Data Evaluation Report on the Acute Toxicity of AE 0317309 02 SE06 A102 to Terrestrial Vascular Plants: Seedling Emergence

PMRA Submission Number 2006-2446 **EPA MRID Number 468019-26**

Data Requirement:
PMRA Data Code: 9.8.4 (TGAI) or 9.8.6 (EP)
EPA DP Barcode: D328639
OECD Data Point: IIA 8.12 (TGAI) and IIIA 10.8.1.1 (EP)
EPA Guideline: 123-1a

Test material: AE 0317309 02 SE06 A102 **Purity:** 4.53% w/w
Common name: AE 0317309 (Pyrasulfotole)
Chemical name: IUPAC: 5-hydroxy-1,3-dimethylpyrazol-4-yl(2-mesyl-4-trifluoromethylphenyl)methanone
CAS name: Not reported
CAS No.: Not reported
Synonyms: Not reported

Primary Reviewer: John Marton
Staff Scientist, Cambridge Environmental Inc.
Signature:
Date: 5/10/06

Secondary Reviewer: Teri S. Myers
Senior Scientist, Cambridge Environmental Inc.
Signature:
Date: 5/30/06

Primary Reviewer: Melissa Panger
EPA
Date: 9/29/06

Secondary Reviewer: J.D. Whall (Officer No. 1268)
PMRA
Date: 11/15/06

Secondary Reviewer: David McAdam
Australian Gvernment Department of the Environment and Heritage (DEH)
Date: 9 Nov 2006

Reference/Submission No.: {.....}

Company Code BCZ
Active Code PSA
Use Site Category: 13, 14
EPA PC Code 000692

Date Evaluation Completed: 11-28-2006

CITATION: Pallet, K and H. Gosch. 2006. Non-target terrestrial plants: Seedling emergence and growth test (Tier 2) Suspo-emulsion: 50+12.5 g/L (Code: AE 0317309 02 SE06 A102). Unpublished study performed by Bayer CropScience GmbH, Frankfurt am Main, Germany. Laboratory study number SE04/006. Study sponsored by Bayer CropScience GmbH, Frankfurt am Main, Germany. Study completed on January 10, 2006.

DISCLAIMER: This document provides guidance for EPA and PMRA reviewers on how to complete a data evaluation record after reviewing a scientific study concerning the acute toxicity of a pesticide to terrestrial vascular plants. It is not intended to prescribe conditions to any external party for conducting this study nor to establish absolute criteria regarding the assessment of whether the study is scientifically sound and whether the study satisfies any applicable data requirements. Reviewers are expected to review and to determine for each study, on a case-by-case basis, whether it is scientifically sound and provides sufficient information to satisfy applicable data requirements. Studies that fail to meet any of the conditions may be accepted, if appropriate; similarly, studies that

meet all of the conditions may be rejected, if appropriate. In sum, the reviewer is to take into account the totality of factors related to the test methodology and results in determining the acceptability of the study.

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EXECUTIVE SUMMARY:

The effect of AE 0317309 02 SE06 A102 (formulation containing the active ingredient AE 0317309; pyrasulfotole) on the seedling emergence of monocot (corn, *Zea mays*; oat, *Avena sativa*; barley, *Hordeum vulgare*; ryegrass, *Lolium perenne*) and dicot (cucumber, *Cucumis sativus*; oilseed rape, *Brassica napus*; soybean, *Glycine max*; sugar beet, *Beta vulgaris*; sunflower, *Helianthus annuus*; tomato, *Lycopersicon esculentum*) crops was studied at varying nominal application rates. AE 0317309 02 SE06 A 102 is proposed for use on selected cereal crops at a one time application rate of 1 L product/ha (or, 50 g a.i./ha). Corn and oat were treated with nominal application rates of 0 (negative control), 0.00311, 0.00622, 0.0125, 0.0249, 0.0498 and 0.0994 lbs ai/A (or 0, 3.5, 7.1, 14.2, 28.3, 56.6 or 113 g a.i./ha). Barley was treated with nominal application rates of 0 (negative control), 0.00156, 0.00311, 0.00622, 0.0125, 0.0249 and 0.0498 lbs ai/A (or, 0, 1.8, 3.5, 7.1, 14.2, 28.3 and 56.6 g a.i./ha). Cucumber, sunflower, soybean, oilseed rape, sugar beet, tomato and ryegrass were treated with nominal application rates of 0 (negative control), 0.000399, 0.000797, 0.00156, 0.00311, 0.00622, 0.0125 and 0.0249 lbs ai/A (or 0, 0.45, 0.89, 1.8, 3.5, 7.1, 14.2 and 28.3 g a.i./ha). The growth medium used in the seedling emergence test was natural soil classified as a silty loam with a pH of 7.4 and an organic carbon content of 1.19%. On Day 21 the surviving plants per pot were recorded and cut at soil level for measuring the plant height and dry weight. Plant height results could not be statistically verified by the reviewer because appropriate replicate data were not provided.

With the exception of soybean, biomass was significantly affected in all dicot species; biomass was not affected in any monocot species. Survival was significantly affected in oilseed rape, sugar beet, sunflower and tomato; survival was not affected in any monocot species or in cucumber and soybean. The % inhibition in seedling emergence in the treated species as compared to the control ranged from -18 to 19%. No monocot species exhibited significant reductions in the two endpoints analyzed (percent survival and dry weight); therefore, the reviewer was unable to identify a most sensitive monocot species. The most sensitive dicot species, based on dry weight, was tomato with an EC_{25} of 0.0011 lbs ai/A (or, 1.23 g a.i./ha) and a NOAEC of 0.000399 lbs ai/A (or, 0.45 g a.i./ha).

Observed phytotoxic effects included chlorosis, necrosis, abnormal growth and growth suspension. None of the species exhibited effects in the negative control group. Ryegrass, oat, barley and soybean did not exhibit any phytotoxic symptoms at any treatment level throughout the definitive test. All other species exhibited phytotoxic effects in one or more treatment levels. For those species exhibiting phytotoxicity, the response appeared to be dose-dependent as the severity and frequency of symptoms increased with increasing application rate.

Maximum Labeled Rate: 1 L product/ha, or 50 g a.i./ha pyrasulfotole

Results Synopsis

Monocot

EC_{05}/IC_{05}: N/A 95% C.I.: N/A
EC_{25}/IC_{25}: N/A 95% C.I.: N/A
EC_{50}/IC_{50}: N/A 95% C.I.: N/A
NOAEC: N/A
Slope: N/A
Std err: N/A
Most sensitive monocot: None
Most sensitive parameter: None

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Dicot

EC_{05}/IC_{05}: 0.00008 lbs ai/A (0.090 g a.i./ha) 95% C.I.: 0.00000081 – 0.0078 lbs ai/A (0.00091 – 8.7 g a.i./ha)
EC_{25}/IC_{25}: 0.0011 lbs ai/A (1.23 g a.i./ha) 95% C.I.: 0.00011-0.011 lbs ai/A (0.123 – 12.3 g a.i./ha)
EC_{50}/IC_{50}: 0.0070 lbs ai/A (7.85 g a.i./ha) 95% C.I.: 0.0018-0.028 lbs ai/A (2.02 – 31.4 g a.i./ha)
NOAEC: 0.000399 lbs ai/A (0.45 g a.i./ha)
Slope: 0.846
Std err: 0.399
Most sensitive dicot: Tomato
Most sensitive parameter: Dry Weight

This toxicity study is classified as **ACCEPTABLE** and satisfies the guideline requirement for a Tier II terrestrial plant seedling emergence toxicity study.

Table 1a. Summary of most sensitive parameters by species (lbs ai/A).

Species	Endpoint	NOAEC	EC_{05}	EC_{25}	EC_{50}
Monocots					
Barley	None	0.0498	ND	>0.0498	>0.0498
Corn	Dry Weight	0.0944	0.038	>0.0944	>0.0944
Oat	None	0.0944	ND	>0.0944	>0.0944
Ryegrass	None	0.0249	ND	>0.0249	>0.0249
Dicots					
Cucumber	Dry Weight	0.00622	0.0046	0.014	>0.0249
Oilseed Rape	Dry Weight	0.00311	0.00098	0.0032	0.0074
Soybean	None	0.0249	>0.0249	>0.0249	>0.0249
Sugar beet	Dry Weight	0.00311	0.0018	0.0051	0.011
Sunflower	Dry Weight	0.00622	0.0038	0.0094	0.018
Tomato	Dry Weight	0.000399	0.00008	0.0011	0.0070

Table 1b. Summary of most sensitive parameters by species (g a.i./ha).

Species	Endpoint	NOAEC	EC_{05}	EC_{25}	EC_{50}
Monocots					
Barley	None	56.6	ND	>56.6	>56.6
Corn	Dry Weight	113.3	42.6	>113.3	>113.3
Oat	None	113.3	ND	>113.3	>113.3
Ryegrass	None	28.3	ND	>28.3	>28.3
Dicots					
Cucumber	Dry Weight	7.1	5.16	15.7	>28.3
Oilseed Rape	Dry Weight	3.5	1.10	3.6	8.3
Soybean	None	28.3	>28.3	>28.3	>28.3
Sugar beet	Dry Weight	3.5	2.02	5.7	12.3
Sunflower	Dry Weight	7.1	4.26	10.5	20.2
Tomato	Dry Weight	0.45	0.090	1.23	7.8

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study followed guidelines outlined in US EPA Pesticide Assessment Guidelines, Sub-division J, Hazard Evaluation, Non-Target Plants , PB83-153940, EPA540/9-82-020, Series 123, Tier 2 of Non-Target Area Testing and OECD, Guideline for the testing of chemicals, Guideline 208, Terrestrial (Non-Target) Plant Test, 208 A, Seedling Emergence and

Seedling Growth Test and 208 B, Vegetative Vigor test. The following deviations were noted:

1. The maximum label rate of the test material was not reported.
2. The physiochemical properties of the test material were not reported.
3. Mean-measured concentrations were not determined. Only the highest application rate was measured for the presence of the active ingredient (AE 0317309).
4. Plant height was not able to be analyzed because replicate mean values were not reported (only the range within each replicate was reported).
5. The LOQ and LOD were not reported.
6. The geographic location, depth of collection, CEC and moisture at 1/3 atm were not reported.
7. All species were tested under the same environmental conditions instead of testing cold-preferring species separately from warm-preferring species.
8. While test containers were bottom-watered for the duration of the study, pots were initially top watered to establish the water column in the soil and to facilitate germination (prior to being treated). It is unclear if loss of test material occurred at this initial watering and what impact this may have had on seed exposure to the test material.
9. The daily range in temperature (15 to 39 °C) and humidity (29 to 96%) were outside the range recommended by EPA (*i.e.*, 20 to 25 °C and 70 to 90%, respectively)

The deviations did not impact on the acceptability of the study.

COMPLIANCE: Signed and dated No Data Confidentiality, GLP and Quality Assurance statements were provided. This study was performed in compliance with the Principles of Good Laboratory Practice, Annex 1 to Chemicals Act of Federal Republic of Germany in the current version [Grundätze der Guten Laborpraxis (GLP), Anhang 1 zum Chemikaliengesetz der Bundesrepublik Deutschland in der aktuellen Fassung] based on the OECD Principles of Good Laboratory Practice as revised in 1997 and adopted November 26th, 1997 by decision of the OECD Council [C(97)186/Final].

A. MATERIALS:

1. Test Material AE 0317309 02 SE06 A102

Description: Light Yellow Milky Liquid

Lot No./Batch No. : 35893-VI (Batch Number)

Purity: 4.53% w/w

Stability of compound under test conditions: Samples of the highest application rate (0.0994 lbs ai/A) were collected and analyzed on Day 0. Percent recoveries were 92.5 and 96.5% of nominal. The other application rates were not analyzed for the presence of the active ingredient AE 0317309. *(OECD recommends chemical stability in water and light)*

Storage conditions of test chemicals: Stored at ambient temperature

Table 2a. Physical/chemical properties of AE 0317309 02 SE06 A102.

Parameter	Values	Comments
Water solubility at 20EC	Not reported	
Vapor pressure	Not reported	
UV absorption	Not reported	
pKa	Not reported	
Kow	Not reported	

Table 2b. Physical/chemical properties of the active ingredient, AE 0317309.

Parameter	Value	Comment
Molecular weight	362.3 g/mol	
Water Solubility (g/L) at 20°C	4.2 at pH 4 69.1 at pH 7 49.0 at pH 9	Very soluble
Vapor Pressure/Volatility	2.7×10^{-7} Pa at 20°C 6.8×10^{-7} Pa at 25°C	Non-volatile
UV Absorption	water $\lambda_{max} = 264$ 0.1M HCl $\lambda_{max} = 241$ 0.1M NaOH $\lambda_{max} = 216$	Not likely to undergo photolysis.
Pka	4.2 ± 0.15	
log K_{ow} at 23°C	0.276 at pH 4 -1.362 at pH 7 -1.58 at pH 9	Not likely to bioaccumulate
Stability of compound at room temperature, if provided		No significant degradation over 12 months at ambient temperatures.

Data obtained from pyrasulfatole chemistry review of Submission 2006-2445.

2. Test organism:

Monocotyledonous species: Barley (*Hordeum vulgare*, Family Poaceae, Baroness), Corn (*Zea mays*, Family Poaceae, Lorenzo), Oat (*Avena sativa*, Family Poaceae, Flämings Nova) and Ryegrass (*Lolium perenne*, Family Poaceae, Deutsches Weidegras); *EPA recommends four monocots in two families, including corn.*

Dicotyledonous species: Cucumber (*Cucumis sativus*, Family Curcubitaceae, Delikatess), Oilseed rape (*Brassica napus*, Family Brassicaceae, Liratop), Soybean (*Glycine max*, Family Fabaceae, Trail), Sugar beet (*Beta vulgaris*, Family Chenopodiaceae, Achat), Sunflower (*Helianthus annuus L.*, Family Asteraceae, Big Smile) and Tomato (*Lycopersicon esculentum*, Family Solanaceae, Balkonstar); *EPA recommends six dicots in four families, including soybean and a root crop.*

OECD recommends a minimum of three species selected for testing, at least one from each of the following categories: Category 1: ryegrass, rice, oat, wheat, and sorghum; Category 2: mustard, rape, radish, turnip, and Chinese cabbage; Category 3: vetch, mung bean, red clover, fenugreek, lettuce, and cress.

Seed source: Seeds were supplied from commercial sources via Bayer CropScience GmbH, Horticulture, H872, 65926 Frankfurt am Main.
Prior seed treatment/sterilization: None
Historical % germination of seed: 80-100% (based on control seedlings)
Seed storage, if any: Seeds were stored in plastic boxes in the refrigerator.

B. STUDY DESIGN:

1. Experimental Conditions

a. Limit test: A limit test was not conducted.

b. Range-finding study: A range-finding study was not conducted

c. Definitive Study

Table 3: Experimental Parameters - Seedling Emergence.

Parameters	Seedling Emergence	
	Details	Remarks *Criteria*
Duration of the test	21 Days	*Recommended test duration is 14-21 days.* *OECD recommends that the test be terminated no sooner than 14 days after 50 percent of the control seedlings have emerged*

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Parameters	Seedling Emergence	
	Details	**Remarks** ***Criteria***
Number of seeds/plants/species/ replicate	5 seeds/pot 8 pots/replicate	*Ten seeds per replicate should be used.* *OECD recommends a minimum of five seeds planted in each replicate within 24 hours of incorporation of the test substance. All seeds of each species for each test should be of the same size class. The seed should not be imbibed.*
Number of replicates Control: Adjuvant control: Treated:	 8 N/A 8	An adjuvant control was not used. There were a total of 40 seeds per treatment level. *Four replicates per dose should be used.* *OECD recommends a minimum of four replicates per treatment*

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Parameters	Seedling Emergence	
	Details	**Remarks** ***Criteria***
Test concentrations (lb ai/A or g ai/ha) Nominal:	Corn and Oat: 0 (negative control), 0.00311, 0.00622, 0.0125, 0.0249, 0.0498 and 0.0944 lbs ai/A or 0 (negative control), 3.5, 7.1, 14.2, 28.3, 56.6 and 113 g a.i./ha.	The proposed use rate AE 0317309 SE06 in Canada and the US is one application per year of 1 L product/ha (or 50 g a.i./ha). Mean-measured concentrations were not determined. Only the highest application rate was measured for the presence of the active ingredient (AE 0317309).
Nominal:	Barley: 0 (negative control), 0.00156, 0.00311, 0.00622, 0.0125, 0.0249 and 0.0498 lbs ai/A or 0 (negative control), 1.8, 3.5, 7.1, 14.2, 28.3 and 56.6 g a.i./ha.	*Five test concentrations should be used with a dose range of 2X or 3X progression* *OECD recommends three concentrations, preferably with application rates equivalent to 0.0 (control), 1.0, 10.0 and 100 mg substance per kg of oven-dried soil.*
Nominal:	Cucumber, Sunflower, Soybean, Oilseed rape, Sugar beet, Tomato and Ryegrass: 0 (negative control), 0.000399, 0.000797, 0.00156, 0.00311, 0.00622, 0.0125 and 0.0249 lbs ai/A or 0 (negative control), 0.45, 0.89, 1.8, 3.5, 7.1, 14.2 and 28.3 g a.i./ha.	
Measured:	Samples of the highest application rate (0.0994 lbs ai/A) were analyzed and yielded percent recoveries of 92.5-96.5% of nominal.	
Method and interval of analytical verification LOQ: LOD:	The highest application rate was analyzed on Day 0 using HPLC. Not reported Not reported	
Adjuvant (type, percentage, if used)	N/A; an adjuvant control was not used	
Test container (pot)		Pots were commercial plastic flower pots (10 cm in diameter).

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Parameters	Seedling Emergence	
	Details	**Remarks**
		Criteria
Size/Volume Material: (glass/polystyrene)	10 cm in diameter Plastic	*Non-porous containers should be used.* *OECD recommends that non-porous plastic or glazed pot be used.*
Growth facility	On-site greenhouse	
Method/depth of seeding	Depth varied with size of seed, i.e. a 5 mm diameter seed was covered with 5 mm of soil, a 3 mm diameter seed with 3 mm of soil. etc	
<u>Test material application</u> Application time including the plant growth stage Number of application Application interval Method of application	 Test material was applied on Day 0 to pre-emerged seeds. 1 N/A; single application Laboratory Track Sprayer	
<u>Details of soil used</u> Geographic location Depth of soil collection Soil texture % sand % silt % clay pH: % organic carbon CEC Moisture at 1/3 atm (%)	 Not reported Not reported Silty loam 14.2% 65.1% 20.7% 7.4 1.19% Not reported Not reported	Soil was supplied locally and was steam pasteurized before use. *Soil mixes containing sandy loam, loam, or clay loam soil with no greater than 2% organic matter are preferable. Glass beads, rock wool, and 100% acid washed sand are not preferred.* *OECD prefers the soil to be sieved (0.5 cm) to remove coarse fragments. Carbon content should not exceed 1.5% (3% organic matter). Fine particles (under 20um) makeup should be between 10 and 20%. The recommended pH is between 5.0 and 7.5.*

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Parameters	Seedling Emergence	
	Details	**Remarks** ***Criteria***
Details of nutrient medium, if used	N/A; a nutrient medium was not used	
<u>Watering regime and schedules</u> Water source/type: Volume applied: Interval of application: Method of application:	 Local tap water Not reported Checked daily Bottom watering	Pots were initially top watered to establish the water column in the soil and to facilitate germination. After that, water was provided via bottom watering as needed in order to have an optimal water supply for plant growth. *EPA prefers that bottom watering be utilized for seedling emergence studies so that the chemical is not leached out of the soil during the test.*
Any pest control method/fertilization, if used	Soil was sterilized via 120 degrees of vapor for about 30 minutes. 2.4 g/L of granular fertilizer (Blaukorn) was added to the soil prior to sowing.	No pest control was reported.
<u>Test conditions</u> Temperature: Photoperiod: Light intensity and quality: Relative humidity:	 Regulated at 23±5°C Day; 18±5°C Night; daily range = 15 to 36°C 16L:8D 6157-23493 lux 29-96%	Minor deviations in temperature occurred for short periods of time when the temperature reached 39°C. Natural daylight was supplemented by artificial lighting to provide the required photoperiod. Regulation of light intensity >10000 lux lamps turn off, >20000 lux shading closing. *EPA prefers that the cold vs warm loving plants be tested in two separate groups to optimize plant growth.* *OECD prefers that the temperature, humidity and light conditions be suitable for maintaining normal growth of each species for the test period.*
<u>Reference chemical (if used)</u> Name: Concentrations:	 N/A N/A	A reference chemical was not used.
Other parameters, if any		

2. Observations:

Table 4: Observation Parameters - Seedling Emergence.

Parameters	Seedling Emergence	
	Details	**Remarks**
Parameters measured (e.g., number of germinated seeds, emerged seedlings, plant height, dry weight or other endpoints)	Emergence, survival, phytotoxicity, growth stage, plant dry weight and length.	
Measurement technique for each parameter	Emergence and survival were determined by visual enumeration. Plant length was determined by measuring the total shoot height (i.e. longest leaf) to the nearest 0.1 cm. Dry weight was determined using a balance and weight to the nearest 0.001 g. Phytotoxicity was determined using a numerical rating system.	
Observation intervals	Emergence, survival and phytotoxicity were determined weekly. Dry weight, plant height and growth stage were determined at test termination (Day 21).	
Other observations, if any	None reported	
Were raw data included?	Raw data for emergence, survival, dry weight and phytotoxicity were included. While replicate data for shoot length were provided, values represented a range, rather than a replicate mean; individual shoot length data were not provided to calculate replicate means.	
Phytotoxicity rating system, if used	Phytotoxicity was described using a percentage, which reflected the extent of the	Any plant considered dead was not rated for phytotoxicity.

Parameters	Seedling Emergence	
	Details	**Remarks**
	symptom. 0%- no injury or effect; 10-20%- slight symptoms throughout the whole plant or more moderate symptoms on a small area; 30-40%- moderate symptoms throughout the whole plant or severe symptoms on a limited area; 50-60%- severe symptoms throughout the whole plant with younger or newly developed leaves growing normally; 70-80%- total plant symptoms with the plant showing poor vigor; 90%- moribund or dying plant	

II. RESULTS and DISCUSSION:

A. INHIBITORY EFFECTS:

1. Seedling Emergence:

None of the monocot species exhibited significant reductions from the negative control for any of the endpoints analyzed (dry weight, shoot height, emergence and survival). Therefore, a most sensitive monocot species could not be identified based on the study authors' results. Soybean was the only dicot species in which no significant reductions were observed. The response of all other dicot species for all analyzed endpoints appeared to dose-dependent. The most sensitive dicot species was tomato, based on dry weight, with NOAEC, EC_{25} and EC_{50} values of 0.00156, 0.00112 and 0.00538 lbs ai/A, respectively.

Observed phytotoxic effects included chlorosis, necrosis, abnormal growth and growth suspension. None of the species exhibited effects in the negative control group. Ryegrass, oat, barley and soybean did not exhibit any phytotoxic symptoms at any treatment level throughout the definitive test. All other species exhibited phytotoxic effects in one or more treatment levels. For those species exhibiting phytotoxicity, the response appeared to be dose-dependent as the severity and frequency of symptoms increased with increasing application rate. Phytotoxicity was described using a percentage, which reflected the extent of the symptom. 0%- no injury or effect; 10-20%- slight symptoms throughout the whole plant or more moderate symptoms on a small area; 30-40%- moderate symptoms throughout the whole plant or severe symptoms on a limited area; 50-60%- severe symptoms throughout the whole plant with younger or newly developed leaves growing normally; 70-80%- total plant symptoms with the plant showing poor vigor; 90%- moribund or dying plant.

B. REPORTED STATISTICS:

The data from all treatment levels were compared to each species' respective negative control. Mortality and dry weight were compared using the ToxRat software for statistical analysis (version 2.09). The study authors did not report analyzing plant height; however, NOAEC and ECx values for plant height were provided by the study authors.

Table 5: Study author-reported effect of AE 0317309 02 SE06 A102 on Seedling Emergence

Species	Results summary for biomass (lbs ai/A)									
	Weight (g)*	NOAEC	EC_{05}	95%CI	EC_{25}	95%CI	EC_{50}	95%CI	slope	std err
Barley	0.355-0.430	0.0498	NR	NR	>0.0498	N/A	>0.0498	N/A	NR	NR
Corn	0.814-0.956	0.0994	NR	NR	>0.0994	N/A	>0.0994	N/A	NR	NR
Oat	0.296-0.334	0.0994	NR	NR	>0.0994	N/A	>0.0994	N/A	NR	NR
Ryegrass	0.032-0.050	0.0249	NR	NR	>0.0249	N/A	>0.0249	N/A	NR	NR
Cucumber	0.391-0.733	0.0125	NR	NR	0.0149	0.0129-0.0167	>0.0249	N/A	NR	NR
Oilseed Rape	0.114-0.601	0.00311	NR	NR	0.00383	>0.0249->0.0249	0.00678	>0.0249->0.0249	NR	NR
Soybean	0.499-0.568	0.0249	NR	NR	>0.0249	N/A	>0.0249	N/A	NR	NR
Sugar beet	0.170-0.356	0.00311	NR	NR	0.00610	0.00108-0.00929	0.0124	0.00821->0.0249	NR	NR
Sunflower	0.123-0.372	0.00622	NR	NR	0.0112	0.00690-0.0141	0.0192	0.0154-0.0258	NR	NR
Tomato	0.028-0.099	0.00156	NR	NR	0.00112	ND	0.00538	ND	NR	NR

* range provided represents the range of the treatment means
N/A- Not applicable
ND- Not determined
NR- Not reported

Table 5a: Study author-reported effect of AE 0317309 02 SE06 A102 on Seedling Emergence

Species	Results summary for height (lbs ai/A)									
	cm*	NOAEC	EC_{05}	95%CI	EC_{25}	95%CI	EC_{50}	95%CI	slope	std err
Barley	40.6-43.9	0.0498	NR	NR	>0.0498	N/A	>0.0498	N/A	NR	NR
Corn	56.9-61.0	0.0994	NR	NR	>0.0994	N/A	>0.0994	N/A	NR	NR
Oat	41.4-44.0	0.0994	NR	NR	>0.0994	N/A	>0.0994	N/A	NR	NR
Ryegrass	16.0-17.5	0.0249	NR	NR	>0.0249	N/A	>0.0249	N/A	NR	NR
Cucumber	16.5-22.0	0.00622	NR	NR	0.0259	0.0192->0.0249	>0.0249	N/A	NR	NR
Oilseed Rape	4.7-19.0	0.00311	NR	NR	0.00367	ND	0.00845	ND	NR	NR
Soybean	21.4-25.8	0.0249	NR	NR	>0.0249	N/A	>0.0249	N/A	NR	NR
Sugar beet	6.2-13.0	0.00311	NR	NR	0.00638	0.00486-0.00757	0.0115	0.00985-0.0144	NR	NR
Sunflower	3.0-11.0	0.00156	NR	NR	0.00753	0.00335-0.0105	0.0139	0.00993-0.0211	NR	NR
Tomato	3.9-6.8	0.000797	NR	NR	0.00327	ND	>0.0249	N/A	NR	NR

* range provided represents the range of the treatment means
N/A- Not applicable
ND- Not determined
NR- Not reported

Table 5b: Study author reported effect of AE 0317309 02 SE06 A102 on Seedling Emergence

Species	Results summary for survival (lbs ai/A)									
	%*	NOAEC	EC_{05}	95%CI	EC_{25}	95%CI	EC_{50}	95%CI	slope	std err
Barley	94.1-100	0.0498	NR	NR	>0.0498	N/A	>0.0498	N/A	NR	NR
Corn	100	0.0994	NR	NR	>0.0994	N/A	>0.0994	N/A	NR	NR
Oat	100	0.0994	NR	NR	>0.0994	N/A	>0.0994	N/A	NR	NR
Ryegrass	98-100	0.0249	NR	NR	>0.0249	N/A	>0.0249	N/A	NR	NR
Cucumber	92.1-100	0.0249	NR	NR	>0.0249	N/A	>0.0249	N/A	NR	NR
Oilseed Rape	22.2-100	0.00622	NR	NR	0.00765	ND	0.0174	ND	NR	NR
Soybean	82.1-96.8	0.0249	NR	NR	>0.0249	N/A	>0.0249	N/A	NR	NR
Sugar beet	3-100	0.00622	NR	NR	0.00562	ND	0.00993	ND	NR	NR
Sunflower	67.5-100	0.0125	NR	NR	0.0277	0.0162->0.0249	>0.0249	N/A	NR	NR
Tomato	0-100	0.00622	NR	NR	0.0083	0.000120-0.0206	0.0129	0.00514->0.0249	NR	NR

* range provided represents the range of the treatment means
N/A- Not applicable
ND- Not determined
NR- Not reported

Study author-reported Day 21 Emergence (%)*											
Control	Barley	Corn	Oat	Ryegrass	Cucumber	Oilseed Rape	Soybean	Sugar beet	Sunflower	Tomato	Adjuvant control
92 (80-100)	81 (75-85)	99 (97.5-100)	91 (85-95)	89 (80-92.5)	89 (85-97.5)	81 (70-90)	89 (77.5-97.5)	92 (82.5-97.5)	95 (92.5-100)	80 (73-95)	N/A

* provide the mean (and range)
The mean and range reported for each species do not include the control values as these were already captured in the "Control" mean (and range) values.

Study author-reported Plant Injury Index*											
Control	Barley	Corn	Oat	Ryegrass	Cucumber	Oilseed rape	Soybean	Sugar beet	Sunflower	Tomato	Adjuvant control
0%	0%	0-20%	0%	0%	0-20%	0-100%	0%	0-100%	0-100%	0-100%	N/A

*0%- no injury or effect; 10-20%- slight symptoms throughout the whole plant or more moderate symptoms on a small area; 30-40%- moderate symptoms throughout the whole plant or severe symptoms on a limited area; 50-60%- severe symptoms throughout the whole plant with younger or newly developed leaves growing normally; 70-80%- total plant symptoms with the plant showing poor vigor; 90%- moribund or dying plant

C. VERIFICATION OF STATISTICAL RESULTS BY THE REVIEWER:

Statistical Method(s): Replicate data for dry weight and percent survival were first tested for the assumptions of ANOVA (normality and homogeneity) for any species that exhibited a ≥5% reduction relative to the negative control. If these assumptions were met, the NOAEC values were determined by comparing the treatment data against the negative control data using the parametric Dunnetts Test (or Bonferonni's T-Test for unequal replicates) and William's Test. If the assumptions of ANOVA were not met, the NOAEC values were determined by comparing the treatment data against the negative control data using the non-parametric Kruskal-Wallis test. All NOAEC values were determined using Toxstat statistical software. Plant height was not able to be analyzed because replicate mean values were not reported (only the range within each replicate was reported). Phytotoxicity was not reported as this is not a quantitative endpoint. The ECx values (with corresponding 95% C.I.) and probit slopes (when applicable) were determined using Nuthatch statistical software. When the % reduction was <5, <25 or <50%, the respective ECx values were determined visually. When 100% mortality was observed in the highest treatment level, these data were excluded from the analyses. All toxicity values were determined using the nominal application rates, which the reviewer converted to lbs ai/A.

Table 6: Reviewer-calculated effect of AE 0317309 02 SE06 A102 on Seedling Emergence

Species	Results summary for biomass (lbs ai/A)									
	g*	NOAEC	EC_{05}	95%CI	EC_{25}	95%CI	EC_{50}	95%CI	slope	std err
Barley	0.355-0.430	0.0498	ND	ND	>0.0498	N/A	>0.0498	N/A	ND	ND
Corn	0.814-0.956	0.0944	0.038	0.0044-0.32	>0.0944	N/A	>0.0944	N/A	1.09	1.11
Oat	0.296-0.334	0.0944	ND	ND	>0.0944	N/A	>0.0944	N/A	ND	ND
Ryegrass	0.032-0.050	0.0249	ND	ND	>0.0249	N/A	>0.0249	N/A	ND	ND
Cucumber	0.391-0.733	0.00622	0.0046	0.0021-0.010	0.014	0.0099-0.019	>0.0249	N/A	2.07	0.513
Oilseed Rape	0.114-0.601	0.00311	0.00098	0.00028-0.0034	0.0032	0.0016-0.0066	0.0074	0.0048-0.011	1.88	0.445
Soybean	0.499-0.568	0.0249	>0.0249	N/A	>0.0249	N/A	>0.0249	N/A	N/A	N/A
Sugar beet	0.170-0.356	0.00311	0.0018	0.00066-0.0049	0.0051	0.0032-0.0081	0.011	0.0078-0.014	2.13	0.607
Sunflower	0.123-0.372	0.00622	0.0038	0.0020-0.0074	0.0094	0.0067-0.013	0.018	0.015-0.022	2.46	0.482
Tomato	0.028-0.099	0.000399	<0.000399	N/A	0.0011	0.00011-0.011	0.0070	0.0018-0.028	0.846	0.399

* range provided represents the range of the treatment means
N/A- Not applicable
ND- Not determined
NR- Not reported

Table 6a: Reviewer-calculated effect of AE 0317309 02 SE06 A102 on Seedling Emergence

Species	Results summary for survival (lbs ai/A)									
	%*	NOAEC	EC_{05}	95%CI	EC_{25}	95%CI	EC_{50}	95%CI	slope	std err
Barley	94.1-100	0.0498	ND	ND	>0.0498	N/A	>0.0498	N/A	ND	ND
Corn	100	0.0944	>0.0944	N/A	>0.0944	N/A	>0.0944	N/A	N/A	N/A
Oat	100	0.0944	>0.0944	N/A	>0.0944	N/A	>0.0944	N/A	N/A	N/A
Ryegrass	98-100	0.0249	>0.0249	N/A	>0.0249	N/A	>0.0249	N/A	N/A	N/A
Cucumber	92.1-100	0.0249	>0.0249	N/A	>0.0249	N/A	>0.0249	N/A	N/A	N/A
Oilseed Rape	22.2-100	0.00156	0.0097	0.0062-0.015	0.014	0.011-0.019	0.018	0.015-0.022	6.01	1.53
Soybean	82.1-96.8	0.0249	ND	ND	>0.0249	N/A	>0.0249	N/A	ND	ND
Sugar beet	3-100	0.00311	0.0051	0.0036-0.0072	0.0079	0.0063-0.0098	0.011	0.0091-0.012	5.18	0.793
Sunflower	67.5-100	0.0125	ND	ND	ND	ND	>0.0249	N/A	ND	ND
Tomato	0-100	0.00311	ND	ND	ND	ND	ND	ND	ND	ND

* range provided represents the range of the treatment means
N/A- Not applicable
ND- Not determined
NR- Not reported

Reviewer-calculated Day 21 Emergence*											
Control	Barley	Corn	Oat	Ryegrass	Cucumber	Oilseed Rape	Soybean	Sugar beet	Sunflower	Tomato	Adjuvant control
92 (80-100)	81 (75-85)	99 (97.5-100)	91 (85-95)	89 (80-92.5)	89 (85-97.5)	81 (70-90)	89 (77.5-97.5)	92 (82.5-97.5)	95 (92.5-100)	80 (73-95)	N/A

* provide the mean (and range)
The mean and range reported for each species do not include the control values as these were already captured in the "Control" mean (and range) values.

Reviewer-calculated Plant Injury Index*											
Control	Barley	Corn	Oat	Ryegrass	Cucumber	Oilseed rape	Soybean	Sugar beet	Sunflower	Tomato	Adjuvant control
0%	0%	0-20%	0%	0%	0-20%	0-100%	0%	0-100%	0-100%	0-100%	N/A

*0%- no injury or effect; 10-20%- slight symptoms throughout the whole plant or more moderate symptoms on a small area; 30-40%- moderate symptoms throughout the whole plant or severe symptoms on a limited area; 50-60%- severe symptoms throughout the whole plant with younger or newly developed leaves growing normally; 70-80%- total plant symptoms with the plant showing poor vigor; 90%- moribund or dying plant

Monocot

EC_{05}/IC_{05}: N/A 95% C.I.: N/A
EC_{25}/IC_{25}: N/A 95% C.I.: N/A
EC_{50}/IC_{50}: N/A 95% C.I.: N/A
NOAEC: N/A
Slope: N/A
Std err: N/A
Most sensitive monocot: None
Most sensitive parameter: None

Dicot

EC_{05}/IC_{05}: 0.00008 lbs ai/A 95% C.I.: 0.00000081 – 0.0078 lbs ai/A
EC_{25}/IC_{25}: 0.0011 lbs ai/A 95% C.I.: 0.00011-0.011 lbs ai/A
EC_{50}/IC_{50}: 0.0070 lbs ai/A 95% C.I.: 0.0018-0.028 lbs ai/A
NOAEC: 0.000399 lbs ai/A
Slope: 0.846
Std err: 0.399
Most sensitive dicot: Tomato
Most sensitive parameter: Dry Weight

D. STUDY DEFICIENCIES:

The reviewers were unable to statistically analyze plant height because the study authors only reported the range of values within each replicate and the treatment mean; no replicate mean values were reported. Additionally, the study authors report that only the highest application rate was analytically verified for the presence of the material. Percent recoveries were 92.5 and 96.5% of nominal. Because only the highest application rate was analytically verified and not all species received the same range of doses, the reviewer did not use the one mean-measured application in the statistical analyses.

E. REVIEWERS' COMMENTS:

The reviewers' conclusions agreed with the study authors', in that tomato was the most sensitive species based on dry weight; the reviewers' EC_{25} estimate for this endpoint was identical to the study authors'. In general, the reviewers' statistical analysis provided more reliable 95% confidence intervals, EC_{05} values and probit slopes (when applicable); therefore, the reviewers' results for the most sensitive species are provided in the Executive Summary and Conclusions sections of this DER.

The percent inhibitions for ryegrass dry weight were 7, 33, 15, 15, -1 and -5% at the nominal 0.000399, 0.000797, 0.00156, 0.00622, 0.0125 and 0.0249 lbs ai/A treatment levels, respectively, relative to the negative control. Because the response was non-linear and did not appear to be dose-dependent, the reviewers agree with

the statistical output that the NOAEC value is 0.0249 lbs ai/A. The reviewers' statistical software was unable to determine ECx values for ryegrass dry weight; however, because the response was not dose-dependent and positive growth was associated with the two highest application rates (0.0125 and 0.0249 lbs ai/A), the reviewers visually determined the EC_{25} value to be >0.0249 lbs ai/A.

The NOAEC value for tomato dry weight was visually determined to be 0.000399 lbs ai/A. The reviewers' statistical analysis of tomato dry weight yielded a NOAEC value of 0.00156 lbs ai/A; however, the reviewers felt that ≥19% reduction at the nominal 0.000797-0.0125 lbs ai/A treatment levels, relative to the negative control were significant reductions because of the apparent dose-dependent response.

The NOAEC value for oilseed rape survival was visually determined to be 0.00156 lbs ai/A due to the ≥11% reductions at the nominal 0.00311-0.0249 lbs ai/A treatment levels, relative to the negative control. The NOAEC value for sugar beet survival was visually determined to be 0.00311 lbs ai/A due to the ≥15% reductions at the nominal 0.00622-0.0249 lbs ai/A treatment levels, relative to the negative control.

Percent reductions in tomato survival were 0, 0, 0, 8, 12, 27 and 100% relative to the negative control at the nominal 0.000399, 0.000797, 0.00156, 0.00311, 0.00622, 0.0125 and 0.0249 lbs ai/A treatment levels, respectively. The PMRA reviewer-calculated EC_{25} and EC_{50} values using ICp linear interpolation model (Nordberg-King model) were 9.94 g a.i./ha (95% CI: 1.67 – 15.375 g a.i./ha), and 16.8 g a.i./ha (95% CI: 12.3 – 19.1 g a.i./ha), respectively. These values are nearly identical to those reported by the study author: EC_{25} 9.94 g a.i./ha (95% CI: 0.14 – 23.5 g a.i./ha and EC_{50} 14.7 g a.i./ha (95% CI: 5.85 - >28.3 g a.i./ha).

The reviewers' analysis for sunflower survival was unable to determine EC_{05} and EC_{25} values due to the non-linearity of the dose-response relationship. Percent reductions in sunflower percent survival were 0, 3, -3, 3, -3, -3 and 31%, relative to the negative control, at the nominal 0.000399, 0.000797, 0.00156, 0.00311, 0.00622, 0.0125 and 0.0249 lbs ai/A treatment levels, respectively. Based on the observed reductions, the reviewers visually determined the NOAEC value for sunflower percent survival to be 0.0125 lbs ai/A.

The reviewers were unable to statistically analyze plant height because the study authors only reported the range of values within each replicate and the treatment mean; no replicate mean values were reported. Based on the treatment mean values, the reviewers were able to calculate the percent reductions at each treatment level, relative to the negative control, for each species. No monocot species exhibited reductions in plant height of ≥9%, relative to each species' negative control. Cucumber and soybean were the only dicot species that did not exhibit reductions in plant height of ≥25%, relative to the negative control; however, cucumber exhibited a reduction of 22.5% at the highest application rate for cucumber (0.0249 lbs ai/A). All other dicot species exhibited dose-dependent responses in plant height relative to the negative control.

Due to high mortality, the highest treatment level for sugar beet and tomato (0.0249 lbs ai/A for both) was not included in the analysis for dry weight.

With the exception of tomato, no monocot or dicot species exhibited dose-dependent reductions in percent emergence at any treatment level, relative to the respective negative control. Oat exhibited the greatest percent reduction in percent emergence relative to the negative control (13%); however, this reduction occurred at the second to lowest nominal application rate (0.00622 lbs ai/A) and was not considered to be dose-dependent. Also, the lack of significant reductions in percent survival for all monocots and dicots (with the exception of tomato) indicates a lack of sensitivity to the test material. Reductions in tomato percent emergence relative to the negative control were 14, -6, 19, 11, 0, 19 and 19% at the nominal 0.000399, 0.000797, 0.00156, 0.00311, 0.00622, 0.0125 and 0.0249 lbs ai/A treatment levels, respectively. Although the response of emergence was not linear, only two treatment levels exhibited reductions <10% relative to the negative control (0.000797 and 0.00622 lbs ai/A); therefore, the reviewer feels that tomato emergence is somewhat sensitive to the test material.

The study authors report that only the highest application rate was analytically verified for the presence of the material. Percent recoveries were 92.5 and 96.5% of nominal. Because only the highest application rate was analytically verified and not all species received the same range of doses, the reviewer did not use the one mean-measured application in the statistical analyses.

Plant height was not able to be analyzed because replicate mean values were not reported (only the range within each replicate was reported).

All species were tested under the same environmental conditions instead of testing cold-preferring species separately from warm-preferring species. The less-than-optimal environmental conditions could have had a synergistic effect with the test material, potentially confounding the observed results which are attributed entirely to the exposure of the test material.

The test material, AE 0317309 02 SE06 A102, was a formulation containing the active ingredients AE 0317309 (purity of 4.53% w/w) and AE F107892 (purity of 1.17% w/w). The reviewers corrected all nominal application rates for the purity of AE 0317309 and converted these rates into lbs ai/A and g ai/ha.

Cucumber, sunflower, soybean, oilseed rape, sugar beet, tomato and ryegrass were treated at a maximum nominal application rate of 28 g a.i./ha which is less than the proposed rate of 50 g a.i./ha. Of these species tested, ryegrass had no effects seen up to the highest treatment level. Therefore, there is uncertainty as to the potential effects on ryegrass at the proposed use rate. However, pyrasulfotole showed no adverse effects on the other monocot species at rates up to 113 g a.i./ha. The EPA, PMRA, and DEH will not require a new study on these species at the proposed use rate as the most sensitive species for use in the risk assessment, tomato, had an EC_{25} well below the proposed rate (*i.e,*. 0.0011 lb a.i./A; 1.24 g. a.i./ha).

The dates of experimental work for the definitive seedling emergence study were April 30-July 28, 2004.

F. CONCLUSIONS:

This study is considered **ACCEPTABLE**. No monocot species exhibited any significant reductions in any endpoint analyzed relative to each species' negative control. The most sensitive dicot was tomato, based on dry weight, with NOAEC and EC_{25} values of 0.000399 and 0.0011 lbs ai/A (or, 0.45 and 1.24 g a.i./ha pyrasulfotole), respectively.

Most sensitive monocot and EC_{25}: N/A; No monocot species exhibited significant reductions in any endpoints analyzed
Most sensitive dicot and EC_{25}: Tomato (Dry Weight), 0.0011 lbs ai/A (or, 1.24 g a.i./ha)

III. REFERENCES:

BBA (Mai 2000): EPPO Standard PP 1/135 (2), Phytotoxicity Assessment.

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Chemikaliengesetz der Bundesrepublik Deutschland (ChemG), Anhang 1. in der Fassung der Bekanntmachung vom 20.03.2002 (BGBI. I S. 2090).

Holst, R.W. and Ellwanger, T.C. 1982. Pesticide Assessment Guidelines, Sub-division J, Hazard Evaluation: Non Target Plants, PB83-153940; EPA540/9-82-020; Series 123; Tier 2 of Non-target Area Testing; §123-1, US EPA, Washington, DC.

Norberg-King, T. 1993. National Effluent Toxicity Assessment Center Technical Report 03-93. A linear interpolation method for sublethal toxicity: The inhibition concentration (ICp) approach. Version 2.0. Environmental Protection Agency, Environmental Research Laboratory – Duluth, MN 55804.

OECD (Draft Document July 2000): Guideline for the testing of chemicals, Proposal for updating Guideline 208 "Terrestrial (Non-Target) Plant Test: 208A: Seedling Emergence and Seedling Growth Test. 208B: Vegetative Vigor Test."

THE OECD PRINCIPLES OF GOOD LABORATORY PRACTICE, adopted by Council on 26th November 1997 [C(97)186/Final]. Environmental Directorate, Organization for Economic Co-operation and Development, Paris 1998.

Ratte. M. ToxRat Professional 2.09: ToxRat Solutions GmbH, Naheweg 15, 52477 Alsdorf.

APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

Barley dry weight (g), Day 21; lbs ai/A
File: 1926bw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.032	0.005	0.625
Within (Error)	49	0.388	0.008	
Total	55	0.420		

Critical F value = 2.34 (0.05,6,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

Barley dry weight (g), Day 21; lbs ai/A
File: 1926bw Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	0.422	0.422		
2	0.00156	0.412	0.412	0.221	
3	0.00311	0.386	0.386	0.816	
4	0.00622	0.356	0.356	1.493	
5	0.0125	0.404	0.404	0.416	
6	0.0249	0.383	0.383	0.889	
7	0.0498	0.430	0.430	-0.165	

Dunnett table value = 2.37 (1 Tailed Value, P=0.05, df=40,6)

Barley dry weight (g), Day 21; lbs ai/A
File: 1926bw Transform: NO TRANSFORMATION

DUNNETTS 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	neg control	8			
2	0.00156	8	0.106	25.1	0.010
3	0.00311	8	0.106	25.1	0.037
4	0.00622	8	0.106	25.1	0.067
5	0.0125	8	0.106	25.1	0.019
6	0.0249	8	0.106	25.1	0.040
7	0.0498	8	0.106	25.1	-0.007

Barley dry weight (g), Day 21; lbs ai/A
File: 1926bw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	0.422	0.422	0.394
2	0.00156	8	0.412	0.412	0.394
3	0.00311	8	0.386	0.386	0.394
4	0.00622	8	0.356	0.356	0.394
5	0.0125	8	0.404	0.404	0.394
6	0.0249	8	0.383	0.383	0.394
7	0.0498	8	0.430	0.430	0.430

Barley dry weight (g), Day 21; lbs ai/A
File: 1926bw 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
neg control	0.394				
0.00156	0.394	0.642		1.68	k= 1, v=49
0.00311	0.394	0.642		1.76	k= 2, v=49
0.00622	0.394	0.642		1.79	k= 3, v=49
0.0125	0.394	0.642		1.80	k= 4, v=49
0.0249	0.394	0.642		1.80	k= 5, v=49
0.0498	**0.430**	**0.166**		**1.81**	**k= 6, v=49**

s = 0.089
Note: df used for table values are approximate when v > 20.

Barley % survival, Day 21; lbs ai/A
File: 1926bs Transform: NO TRANSFORMATION

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	neg control	100.000	100.000	248.000
2	0.00156	93.375	93.375	191.500
3	0.00311	95.875	95.875	218.500
4	0.00622	100.000	100.000	248.000
5	0.0125	97.500	97.500	221.000
6	0.0249	97.500	97.500	221.000
7	**0.0498**	**100.000**	**100.000**	**248.000**

Calculated H Value = 1.190 Critical H Value Table = 12.590
Since Calc H < Crit H FAIL TO REJECT Ho:All groups are equal.

Barley % survival, Day 21; lbs ai/A
File: 1926bs Transform: NO TRANSFORMATION

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP 0 2	0 3	0 5	0 6	0 1	0 4	0 7
2	0.00156	93.375	93.375	\						
3	0.00311	95.875	95.875	.	\					
5	0.0125	97.500	97.500	.	.	\				
6	0.0249	97.500	97.500	.	.	.	\			
1	neg control	100.000	100.000	.	.	.	.	\		
4	0.00622	100.000	100.000	.	.	.	.	.	\	
7	**0.0498**	**100.000**	**100.000**	**.**	**.**	**.**	**.**	**.**	**.**	****

* = significant difference (p=0.05) . = no significant difference
Table q value (0.05,7) = 3.038 SE = 8.118

Corn dry weight (g), Day 21; lbs ai/A
File: 1926cw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.151	0.025	1.667
Within (Error)	49	0.712	0.015	
Total	55	0.864		

Critical F value = 2.34 (0.05,6,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

Corn dry weight (g), Day 21; lbs ai/A
File: 1926cw Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	0.905	0.905		
2	0.00311	0.934	0.934	-0.469	
3	0.00622	0.914	0.914	-0.145	
4	0.0125	0.848	0.848	0.927	
5	0.0249	0.956	0.956	-0.823	
6	0.0498	0.814	0.814	1.490	
7	0.0944	0.822	0.822	1.351	

Dunnett table value = 2.37 (1 Tailed Value, P=0.05, df=40,6)

Corn dry weight (g), Day 21; lbs ai/A
File: 1926cw Transform: NO TRANSFORMATION

DUNNETTS 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	neg control	8			
2	0.00311	8	0.145	16.0	-0.029
3	0.00622	8	0.145	16.0	-0.009
4	0.0125	8	0.145	16.0	0.057
5	0.0249	8	0.145	16.0	-0.050
6	0.0498	8	0.145	16.0	0.091
7	0.0944	8	0.145	16.0	0.083

Corn dry weight (g), Day 21; lbs ai/A
File: 1926cw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	0.905	0.905	0.920
2	0.00311	8	0.934	0.934	0.920
3	0.00622	8	0.914	0.914	0.914
4	0.0125	8	0.848	0.848	0.902
5	0.0249	8	0.956	0.956	0.902
6	0.0498	8	0.814	0.814	0.818
7	0.0944	8	0.822	0.822	0.818

Corn dry weight (g), Day 21; lbs ai/A
File: 1926cw 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
neg control	0.920				
0.00311	0.920	0.238		1.68	k= 1, v=49
0.00622	0.914	0.147		1.76	k= 2, v=49
0.0125	0.902	0.053		1.79	k= 3, v=49
0.0249	0.902	0.053		1.80	k= 4, v=49
0.0498	0.818	1.443		1.80	k= 5, v=49
0.0944	**0.818**	**1.443**		**1.81**	**k= 6, v=49**

s = 0.121
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	**0.038**	**0.0044**	**0.32**	**0.47**	**0.12**
EC10	0.081	0.027	0.25	0.24	0.33
EC25	**0.29**	**0.022**	**3.9**	**0.56**	**0.076**
EC50	**1.2**	**0.0057**	**2.6E+02**	**1.2**	**0.0046**

Slope = 1.09 Std.Err. = 1.11

Goodness of fit: p = 0.25 based on DF= 4.0 49.

1926CW : Corn dry weight (g), Day 21; lbs ai/A

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	0.905	0.915	-0.0102	100.	0.00
0.00311	8.00	0.934	0.913	0.0207	99.8	0.236
0.00622	8.00	0.914	0.910	0.00435	99.4	0.624
0.0125	8.00	0.848	0.902	-0.0532	98.5	1.51
0.0249	8.00	0.956	0.885	0.0701	96.7	3.27
0.0498	8.00	0.814	0.856	-0.0420	93.5	6.50
0.0944	8.00	0.822	0.812	0.0103	88.7	11.3

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

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

Oat dry weight (g), Day 21; lbs ai/A
File: 1926ow Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.009	0.002	2.000
Within (Error)	49	0.065	0.001	
Total	55	0.074		

Critical F value = 2.34 (0.05,6,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

Oat dry weight (g), Day 21; lbs ai/A
File: 1926ow Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	0.312	0.312		
2	0.00311	0.296	0.296	1.020	
3	0.00622	0.299	0.299	0.830	
4	0.0125	0.334	0.334	-1.376	
5	0.0249	0.302	0.302	0.640	
6	0.0498	0.314	0.314	-0.111	
7	0.0944	0.323	0.323	-0.696	

Dunnett table value = 2.37 (1 Tailed Value, P=0.05, df=40,6)

Oat dry weight (g), Day 21; lbs ai/A
File: 1926ow Transform: NO TRANSFORMATION

DUNNETTS 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	neg control	8			
2	0.00311	8	0.037	12.0	0.016
3	0.00622	8	0.037	12.0	0.013
4	0.0125	8	0.037	12.0	-0.022
5	0.0249	8	0.037	12.0	0.010
6	0.0498	8	0.037	12.0	-0.002
7	0.0944	8	0.037	12.0	-0.011

Oat dry weight (g), Day 21; lbs ai/A
File: 1926ow Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	0.312	0.312	0.302
2	0.00311	8	0.296	0.296	0.302
3	0.00622	8	0.299	0.299	0.302
4	0.0125	8	0.334	0.334	0.316
5	0.0249	8	0.302	0.302	0.316
6	0.0498	8	0.314	0.314	0.316
7	0.0944	8	0.323	0.323	0.323

Oat dry weight (g), Day 21; lbs ai/A
File: 1926ow 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
neg control	0.302				
0.00311	0.302	0.537		1.68	k= 1, v=49
0.00622	0.302	0.537		1.76	k= 2, v=49
0.0125	0.316	0.245		1.79	k= 3, v=49
0.0249	0.316	0.245		1.80	k= 4, v=49
0.0498	0.316	0.245		1.80	k= 5, v=49
0.0944	**0.323**	**0.606**		**1.81**	**k= 6, v=49**

s = 0.036
Note: df used for table values are approximate when v > 20.

Ryegrass dry weight (g), Day 21; lbs ai/A
File: 1926rw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F

Between	6	0.0019	0.0003	3.000
Within (Error)	49	0.0061	0.0001	
Total	55	0.0080		

Critical F value = 2.34 (0.05,6,40)
Since F > Critical F REJECT Ho:All groups equal

Ryegrass dry weight (g), Day 21; lbs ai/A
File: 1926rw Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	0.048	0.048		
2	0.000399	0.044	0.044	0.675	
3	0.000797	0.032	0.032	3.150	*
4	0.00156	0.041	0.041	1.425	
5	0.00622	0.040	0.040	1.475	
6	0.0125	0.048	0.048	-0.075	
7	0.0249	0.050	0.050	-0.500	

Dunnett table value = 2.37 (1 Tailed Value, P=0.05, df=40,6)

Ryegrass dry weight (g), Day 21; lbs ai/A
File: 1926rw Transform: NO TRANSFORMATION

DUNNETTS 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	neg control	8			
2	0.000399	8	0.012	24.8	0.003
3	0.000797	8	0.012	24.8	0.016
4	0.00156	8	0.012	24.8	0.007
5	0.00622	8	0.012	24.8	0.007
6	0.0125	8	0.012	24.8	-0.000
7	0.0249	8	0.012	24.8	-0.002

Ryegrass dry weight (g), Day 21; lbs ai/A
File: 1926rw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	0.048	0.048	0.041
2	0.000399	8	0.044	0.044	0.041
3	0.000797	8	0.032	0.032	0.041
4	0.00156	8	0.041	0.041	0.041

5	0.00622	8	0.040	0.040	0.041
6	0.0125	8	0.048	0.048	0.048
7	0.0249	8	0.050	0.050	0.050

Ryegrass dry weight (g), Day 21; lbs ai/A
File: 1926rw 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
neg control	0.041				
0.000399	0.041	1.228		1.68	k= 1, v=49
0.000797	0.041	1.228		1.76	k= 2, v=49
0.00156	0.041	1.228		1.79	k= 3, v=49
0.00622	0.041	1.228		1.80	k= 4, v=49
0.0125	0.048	0.068		1.80	k= 5, v=49
0.0249	**0.050**	**0.456**		**1.81**	**k= 6, v=49**

s = 0.011
Note: df used for table values are approximate when v > 20.

Cucumber dry weight (g), Day 21; lbs ai/A
File: 1926uw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	7	0.771	0.110	8.462
Within (Error)	56	0.728	0.013	
Total	63	1.498		

Critical F value = 2.25 (0.05,7,40)
Since F > Critical F REJECT Ho:All groups equal

Cucumber dry weight (g), Day 21; lbs ai/A
File: 1926uw Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	0.696	0.696		
2	0.000399	0.718	0.718	-0.392	
3	0.000797	0.715	0.715	-0.338	
4	0.00156	0.713	0.713	-0.314	
5	0.00311	0.734	0.734	-0.667	
6	0.00622	0.619	0.619	1.344	
7	0.0125	0.568	0.568	2.236	
8	0.0249	0.391	0.391	5.341	*

Dunnett table value = 2.42 (1 Tailed Value, P=0.05, df=40,7)

Cucumber dry weight (g), Day 21; lbs ai/A
File: 1926uw Transform: NO TRANSFORMATION

DUNNETTS 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	neg control	8			
2	0.000399	8	0.138	19.8	-0.022
3	0.000797	8	0.138	19.8	-0.019
4	0.00156	8	0.138	19.8	-0.018
5	0.00311	8	0.138	19.8	-0.038
6	0.00622	8	0.138	19.8	0.077
7	0.0125	8	0.138	19.8	0.127
8	0.0249	8	0.138	19.8	0.305

Cucumber dry weight (g), Day 21; lbs ai/A
File: 1926uw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	0.696	0.696	0.715
2	0.000399	8	0.718	0.718	0.715
3	0.000797	8	0.715	0.715	0.715
4	0.00156	8	0.713	0.713	0.715
5	0.00311	8	0.734	0.734	0.715
6	0.00622	8	0.619	0.619	0.619
7	0.0125	8	0.568	0.568	0.568
8	0.0249	8	0.391	0.391	0.391

Cucumber dry weight (g), Day 21; lbs ai/A
File: 1926uw 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
neg control	0.715				
0.000399	0.715	0.342		1.68	k= 1, v=56
0.000797	0.715	0.342		1.76	k= 2, v=56
0.00156	0.715	0.342		1.79	k= 3, v=56
0.00311	0.715	0.342		1.80	k= 4, v=56
0.00622	**0.619**	**1.345**		**1.80**	**k= 5, v=56**
0.0125	0.568	2.237	*	1.81	k= 6, v=56
0.0249	0.391	5.343	*	1.81	k= 7, v=56

s = 0.114
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	**0.0046**	**0.0021**	**0.010**	**0.17**	**0.46**
EC10	0.0069	0.0038	0.013	0.13	0.55
EC25	**0.014**	**0.0099**	**0.019**	**0.069**	**0.73**
EC50	**0.029**	**0.022**	**0.038**	**0.059**	**0.76**

Slope = 2.07 Std.Err. = 0.513

Goodness of fit: p = 0.86 based on DF= 5.0 56.

1926UW : Cucumber dry weight (g), Day 21; lbs ai/A

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	0.696	0.714	-0.0189	100.	0.00
0.000399	8.00	0.718	0.714	0.00353	100.	0.00585
0.000797	8.00	0.715	0.714	0.000803	99.9	0.0621
0.00156	8.00	0.713	0.711	0.00209	99.6	0.434
0.00311	8.00	0.733	0.698	0.0353	97.7	2.26
0.00622	8.00	0.619	0.654	-0.0355	91.6	8.40
0.0125	8.00	0.568	0.552	0.0156	77.3	22.7
0.0249	8.00	0.391	0.394	-0.00286	55.1	44.9

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

Oilseed rape dry weight (g), Day 21; lbs ai/A
File: 1926dw Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	7	1.899	0.271	15.941
Within (Error)	50	0.861	0.017	
Total	57	2.760		

Critical F value = 2.25 (0.05,7,40)
Since F > Critical F REJECT Ho:All groups equal

Oilseed rape dry weight (g), Day 21; lbs ai/A
File: 1926dw Transform: NO TRANSFORM

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	0.596	0.596		

2	0.000399	0.596	0.596	0.004	
3	0.000797	0.583	0.583	0.196	
4	0.00156	0.601	0.601	-0.082	
5	0.00311	0.569	0.569	0.422	
6	0.00622	0.201	0.201	5.849	*
7	0.0125	0.229	0.229	5.633	*
8	0.0249	0.125	0.125	5.332	*

Bonferroni T table value = 2.54 (1 Tailed Value, P=0.05, df=50,7)

Oilseed rape dry weight (g), Day 21; lbs ai/A
File: 1926dw Transform: NO TRANSFORM

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	neg control	8			
2	0.000399	8	0.166	27.8	0.000
3	0.000797	8	0.166	27.8	0.013
4	0.00156	8	0.166	27.8	-0.005
5	0.00311	8	0.166	27.8	0.027
6	0.00622	7	0.171	28.7	0.395
7	0.0125	8	0.166	27.8	0.367
8	0.0249	3	0.224	37.6	0.471

Oilseed rape dry weight (g), Day 21; lbs ai/A
File: 1926dw Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	0.596	0.596	0.596
2	0.000399	8	0.596	0.596	0.596
3	0.000797	8	0.583	0.583	0.592
4	0.00156	8	0.601	0.601	0.592
5	0.00311	8	0.569	0.569	0.569
6	0.00622	7	0.201	0.201	0.216
7	0.0125	8	0.229	0.229	0.216
8	0.0249	3	0.125	0.125	0.125

Oilseed rape dry weight (g), Day 21; lbs ai/A
File: 1926dw Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	0.596				
0.000399	0.596	0.004		1.68	k= 1, v=50
0.000797	0.592	0.056		1.76	k= 2, v=50

0.00156	0.592	0.056		1.79	k= 3, v=50
0.00311	**0.569**	**0.419**		**1.80**	**k= 4, v=50**
0.00622	0.216	5.598	*	1.80	k= 5, v=50
0.0125	0.216	5.794	*	1.81	k= 6, v=50
0.0249	0.125	5.299	*	1.81	k= 7, v=50

s = 0.131
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	**0.00098**	**0.00028**	**0.0034**	**0.27**	**0.29**
EC10	0.0015	0.00054	0.0043	0.23	0.35
EC25	**0.0032**	**0.0016**	**0.0066**	**0.16**	**0.49**
EC50	**0.0074**	**0.0048**	**0.011**	**0.093**	**0.65**

Slope = 1.88 Std.Err. = 0.445

Goodness of fit: p = 0.054 based on DF= 5.0 50.

1926DW : Oilseed rape dry weight (g), Day 21; lbs ai/A

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	0.596	0.619	-0.0225	100.	0.00
0.000399	8.00	0.596	0.613	-0.0174	99.1	0.869
0.000797	8.00	0.583	0.597	-0.0137	96.5	3.48
0.00156	8.00	0.601	0.555	0.0464	89.7	10.3
0.00311	8.00	0.569	0.470	0.0990	75.9	24.1
0.00622	7.00	0.201	0.343	-0.142	55.5	44.5
0.0125	8.00	0.229	0.206	0.0228	33.3	66.7
0.0249	3.00	0.125	0.0991	0.0263	16.0	84.0

Oilseed rape % survival, Day 21; lbs ai/A
File: 1926ds Transform: NO TRANSFORMATION

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	neg control	100.000	100.000	336.000
2	0.000399	97.500	97.500	312.000
3	0.000797	100.000	100.000	336.000
4	**0.00156**	**100.000**	**100.000**	**336.000**
5	0.00311	89.375	89.375	274.500
6	0.00622	81.875	81.875	246.000
7	0.0125	80.500	80.500	187.500
8	0.0249	20.000	20.000	52.000

Calculated H Value = 0.061 Critical H Value Table = 14.070
Since Calc H < Crit H FAIL TO REJECT Ho:All groups are equal.

Oilseed rape % survival, Day 21; lbs ai/A
File: 1926ds Transform: NO TRANSFORMATION

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP 0 0 0 0 0 0 0 0 8 7 6 5 2 3 4 1
8		0.0249	20.000	\
7		0.0125	80.500	. \
6		0.00622	81.875	. . \
5		0.00311	89.375	* . . \
2		0.000399	97.500	* . . . \
3		0.000797	100.000	* . . . . \
4		0.00156	100.000	* . . . . . \
1	neg control		100.000	* . . . . . \

* = significant difference (p=0.05) . = no significant difference
Table q value (0.05,8) = 3.124 SE = 8.838

Estimates of EC%

Parameter	Estimate	95% Bounds Lower	Upper	Std.Err.	Lower Bound /Estimate
EC5	**0.0097**	**0.0062**	**0.015**	**0.099**	**0.64**
EC10	0.011	0.0076	0.016	0.084	0.68
EC25	**0.014**	**0.011**	**0.019**	**0.060**	**0.76**
EC50	**0.018**	**0.015**	**0.022**	**0.037**	**0.84**

Slope = 6.01 Std.Err. = 1.53

Goodness of fit: p = 0.76 based on DF= 5.0 56.

1926DS : Oilseed rape % survival, Day 21; lbs ai/A

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	100.	94.9	5.06	100.	0.00
0.000399	8.00	97.5	94.9	2.56	100.	1.50e-14
0.000797	8.00	100.	94.9	5.06	100.	1.50e-14
0.00156	8.00	100.	94.9	5.06	100.	6.58e-09
0.00311	8.00	89.4	94.9	-5.56	100.	0.000187
0.00622	8.00	81.9	94.7	-12.8	99.8	0.242
0.0125	8.00	80.5	79.8	0.708	84.0	16.0
0.0249	8.00	20.0	20.1	-0.0760	21.1	78.9

Soybean % survival, Day 21; lbs ai/A
File: 1926ss Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	7	1392.859	198.980	1.053

Within (Error)	56	10585.375	189.025
Total	63	11978.234	

Critical F value = 2.25 (0.05,7,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

Soybean % survival, Day 21; lbs ai/A
File: 1926ss Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	90.875	90.875		
2	0.000399	89.375	89.375	0.218	
3	0.000797	94.375	94.375	-0.509	
4	0.00156	82.500	82.500	1.218	
5	0.00311	97.500	97.500	-0.964	
6	0.00622	85.625	85.625	0.764	
7	0.0125	95.000	95.000	-0.600	
8	0.0249	91.875	91.875	-0.145	

Dunnett table value = 2.42 (1 Tailed Value, P=0.05, df=40,7)

Soybean % survival, Day 21; lbs ai/A
File: 1926ss Transform: NO TRANSFORMATION

DUNNETTS 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	neg control	8			
2	0.000399	8	16.636	18.3	1.500
3	0.000797	8	16.636	18.3	-3.500
4	0.00156	8	16.636	18.3	8.375
5	0.00311	8	16.636	18.3	-6.625
6	0.00622	8	16.636	18.3	5.250
7	0.0125	8	16.636	18.3	-4.125
8	0.0249	8	16.636	18.3	-1.000

Soybean % survival, Day 21; lbs ai/A
File: 1926ss Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	90.875	90.875	89.281
2	0.000399	8	89.375	89.375	89.281
3	0.000797	8	94.375	94.375	89.281
4	0.00156	8	82.500	82.500	89.281
5	0.00311	8	97.500	97.500	91.563

6	0.00622	8	85.625	85.625	91.563
7	0.0125	8	95.000	95.000	93.438
8	0.0249	8	91.875	91.875	93.438

Soybean % survival, Day 21; lbs ai/A
File: 1926ss 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
neg control	89.281				
0.000399	89.281	0.232		1.68	k= 1, v=56
0.000797	89.281	0.232		1.76	k= 2, v=56
0.00156	89.281	0.232		1.79	k= 3, v=56
0.00311	91.563	0.100		1.80	k= 4, v=56
0.00622	91.563	0.100		1.80	k= 5, v=56
0.0125	93.438	0.373		1.81	k= 6, v=56
0.0249	**93.438**	**0.373**		**1.81**	**k= 7, v=56**

s = 13.749
Note: df used for table values are approximate when v > 20.

Sugar beet dry weight (g), Day 21; lbs ai/A
File: 1926gw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.233	0.039	9.750
Within (Error)	46	0.181	0.004	
Total	52	0.414		

Critical F value = 2.34 (0.05,6,40)
Since F > Critical F REJECT Ho:All groups equal

Sugar beet dry weight (g), Day 21; lbs ai/A
File: 1926gw 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	neg control	0.313	0.313		
2	0.000399	0.356	0.356	-1.344	
3	0.000797	0.325	0.325	-0.379	
4	0.00156	0.363	0.363	-1.573	
5	0.00311	0.323	0.323	-0.312	
6	0.00622	0.199	0.199	3.609	*
7	0.0125	0.170	0.170	3.970	*

Bonferroni T table value = 2.50 (1 Tailed Value, P=0.05, df=40,6)

Sugar beet dry weight (g), Day 21; lbs ai/A
File: 1926gw 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	neg control	8			
2	0.000399	8	0.079	25.2	-0.043
3	0.000797	8	0.079	25.2	-0.012
4	0.00156	8	0.079	25.2	-0.050
5	0.00311	8	0.079	25.2	-0.010
6	0.00622	8	0.079	25.2	0.114
7	0.0125	5	0.090	28.8	0.143

Sugar beet dry weight (g), Day 21; lbs ai/A
File: 1926gw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	0.313	0.313	0.339
2	0.000399	8	0.356	0.356	0.339
3	0.000797	8	0.325	0.325	0.339
4	0.00156	8	0.363	0.363	0.339
5	0.00311	8	0.323	0.323	0.323
6	0.00622	8	0.199	0.199	0.199
7	0.0125	5	0.170	0.170	0.170

Sugar beet dry weight (g), Day 21; lbs ai/A
File: 1926gw 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
neg control	0.339				
0.000399	0.339	0.830		1.68	k= 1, v=46
0.000797	0.339	0.830		1.76	k= 2, v=46
0.00156	0.339	0.830		1.79	k= 3, v=46
0.00311	**0.323**	**0.315**		**1.80**	**k= 4, v=46**
0.00622	0.199	3.636	*	1.80	k= 5, v=46
0.0125	0.170	4.000	*	1.81	k= 6, v=46

s = 0.063
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	**0.0018**	**0.00066**	**0.0049**	**0.22**	**0.37**
EC10	0.0027	0.0012	0.0058	0.17	0.45
EC25	**0.0051**	**0.0032**	**0.0081**	**0.10**	**0.63**
EC50	**0.011**	**0.0078**	**0.014**	**0.068**	**0.73**

Slope = 2.13 Std.Err. = 0.607

Goodness of fit: p = 0.096 based on DF= 4.0 46.

1926GW : Sugar beet dry weight (g), Day 21; lbs ai/A

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	0.313	0.343	-0.0298	100.	0.00
0.000399	8.00	0.356	0.343	0.0131	99.9	0.121
0.000797	8.00	0.325	0.340	-0.0150	99.2	0.837
0.00156	8.00	0.363	0.330	0.0330	96.2	3.82
0.00311	8.00	0.323	0.299	0.0241	87.2	12.8
0.00622	8.00	0.199	0.236	-0.0374	68.9	31.1
0.0125	5.00	0.170	0.151	0.0192	44.0	56.0

Sugar beet % survival, Day 21; lbs ai/A
File: 1926gs Transform: NO TRANSFORMATION

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	neg control	100.000	100.000	340.000
2	0.000399	97.500	97.500	316.500
3	0.000797	97.500	97.500	316.500
4	0.00156	100.000	100.000	340.000
5	**0.00311**	**100.000**	**100.000**	**340.000**
6	0.00622	85.000	85.000	261.000
7	0.0125	36.250	36.250	116.500
8	0.0249	2.500	2.500	49.500

Calculated H Value = 0.101 Critical H Value Table = 14.070
Since Calc H < Crit H FAIL TO REJECT Ho:All groups are equal.

Sugar beet % survival, Day 21; lbs ai/A
File: 1926gs Transform: NO TRANSFORMATION

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP 0 8	0 7	0 6	0 3	0 2	0 1	0 4	0 5
8		0.0249	2.500	\							
7		0.0125	36.250	.	\						
6		0.00622	85.000	.	.	\					

3	0.000797	97.500	97.500	* . . \
2	0.000399	97.500	97.500	* . . . \
1	neg control	100.000	100.000	* * . . . \
4	0.00156	100.000	100.000	* * . . . . \
5	**0.00311**	**100.000**	**100.000**	*** * . . . . . **

* = significant difference (p=0.05) . = no significant difference
Table q value (0.05,8) = 3.124 SE = 8.935

Estimates of EC%

Parameter	Estimate	95% Bounds Lower	95% Bounds Upper	Std.Err.	Lower Bound /Estimate
EC5	**0.0051**	**0.0036**	**0.0072**	**0.074**	**0.71**
EC10	0.0060	0.0045	0.0081	0.064	0.74
EC25	**0.0079**	**0.0063**	**0.0098**	**0.048**	**0.80**
EC50	**0.011**	**0.0091**	**0.012**	**0.033**	**0.86**

Slope = 5.18 Std.Err. = 0.793

Goodness of fit: p = 1.0 based on DF= 5.0 56.

1926GS : Sugar beet % survival, Day 21; lbs ai/A

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	100.	98.7	1.28	100.	0.00
0.000399	8.00	97.5	98.7	-1.22	100.	7.47e-12
0.000797	8.00	97.5	98.7	-1.22	100.	2.77e-07
0.00156	8.00	100.	98.7	1.28	100.	0.000786
0.00311	8.00	100.	98.4	1.56	99.7	0.284
0.00622	8.00	85.0	87.5	-2.46	88.6	11.4
0.0125	8.00	36.3	35.3	0.993	35.7	64.3
0.0249	8.00	2.50	2.72	-0.224	2.76	97.2

Sunflower dry weight (g), Day 21; lbs ai/A
File: 1926fw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	7	0.376	0.054	18.000
Within (Error)	56	0.176	0.003	
Total	63	0.552		

Critical F value = 2.25 (0.05,7,40)
Since F > Critical F REJECT Ho:All groups equal

Sunflower dry weight (g), Day 21; lbs ai/A
File: 1926fw Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	0.306	0.306		
2	0.000399	0.327	0.327	-0.781	
3	0.000797	0.372	0.372	-2.437	
4	0.00156	0.318	0.318	-0.466	
5	0.00311	0.298	0.298	0.265	
6	0.00622	0.322	0.322	-0.589	
7	0.0125	0.193	0.193	4.126	*
8	0.0249	0.123	0.123	6.650	*

Dunnett table value = 2.42 (1 Tailed Value, P=0.05, df=40,7)

Sunflower dry weight (g), Day 21; lbs ai/A
File: 1926fw Transform: NO TRANSFORMATION

DUNNETTS 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	neg control	8			
2	0.000399	8	0.066	21.7	-0.021
3	0.000797	8	0.066	21.7	-0.067
4	0.00156	8	0.066	21.7	-0.013
5	0.00311	8	0.066	21.7	0.007
6	0.00622	8	0.066	21.7	-0.016
7	0.0125	8	0.066	21.7	0.113
8	0.0249	8	0.066	21.7	0.182

Sunflower dry weight (g), Day 21; lbs ai/A
File: 1926fw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	0.306	0.306	0.335
2	0.000399	8	0.327	0.327	0.335
3	0.000797	8	0.372	0.372	0.335
4	0.00156	8	0.318	0.318	0.318
5	0.00311	8	0.298	0.298	0.310
6	0.00622	8	0.322	0.322	0.310
7	0.0125	8	0.193	0.193	0.193
8	0.0249	8	0.123	0.123	0.123

Sunflower dry weight (g), Day 21; lbs ai/A
File: 1926fw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

	ISOTONIZED	CALC.	SIG	TABLE	DEGREES OF

IDENTIFICATION	MEAN	WILLIAMS	P=.05	WILLIAMS	FREEDOM
neg control	0.335				
0.000399	0.335	1.048		1.68	k= 1, v=56
0.000797	0.335	1.048		1.76	k= 2, v=56
0.00156	0.318	0.455		1.79	k= 3, v=56
0.00311	0.310	0.158		1.80	k= 4, v=56
0.00622	**0.310**	**0.158**		**1.80**	**k= 5, v=56**
0.0125	0.193	4.033	*	1.81	k= 6, v=56
0.0249	0.123	6.500	*	1.81	k= 7, v=56

s = 0.056
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	**0.0038**	**0.0020**	**0.0074**	**0.15**	**0.51**
EC10	0.0054	0.0031	0.0092	0.12	0.58
EC25	**0.0094**	**0.0067**	**0.013**	**0.075**	**0.71**
EC50	**0.018**	**0.015**	**0.022**	**0.042**	**0.82**

Slope = 2.46 Std.Err. = 0.482

Goodness of fit: p = 0.098 based on DF= 5.0 56.

1926FW : Sunflower dry weight (g), Day 21; lbs ai/A

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	0.305	0.330	-0.0249	100.	0.00
0.000399	8.00	0.327	0.330	-0.00348	100.	0.00245
0.000797	8.00	0.372	0.330	0.0420	100.	0.0451
0.00156	8.00	0.318	0.329	-0.0106	99.5	0.465
0.00311	8.00	0.298	0.320	-0.0218	96.9	3.12
0.00622	8.00	0.322	0.287	0.0346	86.9	13.1
0.0125	8.00	0.193	0.213	-0.0209	64.6	35.4
0.0249	8.00	0.123	0.118	0.00501	35.8	64.2

Sunflower % survival, Day 21; lbs ai/A
File: 1926fs Transform: NO TRANSFORMATION

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	neg control	97.500	97.500	276.000
2	0.000399	97.500	97.500	276.000
3	0.000797	95.000	95.000	270.500
4	0.00156	100.000	100.000	304.000
5	0.00311	94.375	94.375	246.000
6	0.00622	100.000	100.000	304.000
7	**0.0125**	**100.000**	**100.000**	**304.000**
8	0.0249	67.500	67.500	99.500

Calculated H Value = 0.041 Critical H Value Table = 14.070
Since Calc H < Crit H FAIL TO REJECT Ho:All groups are equal.

Sunflower % survival, Day 21; lbs ai/A
File: 1926fs Transform: NO TRANSFORMATION

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP 0 0 0 0 0 0 0 0 8 5 3 2 1 6 7 4
8	0.0249	67.500	67.500	\
5	0.00311	94.375	94.375	. \
3	0.000797	95.000	95.000	. . \
2	0.000399	97.500	97.500	. . . \
1	neg control	97.500	97.500	. . . . \
6	0.00622	100.000	100.000	. . . . . \
7	**0.0125**	**100.000**	**100.000**	**. . . . . **
4	0.00156	100.000	100.000	. . . . . \

* = significant difference (p=0.05) . = no significant difference
Table q value (0.05,8) = 3.124 SE = 8.984

Tomato dry weight (g), Day 21; lbs ai/A
File: 1926tw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.0216	0.0036	4.000
Within (Error)	45	0.0395	0.0009	
Total	51	0.0611		

Critical F value = 2.34 (0.05,6,40)
Since F > Critical F REJECT Ho:All groups equal

Tomato dry weight (g), Day 21; lbs ai/A
File: 1926tw 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	neg control	0.084	0.084		
2	0.000399	0.099	0.099	-0.958	
3	0.000797	0.069	0.069	0.999	
4	0.00156	0.060	0.060	1.625	
5	0.00311	0.038	0.038	3.108	*
6	0.00622	0.052	0.052	2.167	
7	0.0125	0.046	0.046	2.256	

Bonferroni T table value = 2.50 (1 Tailed Value, P=0.05, df=40,6)

Tomato dry weight (g), Day 21; lbs ai/A
File: 1926tw 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	neg control	8			
2	0.000399	8	0.037	44.4	-0.014
3	0.000797	7	0.039	46.0	0.016
4	0.00156	8	0.037	44.4	0.024
5	0.00311	8	0.037	44.4	0.047
6	0.00622	8	0.037	44.4	0.033
7	0.0125	5	0.043	50.7	0.039

Tomato dry weight (g), Day 21; lbs ai/A
File: 1926tw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	8	0.084	0.084	0.092
2	0.000399	8	0.099	0.099	0.092
3	0.000797	7	0.069	0.069	0.069
4	0.00156	8	0.060	0.060	0.060
5	0.00311	8	0.038	0.038	0.045
6	0.00622	8	0.052	0.052	0.045
7	0.0125	5	0.046	0.046	0.045

Tomato dry weight (g), Day 21; lbs ai/A
File: 1926tw 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
neg control	0.092				
0.000399	**0.092**	**0.485**		**1.68**	**k= 1, v=45**
0.000797	0.069	1.011		1.76	k= 2, v=45
0.00156	0.060	1.643		1.79	k= 3, v=45
0.00311	0.045	2.651	*	1.80	k= 4, v=45
0.00622	0.045	2.651	*	1.80	k= 5, v=45
0.0125	0.045	2.325	*	1.81	k= 6, v=45

s = 0.030
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	**8.0E-05**	**8.1E-07**	**0.0078**	**0.99**	**0.010**
EC10	0.00021	5.3E-06	0.0087	0.80	0.025
EC25	**0.0011**	**0.00011**	**0.011**	**0.50**	**0.099**
EC50	**0.0070**	**0.0018**	**0.028**	**0.30**	**0.25**

Slope = 0.846 Std.Err. = 0.399

Goodness of fit: p = 0.13 based on DF= 4.0 45.

1926TW : Tomato dry weight (g), Day 21; lbs ai/A

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	0.0844	0.0907	-0.00634	100.	0.00
0.000399	8.00	0.0987	0.0775	0.0213	85.4	14.6
0.000797	7.00	0.0689	0.0715	-0.00261	78.8	21.2
0.00156	8.00	0.0600	0.0644	-0.00437	71.0	29.0
0.00311	8.00	0.0378	0.0560	-0.0183	61.7	38.3
0.00622	8.00	0.0519	0.0470	0.00491	51.8	48.2
0.0125	5.00	0.0458	0.0377	0.00806	41.6	58.4

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

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

Tomato % survival, Day 21; lbs ai/A
File: 1926ts Transform: NO TRANSFORMATION

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	neg control	100.000	100.000	332.000
2	0.000399	100.000	100.000	332.000
3	0.000797	100.000	100.000	332.000
4	0.00156	100.000	100.000	332.000
5	**0.00311**	**91.750**	**91.750**	**276.000**
6	0.00622	88.125	88.125	252.500
7	0.0125	73.000	73.000	187.500
8	0.0249	0.000	0.000	36.000

Calculated H Value = 0.054 Critical H Value Table = 14.070
Since Calc H < Crit H FAIL TO REJECT Ho:All groups are equal.

Tomato % survival, Day 21; lbs ai/A
File: 1926ts Transform: NO TRANSFORMATION

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP 0 0 0 0 0 0 0 0 8 7 6 5 1 2 3 4

8	0.0249	0.000	0.000	\
7	0.0125	73.000	73.000	. \
6	0.00622	88.125	88.125	. . \
5	**0.00311**	**91.750**	**91.750**	*** . . **
1	neg control	100.000	100.000	* . . . \
2	0.000399	100.000	100.000	* . . . . \
3	0.000797	100.000	100.000	* . . . . . \
4	0.00156	100.000	100.000	* . . . . . \

* = significant difference (p=0.05) . = no significant difference
Table q value (0.05,8) = 3.124 SE = 8.716

Barley Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	4	80	4	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	3	60	3	100
Mean		*85*		*100*
0.00156				
Rep 1	5	100	4	80
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100
Rep 6	4	80	4	100
Rep 7	4	80	4	100
Rep 8	3	60	2	67
Mean		*85*		*93*
0.00311				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	3	60	3	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	3	60	3	100
Rep 8	3	60	2	67
Mean		*80*		*96*
0.00622				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100
Rep 6	4	80	4	100
Rep 7	4	80	4	100
Rep 8	3	60	3	100
Mean		*80*		*100*
0.0125				
Rep 1	3	60	3	100
Rep 2	3	60	3	100
Rep 3	4	80	4	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100

Rep 6	5	100	4	80
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*80*		*98*
0.0249				
Rep 1	5	100	4	80
Rep 2	4	80	4	100
Rep 3	3	60	3	100
Rep 4	2	40	2	100
Rep 5	4	80	4	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	2	40	2	100
Mean		*75*		*98*
0.0498				
Rep 1	3	60	3	100
Rep 2	3	60	3	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*85*		*100*

Mean Emergence	81
Range	75-85

Emergence % Red.	Survival % Red.
N/A	*N/A*
0	*7*
6	*4*
6	*0*

6	3
12	3
0	0

Corn Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*100*		*100*
0.00311				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*100*		*100*
0.00622				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*100*		*100*
0.0125				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*98*		*100*
0.0249				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100

Rep 6	5	100	5	100
Rep 7	4	80	4	100
Rep 8	5	100	5	100
Mean		*98*		*100*
0.0498				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*100*		*100*
0.0994				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*100*		*100*

Mean Emergence	99
Range	98-100

Emergence % Red.	Survival % Red.
N/A	*N/A*
0	*0*
0	*0*
3	*0*

3	0
0	0
0	0

Barley % survival, Day 21; lbs ai/A
7
8
8
8
8
8
8
8
neg control
100
100
100
100
100
100
100
100
0.00156
80
100
100
100
100
100
100
67
0.00311
100
100
100
100
100
100
100
67
0.00622
100
100
100
100
100
100
100
100
0.0125
100
100
100
100
100
80
100
100
0.0249
80
100

100
100
100
100
100
100
0.0498
100
100
100
100
100
100
100
100

Barley dry weight (g), Day 21; lbs ai/A
7
8
8
8
8
8
8
8
neg control
0.416
0.423
0.432
0.411
0.490
0.403
0.365
0.438
0.00156
0.253
0.398
0.343
0.499
0.443
0.545
0.394
0.424
0.00311
0.197
0.336
0.448
0.455
0.403
0.365
0.408
0.474
0.00622
0.404
0.428
0.462
0.522
0.311
0.231
0.289
0.197
0.0125
0.390
0.253
0.421
0.486
0.450
0.293
0.430
0.506
0.0249
0.323
0.277

0.585
0.375
0.346
0.296
0.465
0.393
0.0498
0.453
0.433
0.389
0.267
0.469
0.395
0.515
0.516

Conversion of Study Authors' Toxicity Values

Sunflower	**kg product/ha**	**g ai/ha**	**lbs ai/A**
EC25	0.695	31.4835	0.0277
Lower 95% C.I.	0.408	18.4824	0.01626
Upper 95% C.I.	>0.625	>28.3125	>0.0249
Tomato			
EC25	0.208	9.4224	0.0083
Lower 95% C.I.	0.003	0.1359	0.000120
Upper 95% C.I.	0.518	23.4654	0.0206
EC50	0.324	14.6772	0.0129
Lower 95% C.I.	0.129	5.8437	0.00514
Upper 95% C.I.	>0.625	>28.3125	>0.0249
Oilseed rape			
EC25	0.192	8.6976	0.00765
Lower 95% C.I.	ND	ND	ND
Upper 95% C.I.	ND	ND	ND
EC50	0.437	19.7961	0.0174
Lower 95% C.I.	ND	ND	ND
Upper 95% C.I.	ND	ND	ND
Sugar beet			
EC25	0.141	6.3873	0.00562
Lower 95% C.I.	ND	ND	ND
Upper 95% C.I.	ND	ND	ND
EC50	0.249	11.2797	0.00993
Lower 95% C.I.	ND	ND	ND
Upper 95% C.I.	ND	ND	ND

Corn dry weight (g), Day 21; lbs ai/A
7
8
8
8
8
8
8
8
neg control
0.899
0.706
1.085
0.833
0.965
0.917
0.864
0.972
0.00311
1.045
0.852
0.873
1.091
0.705
1.034
0.881
0.990
0.00622
0.763
0.848
0.984
0.850
1.164
0.872
1.013
0.818
0.0125
0.822
0.857
0.887
0.930
0.631
0.750
0.970
0.940
0.0249
0.712
0.971
0.754
1.148
1.109
0.871
1.114
0.965
0.0498
0.812
0.917

0.719
0.820
0.838
0.809
0.708
0.888
0.0944
0.967
0.823
0.853
0.825
0.617
0.892
0.777
0.825

Cucumber Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	5	100	5	100
Rep 2	5	100	4	80
Rep 3	5	100	5	100
Rep 4	5	100	4	80
Rep 5	5	100	4	80
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*95*		*92.5*
0.000399				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	4	80	4	100
Rep 8	5	100	5	100
Mean		*97.5*		*100*
0.000797				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	3	60	3	100
Mean		*87.5*		*100*
0.00156				
Rep 1	4	80	4	100
Rep 2	5	100	5	100
Rep 3	4	80	4	100
Rep 4	5	100	5	100
Rep 5	4	80	4	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*90*		*100*
0.00311				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100

Rep 6	5	100	5	100
Rep 7	2	40	2	100
Rep 8	4	80	4	100
Mean		*85*		*100*
0.00622				
Rep 1	3	60	3	100
Rep 2	5	100	5	100
Rep 3	4	80	4	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*85*		*100*
0.0125				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	4	80	4	100
Rep 4	2	40	2	100
Rep 5	5	100	5	100
Rep 6	5	100	4	80
Rep 7	5	100	4	80
Rep 8	5	100	5	100
Mean		*85*		*95*
0.0249				
Rep 1	4	80	4	100
Rep 2	5	100	5	100
Rep 3	4	80	4	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*95*		*100*

Mean Emergence	89
Range	85-98

Emergence % Red.	Survival % Red.
N/A	*N/A*
-3	*-8*
8	*-8*
5	*-8*

11 *-8*

11 *-8*

11 *-3*

0 *-8*

Cucumber dry weight (g), Day 21; lbs ai/A
8
8
8
8
8
8
8
8
8
neg control
0.690
0.673
0.742
0.826
0.807
0.680
0.614
0.532
0.000399
0.680
0.723
0.662
0.790
0.680
0.688
0.818
0.702
0.000797
0.731
0.772
0.646
0.739
0.689
0.794
0.634
0.713
0.00156
0.727
0.573
0.856
0.566
0.748
0.809
0.742
0.686
0.00311
0.745
0.543
0.593
0.667
0.757
0.625
1.265
0.673
0.00622
0.598

0.638
0.671
0.553
0.810
0.639
0.588
0.454
0.0125
0.727
0.702
0.550
0.645
0.571
0.486
0.440
0.423
0.0249
0.333
0.478
0.382
0.403
0.444
0.379
0.374
0.335

Nominal Application Rates

kg product/ha	g ai/ha	
Negative Control	Negative Control	x 0.0022 lb/g
0.010	0.453	x 0.0022 lb/g
0.020	0.906	x 0.0022 lb/g
0.039	1.77	x 0.0022 lb/g
0.078	3.53	x 0.0022 lb/g
0.156	7.07	x 0.0022 lb/g
0.313	14.2	x 0.0022 lb/g
0.625	28.3	x 0.0022 lb/g
1.25	56.6	x 0.0022 lb/g
2.5	113	x 0.0022 lb/g

		lbs ai/A
0	x 0.4 ha/A	0
0.000997	x 0.4 ha/A	**0.000399**
0.00199	x 0.4 ha/A	**0.000797**
0.00389	x 0.4 ha/A	**0.00156**
0.00777	x 0.4 ha/A	**0.00311**
0.0156	x 0.4 ha/A	**0.00622**
0.0312	x 0.4 ha/A	**0.0125**
0.0623	x 0.4 ha/A	**0.0249**
0.125	x 0.4 ha/A	**0.0498**
0.249	x 0.4 ha/A	**0.0994**

Oat Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	4	80	4	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*98*		*100*
0.00311				
Rep 1	4	80	4	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	4	80	4	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*93*		*100*
0.00622				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	4	80	4	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	3	60	3	100
Mean		*85*		*100*
0.0125				
Rep 1	4	80	4	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*93*		*100*
0.0249				
Rep 1	5	100	5	100
Rep 2	3	60	3	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100

Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*95*		*100*
0.0498				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	4	80	4	100
Rep 4	5	100	5	100
Rep 5	4	80	4	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*93*		*100*
0.0994				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	3	60	3	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*88*		*100*

Mean Emergence	91
Range	85-95

Emergence % Red.	Survival % Red.
N/A	*N/A*
5	*0*
13	*0*
5	*0*

3	0
5	0
10	0

Oat dry weight (g), Day 21; lbs ai/A
7
8
8
8
8
8
8
8
neg control
0.289
0.376
0.334
0.304
0.263
0.262
0.309
0.357
0.00311
0.275
0.267
0.272
0.264
0.305
0.320
0.303
0.359
0.00622
0.283
0.268
0.373
0.290
0.325
0.243
0.306
0.301
0.0125
0.372
0.357
0.352
0.326
0.324
0.255
0.358
0.324
0.0249
0.329
0.336
0.232
0.293
0.356
0.251
0.318
0.298
0.0498
0.282
0.296

0.327
0.316
0.342
0.289
0.302
0.354
0.0944
0.305
0.334
0.336
0.257
0.306
0.366
0.338
0.340

Oilsee rape Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	3	60	3	100
Rep 4	3	60	3	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	4	80	4	100
Rep 8	4	80	4	100
Mean		*80*		*100*
0.000399				
Rep 1	5	100	5	100
Rep 2	3	60	3	100
Rep 3	4	80	4	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100
Rep 6	5	100	4	80
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*88*		*98*
0.000797				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	4	80	4	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	4	80	4	100
Rep 8	5	100	5	100
Mean		*88*		*100*
0.00156				
Rep 1	4	80	4	100
Rep 2	3	60	3	100
Rep 3	4	80	4	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	4	80	4	100
Rep 8	5	100	5	100
Mean		*85*		*100*
0.00311				
Rep 1	3	60	3	100
Rep 2	4	80	4	100
Rep 3	5	100	2	40
Rep 4	4	80	4	100
Rep 5	4	80	3	75

Rep 6	4	80	4	100
Rep 7	2	40	2	100
Rep 8	3	60	3	100
Mean		*73*		*89*
0.00622				
Rep 1	5	100	4	80
Rep 2	4	80	4	100
Rep 3	4	80	3	75
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	1	20	0	0
Rep 7	5	100	5	100
Rep 8	3	60	3	100
Mean		*78*		*82*
0.0125				
Rep 1	2	40	2	100
Rep 2	5	100	3	60
Rep 3	3	60	2	67
Rep 4	3	60	3	100
Rep 5	4	80	3	75
Rep 6	4	80	3	75
Rep 7	4	80	4	100
Rep 8	3	60	2	67
Mean		*70*		*80*
0.0249				
Rep 1	4	80	0	0
Rep 2	5	100	1	20
Rep 3	4	80	0	0
Rep 4	5	100	0	0
Rep 5	5	100	0	0
Rep 6	3	60	0	0
Rep 7	5	100	4	80
Rep 8	5	100	3	60
Mean		*90*		*20*

Mean Emergence	81
Range	70-90

Emergence % Red.	Survival % Red.
N/A	*N/A*
-9	*3*
-9	*0*
-6	*0*

9	*11*
3	*18*
13	*20*
-13	*80*

Oilseed rape % survival, Day 21; lbs ai/A
8
8
8
8
8
8
8
8
8
neg control
100
100
100
100
100
100
100
100
0.000399
100
100
100
100
100
80
100
100
0.000797
100
100
100
100
100
100
100
100
0.00156
100
100
100
100
100
100
100
100
0.00311
100
100
40
100
75
100
100
100
0.00622
80

100
75
100
100
0
100
100
0.0125
100
60
67
100
75
75
100
67
0.0249
0
20
0
0
0
0
80
60

Ryegrass Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	4	80	4	100
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	3	60	3	100
Rep 7	4	80	4	100
Rep 8	5	100	5	100
Mean		*88*		*100*
0.000399				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*93*		*100*
0.000797				
Rep 1	5	100	5	100
Rep 2	5	100	4	80
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	3	60	3	100
Mean		*90*		*98*
0.00156				
Rep 1	5	100	5	100
Rep 2	2	40	2	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	4	80	4	100
Rep 8	4	80	4	100
Mean		*88*		*100*
0.00622				
Rep 1	3	60	3	100
Rep 2	2	40	2	100
Rep 3	3	60	3	100
Rep 4	4	80	4	100
Rep 5	5	100	5	100

Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	4	80
Mean		*80*		*98*
0.0125				
Rep 1	5	100	4	80
Rep 2	3	60	3	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*90*		*98*
0.0249				
Rep 1	5	100	4	80
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	4	80	4	100
Rep 6	5	100	5	100
Rep 7	4	80	4	100
Rep 8	4	80	4	100
Mean		*93*		*98*

Mean Emergence	89
Range	80-93

Emergence % Red.	Survival % Red.
N/A	*N/A*
-6	*0*
-3	*3*
0	*0*

9 3

-3 3

-6 3

Oilseed rape dry weight (g), Day 21; lbs ai/A
8
8
8
8
8
8
7
8
3
neg control
0.52600000
0.58900000
0.63000000
0.73800000
0.52000000
0.50100000
0.66400000
0.60000000
0.000399
0.55200000
0.70700000
0.59400000
0.63900000
0.66800000
0.65100000
0.44200000
0.51300000
0.000797
0.71100000
0.57200000
0.53400000
0.53900000
0.55500000
0.62100000
0.62800000
0.50600000
0.00156
0.72500000
0.77200000
0.37100000
0.48800000
0.47500000
0.75000000
0.63100000
0.59900000
0.00311
0.66400000
0.72400000
0.18000000
0.64600000
0.51200000
0.47400000
0.71000000
0.63800000
0.00622
0.48100000

0.02300000
0.07700000
0.24800000
0.16500000
0.31000000
0.10500000
0.0125
0.267
0.034
0.451
0.226
0.347
0.195
0.102
0.208
0.0249
0.01600000
0.00100000
0.35900000

Ryegrass dry weight (g), Day 21; lbs ai/A
7
8
8
8
8
8
8
8
neg control
0.058
0.037
0.054
0.027
0.060
0.050
0.044
0.052
0.000399
0.061
0.034
0.049
0.063
0.029
0.032
0.049
0.038
0.000797
0.025
0.020
0.042
0.016
0.053
0.038
0.038
0.024
0.00156
0.042
0.034
0.034
0.039
0.044
0.037
0.045
0.050
0.00622
0.026
0.031
0.046
0.057
0.041
0.047
0.033
0.042
0.0125
0.065
0.027

0.040
0.045
0.043
0.052
0.058
0.055
0.0249
0.064
0.057
0.029
0.061
0.058
0.046
0.045
0.042

Soybean Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	4	80	4	100
Rep 2	5	100	3	60
Rep 3	4	80	4	100
Rep 4	5	100	5	100
Rep 5	3	60	2	67
Rep 6	3	60	3	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*83*		*91*
0.000399				
Rep 1	5	100	4	80
Rep 2	4	80	4	100
Rep 3	5	100	5	100
Rep 4	5	100	4	80
Rep 5	4	80	4	100
Rep 6	4	80	4	100
Rep 7	5	100	4	80
Rep 8	4	80	3	75
Mean		*90*		*89*
0.000797				
Rep 1	4	80	4	100
Rep 2	5	100	5	100
Rep 3	5	100	4	80
Rep 4	4	80	3	75
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*93*		*94*
0.00156				
Rep 1	5	100	3	60
Rep 2	5	100	3	60
Rep 3	5	100	4	80
Rep 4	5	100	4	80
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	4	80	4	100
Rep 8	5	100	4	80
Mean		*98*		*83*
0.00311				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	3	60	3	100
Rep 4	5	100	5	100
Rep 5	3	60	3	100

Rep 6	5	100	5	100
Rep 7	5	100	4	80
Rep 8	2	40	2	100
Mean		*78*		*98*
0.00622				
Rep 1	3	60	3	100
Rep 2	2	40	1	50
Rep 3	4	80	3	75
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	4	80	4	100
Rep 8	5	100	3	60
Mean		*80*		*86*
0.0125				
Rep 1	4	80	4	100
Rep 2	4	80	4	100
Rep 3	5	100	5	100
Rep 4	5	100	4	80
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	5	100	4	80
Rep 8	5	100	5	100
Mean		*93*		*95*
0.0249				
Rep 1	4	80	4	100
Rep 2	5	100	4	80
Rep 3	4	80	4	100
Rep 4	4	80	3	75
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	4	80
Mean		*93*		*92*

Mean Emergence	89
Range	78-98

Emergence % Red.	Survival % Red.
N/A	*N/A*
-9	*2*
-12	*-4*
-18	*9*

6 *-7*

3 *6*

-12 *-5*

-12 *-1*

Sugar beet Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*98*		*100*
0.000399				
Rep 1	3	60	3	100
Rep 2	4	80	4	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	4	80
Mean		*93*		*98*
0.000797				
Rep 1	4	80	4	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	5	100	4	80
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	3	60	3	100
Mean		*90*		*98*
0.00156				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	4	80	4	100
Rep 8	5	100	5	100
Mean		*98*		*100*
0.00311				
Rep 1	5	100	5	100
Rep 2	4	80	4	100
Rep 3	4	80	4	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100

Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*90*		*100*
0.00622				
Rep 1	4	80	4	100
Rep 2	5	100	3	60
Rep 3	5	100	4	80
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	5	100	2	40
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*95*		*85*
0.0125				
Rep 1	5	100	3	60
Rep 2	5	100	0	0
Rep 3	5	100	2	40
Rep 4	5	100	0	0
Rep 5	5	100	2	40
Rep 6	5	100	0	0
Rep 7	4	80	2	50
Rep 8	5	100	5	100
Mean		*98*		*36*
0.0249				
Rep 1	3	60	0	0
Rep 2	2	40	0	0
Rep 3	5	100	0	0
Rep 4	5	100	0	0
Rep 5	3	60	0	0
Rep 6	5	100	0	0
Rep 7	5	100	0	0
Rep 8	5	100	1	20
Mean		*83*		*3*

Mean Emergence	92
Range	83-98

Emergence % Red.	Survival % Red.
N/A	*N/A*
5	*3*
8	*3*
0	*0*

8	0
3	15
0	64
15	98

Soybean % survival, Day 21; lbs ai/A
8
8
8
8
8
8
8
8
8
neg control
100
60
100
100
67
100
100
100
0.000399
80
100
100
80
100
100
80
75
0.000797
100
100
80
75
100
100
100
100
0.00156
60
60
80
80
100
100
100
80
0.00311
100
100
100
100
100
100
80
100
0.00622
100

50
75
100
100
100
100
60
0.0125
100
100
100
80
100
100
80
100
0.0249
100
80
100
75
100
100
100
80

Sugar beet % survival, Day 21; lbs ai/A
8
8
8
8
8
8
8
8
8
neg control
100
100
100
100
100
100
100
100
0.000399
100
100
100
100
100
100
100
80
0.000797
100
100
100
100
80
100
100
100
0.00156
100
100
100
100
100
100
100
100
100
0.00311
100
100
100
100
100
100
100
100
100
0.00622
100

60
80
100
100
40
100
100
0.0125
60
0
40
0
40
0
50
100
0.0249
0
0
0
0
0
0
0
20

Sugar beet dry weight (g), Day 21; lbs ai/A
7
8
8
8
8
8
8
5
neg control
0.356
0.318
0.266
0.314
0.294
0.332
0.325
0.300
0.000399
0.471
0.406
0.323
0.335
0.291
0.353
0.355
0.311
0.000797
0.345
0.252
0.331
0.472
0.354
0.307
0.307
0.233
0.00156
0.359
0.350
0.384
0.335
0.393
0.376
0.407
0.299
0.00311
0.404
0.187
0.401
0.268
0.332
0.331
0.332
0.329
0.00622
0.139
0.195

0.222
0.137
0.288
0.079
0.257
0.275
0.0125
0.119
0.037
0.216
0.260
0.218

Sunflower Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	5	100	4	80
Rep 8	5	100	5	100
Mean		*100*		*98*
0.000399				
Rep 1	5	100	5	100
Rep 2	5	100	4	80
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*95*		*98*
0.000797				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	5	100	3	60
Rep 8	4	80	4	100
Mean		*93*		*95*
0.00156				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	4	80	4	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*98*		*100*
0.00311				
Rep 1	5	100	4	80
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	4	80	3	75
Rep 5	4	80	4	100

Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*95*		*94*
0.00622				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	3	60	3	100
Rep 5	5	100	5	100
Rep 6	5	100	5	100
Rep 7	4	80	4	100
Rep 8	5	100	5	100
Mean		*93*		*100*
0.0125				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	4	80	4	100
Rep 5	5	100	5	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*95*		*100*
0.0249				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	2	40
Rep 4	5	100	3	60
Rep 5	5	100	3	60
Rep 6	5	100	3	60
Rep 7	5	100	3	60
Rep 8	5	100	3	60
Mean		*100*		*68*

Mean Emergence	95
Range	93-100

Emergence % Red.	Survival % Red.
N/A	*N/A*
5	*0*
8	*3*
3	*-3*

5 *3*

8 *-3*

5 *-3*

0 *31*

Sunflower % survival, Day 21; lbs ai/A
8
8
8
8
8
8
8
8
8
neg control
100
100
100
100
100
100
80
100
0.000399
100
80
100
100
100
100
100
100
0.000797
100
100
100
100
100
100
60
100
0.00156
100
100
100
100
100
100
100
100
0.00311
80
100
100
75
100
100
100
100
0.00622
100

100
100
100
100
100
100
100
0.0125
100
100
100
100
100
100
100
100
0.0249
100
100
40
60
60
60
60
60

Sunflower dry weight (g), Day 21; lbs ai/A
8
8
8
8
8
8
8
8
8
neg control
0.291
0.291
0.302
0.259
0.274
0.241
0.401
0.385
0.000399
0.295
0.342
0.288
0.313
0.315
0.379
0.332
0.351
0.000797
0.393
0.412
0.384
0.377
0.377
0.333
0.304
0.398
0.00156
0.330
0.306
0.393
0.366
0.258
0.342
0.244
0.307
0.00311
0.219
0.295
0.306
0.133
0.495
0.302
0.290
0.346
0.00622
0.322

0.302
0.265
0.329
0.314
0.396
0.307
0.338
0.0125
0.151
0.155
0.238
0.198
0.188
0.201
0.176
0.233
0.0249
0.041
0.057
0.138
0.084
0.218
0.131
0.120
0.198

Tomato Percent Emergence and Survival

Application Rate (lbs ai/A)	# Emerged	% Emergence	# Survived	% Survival
Negative Control				
Rep 1	5	100	5	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	3	60	3	100
Rep 5	4	80	4	100
Rep 6	4	80	4	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*90*		*100*
0.000399				
Rep 1	3	60	3	100
Rep 2	3	60	3	100
Rep 3	4	80	4	100
Rep 4	3	60	3	100
Rep 5	5	100	5	100
Rep 6	3	60	3	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*78*		*100*
0.000797				
Rep 1	5	100	5	100
Rep 2	4	80	4	100
Rep 3	5	100	5	100
Rep 4	5	100	5	100
Rep 5	4	80	4	100
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	5	100	5	100
Mean		*95*		*100*
0.00156				
Rep 1	2	40	2	100
Rep 2	3	60	3	100
Rep 3	4	80	4	100
Rep 4	4	80	4	100
Rep 5	4	80	4	100
Rep 6	3	60	3	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*73*		*100*
0.00311				
Rep 1	4	80	4	100
Rep 2	5	100	5	100
Rep 3	5	100	5	100
Rep 4	3	60	2	67
Rep 5	3	60	3	100

Rep 6	4	80	4	100
Rep 7	3	60	2	67
Rep 8	5	100	5	100
Mean		*80*		*92*
0.00622				
Rep 1	5	100	5	100
Rep 2	4	80	4	100
Rep 3	4	80	2	50
Rep 4	4	80	3	75
Rep 5	5	100	4	80
Rep 6	5	100	5	100
Rep 7	5	100	5	100
Rep 8	4	80	4	100
Mean		*90*		*88*
0.0125				
Rep 1	5	100	5	100
Rep 2	4	80	1	25
Rep 3	4	80	4	100
Rep 4	3	60	2	67
Rep 5	3	60	2	67
Rep 6	4	80	4	100
Rep 7	4	80	3	75
Rep 8	2	40	1	50
Mean		*73*		*73*
0.0249				
Rep 1	5	100	0	0
Rep 2	2	40	0	0
Rep 3	5	100	0	0
Rep 4	4	80	0	0
Rep 5	4	80	0	0
Rep 6	2	40	0	0
Rep 7	2	40	0	0
Rep 8	5	100	0	0
Mean		*73*		*0*

Mean Emergence	80
Range	73-95

Emergence % Red.	Survival % Red.
N/A	*N/A*
14	*0*
-6	*0*
19	*0*

11 8

0 12

19 27

19 100

Tomato % survival, Day 21; lbs ai/A
8
8
8
8
8
8
8
8
8
neg control
100
100
100
100
100
100
100
100
0.000399
100
100
100
100
100
100
100
100
0.000797
100
100
100
100
100
100
100
100
0.00156
100
100
100
100
100
100
100
100
0.00311
100
100
100
67
100
100
67
100
0.00622
100

100
50
75
80
100
100
100
0.0125
100
25
100
67
67
100
75
50
0.0249
0
0
0
0
0
0
0
0

Tomato % survival, Day 21; lbs ai/A
8
8
8
8
8
8
8
8
8
neg control
100
100
100
100
100
100
100
100
0.000399
100
100
100
100
100
100
100
100
100
0.000797
100
100
100
100
100
100
100
100
100
0.00156
100
100
100
100
100
100
100
100
100
0.00311
100
100
100
67
100
100
67
100
0.00622
100

100
50
75
80
100
100
100
0.0125
100
25
100
67
67
100
75
50
0.0249
0
0
0
0
0
0
0
0

Tomato dry weight (g), Day 21; lbs ai/A
7
8
8
7
8
8
8
5
neg control
0.074
0.097
0.088
0.069
0.105
0.030
0.101
0.111
0.000399
0.070
0.127
0.110
0.110
0.064
0.107
0.127
0.075
0.000797
0.028
0.085
0.102
0.063
0.056
0.071
0.077
0.00156
0.002
0.114
0.014
0.045
0.040
0.089
0.094
0.082
0.00311
0.086
0.016
0.022
0.039
0.034
0.055
0.018
0.032
0.00622
0.077
0.015
0.017

0.074
0.042
0.030
0.069
0.091
0.0125
0.061
0.014
0.1
0.043
0.011