

US EPA ARCHIVE DOCUMENT

6-28-88

DATA EVALUATION RECORD

- 1. Chemical: Ammonium-DL-homoalanin-4-yl (methyl) phosphinate
- 2. Test Material: HOE 039866 96.3% ai Technical
- 3. Study/Action Type: Nontarget Phytotoxicity - Vegetative Vigor
- 4. Study ID: HOE 039866 - Active Ingredient Technical (Code: HOE 039866 OH ZC96 0002) Plant Effect Test: Vegetative Vigor Test Tier I; Prepared by Eastman Kodak Company, June 18, 1987. (Unpublished study submitted by Hoechst Celanese Corporation under Accession No. 403456-52.)

- 5. Reviewed By: Charles Lewis
EEB/HED
Signature: *Charles Lewis*
Date: *June 14, 1988*
- 6. Approved By: Doug Urban
EEB/HED
Signature: *Douglas J. Urban*
Date: *6/28/88*

7. Conclusions:

The study is scientifically sound and fulfills the Guidelines requirement for a Tier I vegetative vigor test.

HOE-039866 applied at a maximum rate of 2.00 lb ai/A resulted in a > 25% phytotoxicity effect on 8 of the 10 species tested. Tier II testing is required.

- 8. Recommendations: N/A
- 9. Background: N/A
- 10. Discussion of Individual Tests or Studies:

11. Materials and Methods (Protocols):

| | |
|-----------------------|---------------------------------------|
| Test Species - Tomato | <u>Lycopersicon</u> <u>esculentum</u> |
| Cucumber | <u>Cucumis</u> <u>sativa</u> |
| Lettuce | <u>Lactuca</u> <u>sativa</u> |
| Soybean | <u>Glycine</u> <u>max</u> |
| Cabbage | <u>Brassica</u> <u>oleracea</u> |
| Carrot | <u>Daucus</u> <u>carota</u> |
| Oat | <u>Avena</u> <u>sativa</u> |
| Perennial Ryegrass | <u>Lolium</u> <u>perenne</u> |
| Corn | <u>Zea</u> <u>mays</u> |
| Onion | <u>Allium</u> <u>cepa</u> |

Source: Harris Moran Seed Company and Livermore Seeds and Chemicals.

Soil: Jiffy Mix® 50% sphagnum peat moss, 50% No. 3 grade vermiculite, and minor amounts of granular dolomite and sand, major nutrients, some micronutrients, and a wetting agent. pH of control soil 6.5 and the soil paste 5.1.

Containers: Plastic V-line VIP-223® paks, 5.5 cm x 5.1 cm, used for carrot, oat, onion, and ryegrass. VIP 323 (7.6 cm x 7.6 cm) for cabbage, corn, cucumber, lettuce, soybean, and tomato.

Greenhouse: Three-room greenhouse climatically controlled by an air system from an adjacent building, thermoregulated ceiling dampers, heating system, and cool-white fluorescent lights for laboratory work. Light source was the sun. Air temperature was recorded daily with a Taylor mini-max thermometer. Continuous temperature was recorded by a Honeywell Temperature/RH 7-day recorder. Air temperature ranged from 20 to 32 °C (except for one day when temperature reached 35 °C). Relative humidity ranged between 20 and 54% daily high value and 13 and 35% daily low.

Duration: Plants were harvested/measured 14 days after treatment. Plants were treated 9 to 13 days after emergence.

Rate: Five plants per container with three replicates were exposed to rates of 192, 960, and 48,000 mg/L plus control.

12. Reported Results:

The following was copied directly from the submitted study.

Mean Starting Seedling Heights (cm)*

| <u>Plant Species</u> | <u>Control</u> | <u>192 mg/L</u> | <u>960 mg/L</u> | <u>48,000 mg/L</u> |
|-------------------------------|----------------|-----------------|-----------------|--------------------|
| Cabbage (Ht) % Control** | 7.1 | 7.0 100 | 7.1 100 | 7.1 100 |
| Carrot (Ht) % Control (Ht) | 3.9 | 3.9 101 | 3.8 98 | 3.8 97 |
| Corn (Ht) % Control | 43.9 | 43.6 100 | 43.3 99 | 44.7 102 |
| Cucumber (Ht) % Control | 16.4 | 16.0 98 | 16.5 101 | 16.3 99 |
| Lettuce (Ht) % Control | 5.3 | 5.2 99 | 5.3 99 | 5.2 99 |
| Oat (Ht) % Control | 22.4 | 22.8 102 | 22.8 102 | 24.5 109 |
| Onion (Ht) % Control | 6.2 | 6.5 104 | 6.5 104 | 6.5 104 |
| Ryegrass (Ht) % Control | 9.9 | 9.8 99 | 9.7 99 | 10.2 103 |
| Soybean (Ht) % Control | 18.2 | 18.5 102 | 18.2 100 | 18.3 101 |
| Tomato (Ht) % Control | 11.5 | 11.5 100 | 11.6 101 | 11.5 100 |

*Height (Ht) is rounded to the nearest 0.1 cm.

**% Control is rounded to the nearest whole number.

Mean Phytotoxicologically Coded Effects

| <u>Plant Species</u> | <u>Day 7 Posttreatment*</u> | | | |
|----------------------|-----------------------------|-----------------|-----------------|--------------------|
| | <u>Control</u> | <u>192 mg/L</u> | <u>960 mg/L</u> | <u>48,000 mg/L</u> |
| Cabbage | 0.0 | 0.0 | 0.0 | 1.8 |
| Carrot | 0.0 | 0.0 | 0.0 | 2.5 |
| Corn | 0.0 | 0.0 | 0.5 | 2.4 |
| Cucumber | 0.0 | 0.0 | 1.0 | 3.0 |
| Lettuce | 0.0 | 0.0 | 0.0 | 3.0 |
| Oat | 0.0 | 0.0 | 0.0 | 1.1 |
| Onion | 0.0 | 0.0 | 0.1 | 2.5 |
| Ryegrass | 0.0 | 0.0 | 0.0 | 1.8 |
| Soybean | 0.0 | 0.0 | 1.0 | 2.9 |
| Tomato | 0.0 | 0.0 | 0.8 | 3.0 |

| <u>Plant Species</u> | <u>Day 14 Posttreatment*</u> | | | |
|----------------------|------------------------------|-----------------|-----------------|--------------------|
| | <u>Control</u> | <u>192 mg/L</u> | <u>960 mg/L</u> | <u>48,000 mg/L</u> |
| Cabbage | 0.0 | 0.0 | 0.0 | 1.7 |
| Carrot | 0.0 | 0.0 | 0.1 | 2.8 |
| Corn | 0.0 | 0.0 | 0.7 | 2.7 |
| Cucumber | 0.0 | 0.0 | 1.3 | 3.0 |
| Lettuce | 0.0 | 0.0 | 0.0 | 4.0 |
| Oat | 0.0 | 0.0 | 0.0 | 1.9 |
| Onion | 0.0 | 0.1 | 0.5 | 2.7 |
| Ryegrass | 0.0 | 0.0 | 0.3 | 2.3 |
| Soybean | 0.0 | 0.0 | 1.3 | 2.7 |
| Tomato | 0.0 | 0.0 | 1.0 | 3.0+ |

*Values from 0 to 4, rounded to nearest 0.1 unit.
0 = Healthy, normal; 1 - Slight adverse effect; 2 = Moderate adverse effect; 3 = Severe adverse effect; 4 = Complete adverse effect (Dead); 3(+) = Plant not expected to survive if study had been continued.

Mean Yield Determination of Seedlings

| <u>Plant Species</u> | <u>Dry Weight (mg)*</u> | | | |
|--------------------------------|-------------------------|-----------------|-----------------|--------------------|
| | <u>Control</u> | <u>192 mg/L</u> | <u>960 mg/L</u> | <u>48,000 mg/L</u> |
| Cabbage (Ht) % Control** | 588.1 | 520.0 88 | 594.8 101 | 489.1 83 |
| Carrot Shoot (Wt) % Control | 67.6 | 71.7 106 | 88.9 131 | 13.6 20 |
| Carrot Root (Wt) % Control | 15.6 | 14.0 90 | 20.8 134 | 4.1 26 |
| Corn (Wt) % Control | 1752.7 | 1816.0 104 | 1904.4 109 | 1290.9 74 |
| Cucumber (Wt) % Control | 1109.9 | 1229.6 111 | 1215.3 110 | 421.8 38 |
| Lettuce (Wt) % Control | 283.3 | 274.9 97 | 345.8 122 | 38.3 14 |
| Oat (Wt) % Control | 278.9 | 288.6 104 | 369.3 132 | 281.6 101 |
| Onion (Wt) % Control | 16.2 | 15.0 93 | 20.6 127 | 10.2 63 |
| Ryegrass (Wt) % Control | 61.4 | 53.8 88 | 60.8 99 | 21.0 34 |
| Soybean (Wt) % Control) | 1049.7 | 1038.7 99 | 1099.7 105 | 616.6 59 |
| Tomato (Wt) % Control | 614.8 | 669.6 109 | 722.1 118 | 58.3 10 |

*Rounded to the nearest 0.1 mg.

**Rounded to the nearest whole percent.

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13. Study Author's Conclusions/Quality Assurance Measures:

"The environmental conditions (temperature, humidity, soil pH, photoperiod, and water characteristics) are considered to be acceptable for the plant species used in the study.

"The starting height of the seedlings of treated and control replicates did not differ by more than 9%, with a mean difference of 1.7%. These small differences in mean starting height are not considered to have influenced the results of this study.

"The overall mean for the phytotoxicologically coded effects for all control seedlings is zero (0), although some minor NPK deficiencies were noted on corn, (phosphorus - purple streaks on stalk; potassium - light yellowing of midrib of lower leaves; and, nitrogen - yellow leaf tips). These minor signs of deficiency were a result of the limited amount (usually 3-4 weeks for large, rapidly growing plants) of nutrients available for plant growth. The control seedlings were all considered healthy. All seedlings treated with the 192 mg/L test solution appeared normal and healthy with the exception onion, which had a noticeable phytotoxicological effect (0.1) on day 14 posttreatment; this is not considered significant. Cabbage, lettuce, and oat seedlings treated with the 960 mg/L test solution were not adversely affected. Ryegrass and carrot had minor effects (0.3 and 0.1, respectively) on Day 14 post treatment; this is not considered significant. Onion and corn seedlings exposed to 960 mg/L were observed to have minor adverse effects (0.1 and 0.5, respectively) on Day 7, and slight effects (0.5 to 0.7) on Day 14. Cucumber, soybean, and tomato demonstrated slightly adverse effects (1.0, 1.0, and 0.8, respectively) on Day 7, and progressively more adverse (1.3, 1.3, and 1.0, respectively) by Day 14. All seedlings exposed to 48,000 mg/L of the test solution were observed to be adversely affected, oat and cabbage the least (moderate on Day 14). All other species were moderately to completely adversely affected; lettuce and tomato were the most sensitive species. The order of sensitivity of the seedlings to the test substance as determined in this test, based on phytotoxicological effects, increased as follows:

"Cabbage < Oat < Ryegrass < Corn = Onion = Soybean
< Carrot < Cucumber < Tomato < Lettuce.

"Based on the yield (dry weight) of the seedlings exposed to the 192 mg/L and 960 mg/L test solutions, none of the species experienced a 25% decrease in weight. In fact, the yields of most seedlings exposed to the 960 mg/L test solution were greater than those for the control seedlings. Except for oat seedlings which were not adversely affected, all seedlings exposed to the 48,000 mg/L test solution had lower yields than the control seedlings. Of those species adversely affected, with the exception of cabbage (17% reduction), all yields were reduced by 25% or more. The order of sensitivity of the seedlings to the test substance as determined in this test, based on the overall yield reductions, increased as follows:

"Oat < Cabbage < Corn < Onion < Soybean < Cucumber < Ryegrass < Carrot < Lettuce < Tomato.

"An examination of the root yield in comparison to the shoot yield did not reveal that one part of the plant was more sensitive than another.

"Based on the results (yield and phytotoxicological effects) of this study the seedlings exposed to the test substance were adversely affected at the following concentrations:

| | |
|----------|--------------------------|
| Cabbage | 48,000 mg/L |
| Carrot | 48,000 mg/L |
| Corn | 960 mg/L and 48,000 mg/L |
| Cucumber | 960 mg/L and 48,000 mg/L |
| Lettuce | 48,000 mg/L |
| Oat | 48,000 mg/L |
| Onion | 960 mg/L and 48,000 mg/L |
| Ryegrass | 48,000 mg/L |
| Soybean | 960 mg/L and 48,000 mg/L |
| Tomato | 960 mg/L and 48,000 mg/L |

"The highest concentration of HOE 039866 tested, 48,000 mg/L, resulted in \geq 25% reduction in yield of carrot, corn, cucumber, lettuce, onion, ryegrass, soybean, and tomato; a 17% reduction in yield of cabbage; and, no reduction in yield of oats, although the phytotoxicological effects were moderate. Exposure to the 960 mg/L test solution resulted in no reductions in yield of any plant species; however, based on the phytotoxicological effects, cucumber, soybean and tomato were slightly affected adversely. There were no adverse effects observed for any of the plant species exposed to 192 mg/L of the test solution."

A quality assurance statement was included with the study.

14. Reviewer's Discussion and Interpretation of the Study:

- a. Test Procedures - The study followed the protocol outlined in Subdivision J of the Guidelines and satisfies the requirement for a Tier I vegetative vigor study.
- b. Statistical Analysis - Analysis of data was by inspection.

Observed phytotoxicity symptoms for the treated plants indicated that at both the 7-day posttreatment recording periods there were moderate to severe effects for all species except cabbage, ryegrass, and oat. The 14-day values indicate a less than moderate effect for cabbage and oat.

Dry weight yield values after 14 days indicate that oat (0%) and cabbage (16.8%) had yields that were affected < 25%. For the other eight species, yields were reduced from 26.3 to 90.5% below controls.

Based on the data provided, Tier II testing is required for all species previously treated except for cabbage and oat. However, it is suggested that these two species be included.

D. Adequacy of the Study

- 1) Classification - Core
- 2) Rationale - N/A
- 3) Reparability - N/A

15. Completion of One-Liner for Study:

16. CBI Appendix: N/A.