DATA EVALUATION RECORD

1. **CHEMICAL:** Trisulfuron.
Shaughnessey No. 128969-3.

2. **TEST MATERIAL:** CGA-131036 technical; Lot no. FL-861740; 93.9% active ingredient, N-(6-methoxy-4-methyl-1,3,5-triazin-2-ylaminocarbonyl)-2-(2-chloroethoxy)-benzenesulfonamide, a colorless crystalline solid.

3. **STUDY TYPE:** Non-target plants: Vegetative Vigor - Tier II. Species Tested: Soybean, Lettuce, Carrot, Tomato, Cucumber, Cabbage, Oat, Ryegrass, Corn, and Onion.

4. **CITATION:** Canez, V. M., Jr. 1988. CGA-131036: Nontarget Phytotoxicity Test Vegetative Vigor - Tier 2. Conducted and submitted by Pan-Agricultural Labs, Inc., Madera, CA. MRID No. 407283-23.

5. **REVIEWED BY:**

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Signature: Debra S. Segal
Date: 8-31-89

Charles Lewis 9/12/89

6. **APPROVED BY:**

Michael L. Whitten, M.S.
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7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements for a Tier-II vegetative vigor test on non-target plants. Oat was the only species which had a statistical no-effect level of 80.0 gm tech/ha (the highest concentration tested) in plant height, phytotoxicity rating, and plant dry weight. Lettuce was the most sensitive species to CGA-131036, with a no-effect

concentration of 0.075, 0.094, and 0.038 gm tech/ha for plant height, phytotoxicity rating, and plant dry weight, respectively. Based on the maximum application rate of 2.5 oz a.i./acre, CGA-131036 is expected to exert a detrimental effect on all plants tested.

8. **RECOMMENDATIONS:** N/A.

9. **BACKGROUND:**

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

11. **MATERIALS AND METHODS:**

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

B. **Test System:** The study was conducted with seeds planted in plastic pots (7.5 x 7.5 x 6.0 cm). Supersoil, a pasteurized potting soil, was used as a growth medium. Plants were fertilized weekly with Peter's Special (20-20-20, N-P-K) at the rate of 1.0 tsp/gal. A plexiglass template was used to create planting holes in the soil, thus allowing for uniform planting depth and seed distribution in each pot. Soybean and corn were planted at a depth of 2.5 cm, while the remaining eight species were planted at a depth of 1.3 cm. After planting, the pots were placed in a greenhouse until they developed 2 to 3 true leaves. Prior to treatment, each pot was thinned to five plants of uniform height and stage of growth. Applications of CGA-131036 were performed with a belt sprayer equipped with a single nozzle. The nozzle height of 12 inches and a nozzle pressure of 42 psi were used.

Temperature, relative humidity, illuminance, and photoperiod during the study were provided in the report. Plants were watered from a well at the laboratory facility three times daily for three minutes at each watering except when environmental conditions reduced the irrigation needs.

C. **Dosage:** CGA-131036 (FL-861740) was applied to all species at rates of 0, 1.25, 2.5, 5.0, 10.0, 20.0,

40.0, and 80.0 gm tech/ha. A continuation of the study designed to detect a "no-effect" level was initiated using all plant species except oat and ryegrass treated at rates of 0, 0.094, 0.188, 0.375, 0.75, and 1.5 gm tech/ha. A continuation of the study on lettuce was later initiated using the rates of 0, 0.009, 0.019, 0.038, 0.075, and 0.15 gm tech/ha. Treatment application rates were calibrated on the weight of the technical material, which was assumed to be 100% AI. Plants were sprayed at the equivalent of 467.7 L/ha (50 gpa) of water.

D. **Design:** Each crop/treatment combination was replicated three times (five seedlings/pot, 3 pots/treatment). After treatment, the pots were randomized within crops and placed in a greenhouse. The study was terminated 21 days after the treatment. Plant height was measured prior to treatment and 21 days after treatment by extending the seedling to its maximum height and recording the height to the nearest millimeter.

Phytotoxicity ratings were recorded 7, 14, and 21 days after treatment. The phytotoxicity rating system used to evaluate five observable toxic effects ranged from "0" for no injury or effect to "4" for total effect or plant death.

Twenty-one days after treatment, the plants within treatment replicates were cut at soil level and dried in a pre-weighed paper bag. Plant material was dried at 70°C for 48 hours. After drying, the dry weight of the plant material was recorded.

E. **Statistics:** Treatment means were used to calculate the percent detrimental effect resulting from the treatment as follows:

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

Plant heights taken prior to treatment were used as a baseline to calculate the percent growth at the 21-day observation using the following equation:

$$\% \text{ increase} = \frac{(\text{21-day mean}) - (\text{0-day mean})}{\text{0 day mean}} \times 100$$

The percent effect on growth was calculated for each treatment using the following equation:

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

An analysis of variance table was constructed using the Lotus 1-2-3 raw data spreadsheet. A one-way analysis of variance model for data with equal subsamples was used to analyze the data. Treatment mean separation was achieved using either MSTAT or the Lotus 1-2-3 spreadsheet. The percent detrimental effect values were input into an MSTAT probit analysis program.

12. **REPORTED RESULTS:** Results of the mean separation of plant height showed that oat had the highest no-effect concentration while lettuce was the most sensitive crop tested (Table 31, attached). Crops listed in order of increasing sensitivity to CGA-131036 based on no-effect concentrations (corresponding no-effect concentration in gm tech/ha) are as follows:

oat (80 gm) < corn (5.0 gm) < tomato (1.5 gm) < ryegrass (1.25 gm) < soybean (0.75 gm) < onion = cucumber = cabbage (0.375 gm) < carrot (0.094 gm) < lettuce (0.075 gm).

Treatment of oat plants did not result in a statistically significant detrimental effect on plant growth, regardless of treatment concentrations. Crops listed in order of increasing sensitivity to CGA-131036 based on EC_{50} values (corresponding EC_{50} values in gm tech/ha) are as follows:

corn (13.8 gm) < ryegrass (2.52 gm) < tomato (2.35 gm) < soybean (2.05 gm) < cucumber = cabbage (1.47 gm) < onion (0.961 gm) < carrot (0.652 gm) < lettuce (0.079 gm).

Treatment of seedlings with GCA-131036 resulted in a significant effect on mean phytotoxicity rating for all species except oat. Mean phytotoxicity rating at the no-effect concentrations ranged from 0.0 for lettuce, tomato, cucumber, oat, and onion to 0.9 for ryegrass (Table 32, attached). Crops listed in order of increasing sensitivity to CGA-131036 based on no-effect concentration (corresponding concentration in gm tech/ha) are as follows:

oat (80.0 gm) < corn (5.0 gm) < soybean = ryegrass (2.5 gm) < tomato (1.5 gm) < onion (0.75 gm) < cabbage = carrot (0.375 gm) < cucumber (0.188 gm) < lettuce (0.094 gm).

Treatment of CGA-131036 affected plant dry weight of all seedlings except oat (Table 33, attached). Crops listed in order of increasing sensitivity to CGA-131036 based on the statistical no-effect concentration (gm tech/ha) are as follows:

oat (80.0 gm) < ryegrass (2.5 gm) < onion = corn = tomato (1.5 gm) < soybean (0.75 gm) < carrot = cucumber = cabbage (0.188 gm) < lettuce (0.038 gm).

Treatment of oat plants with CGA-131036 did not result in a statistically significant effect ($P \leq 0.05$) on plant dry weight, regardless of treatment concentration. Treatment of the remaining plant species resulted in a dose response curve and probit analysis showed lettuce to be the most sensitive plant species to treatment. Crops listed in order of increasing sensitivity to CGA-131036 based EC_{50} values (corresponding EC_{50} values in gm tech/ha) are as follows:

corn (6.65 gm) < ryegrass (3.94 gm) < soybean (2.29 gm) < cucumber (1.82 gm) < onion (1.61 gm) < tomato (1.10 gm) < carrot (0.842 gm) < cabbage (0.671 gm) < lettuce (0.110 gm).

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** Oat was the only species which had a statistical no-effect level of 80.0 gm tech/ha (the highest concentration tested) in plant height, phytotoxicity rating, and plant dry weight. Lettuce was the most sensitive species to CGA-131036, with a no-effect concentration of 0.075, 0.094, and 0.038 gm tech/ha for plant height, phytotoxicity rating, and plant dry weight, respectively.

A quality assurance statement was included in the report, indicating that the study was conducted under Good Laboratory Practice (GLP) standards.

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

A. **Test Procedure:** The test procedure was in accordance with EPA Subdivision J guidelines for a Tier-II vegetative vigor test on non-target plants.

B. **Statistical Analysis:** Plant height data were analyzed using analysis of covariance with height at Day 0 being the covariate. Since the results of the statistical analysis agreed with the study author's results, no additional data were analyzed.

C. **Discussion/Results:** This study is scientifically sound and fulfills the guideline requirements for a Tier-II vegetative vigor test on non-target plants. Oat was the only species which had a statistical no-effect level of 80.0 gm tech/ha (the highest concentration tested) in plant height, phytotoxicity rating, and plant dry weight. Lettuce was the most sensitive species to CGA-131036, with a no-effect concentration of 0.075, 0.094, and 0.038 gm tech/ha for plant height, phytotoxicity rating, and plant dry weight, respectively.

D. **Adequacy of the Study:**

(1) **Classification:** Core.

(2) **Rationale:** This study followed the approved protocol for a toxicity test on vegetative vigor of non-target plants.

(3) **Repairability:** N/A.

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

Table 31. Statistical no-effect concentration[y] (gm tech/ha) of CGA-131036 (FL-861740) on plant height, along with EC_{25} and EC_{50} values.

Test Plant	No-effect Concentration	EC_{25}	EC_{50}
Soybean	0.75	0.702	2.05
Lettuce	0.075	0.038	0.079
Carrot	0.094	0.302	0.652
Tomato	1.5	1.03	2.35
Cucumber	0.375	0.440	1.47
Cabbage	0.375	0.752	1.47
Oat	80.0	ND[z]	ND
Ryegrass	1.25	0.870	2.52
Corn	5.0	6.87	13.8
Onion	0.375	0.495	0.961

[y] Highest treatment concentration which was statistically similar to the control 21 days after treatment, according to Duncan's New Multiple Range Test ($p \leq 0.05$).

[z] A dosage response curve was not evident, since the highest concentration tested (80.0 gm tech/ha) resulted in a 10% increase in growth and the lowest concentration tested (1.25 gm tech/ha) resulted in a 7% increase in growth. Therefore a probit analysis could not be conducted to determine EC_{25} and EC_{50} values.

Table 32. Statistical no-effect concentration[y] and the mean phytotoxicity rating[z] at that concentration (gm tech/ha) of CGA-131036 (FL-861740) plant height 21 days after treatment.

Test Plant	No-effect Concentration	Mean Phytotoxicity rating
Soybean	2.5	0.1
Lettuce	0.094	0.0
Carrot	0.375	0.3
Tomato	1.5	0.0
Cucumber	0.188	0.0
Cabbage	0.375	0.3
Oat	80.0	0.0
Ryegrass	2.5	0.9
Corn	5.0	0.3
Onion	0.75	0.0

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

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

Table 33. Statistical no-effect concentration[y] (gm tech/ha) of CGA-131036 (FL-861740) on plant dry weight, along with EC_{25} and EC_{50} values.

Test Plant	No-effect Concentration	EC_{25}	EC_{50}
Soybean	0.75	0.481	2.29
Lettuce	0.038	0.057	0.110
Carrot	0.188	0.281	0.842
Tomato	1.5	0.305	1.10
Cucumber	0.188	0.303	1.82
Cabbage	0.188	0.389	0.671
Oat	80.0	ND[z]	ND
Ryegrass	2.5	2.51	3.94
Corn	1.5	2.91	6.65
Onion	1.5	1.29	1.61

[y] Highest treatment concentration which was statistically similar to the control 21 days after treatment, according to Duncan's New Multiple Range Test ($p \leq 0.05$).

[z] A dosage response curve was not evident, since an 80 gm tech/ha treatment resulted in a 9% decrease in dry weight and 1.25 gm tech/ha treatment resulted in a 12% increase in dry weight. Therefore a probit analysis could not be conducted to determine EC_{25} and EC_{50} values.