

US EPA ARCHIVE DOCUMENT

DATA EVALUATION REPORT

1. Chemical: Ammonium-DL-homoalanin-4-yl(methyl) phosphinate
2. Test Material: HOE 039866 Technical 96.3%
3. Study Type: Nontarget Phytotoxicity - TIER II Vegetative Vigor
4. Study ID: HOE-039866 - Active Ingredient Technical (Code: HOE-039866 OH ZC96 0002) Nontarget Phytotoxicity Test, Vegetative Vigor Tier II prepared by Pan-Agriculture Laboratories, Inc., December 14, 1987. (Unpublished study received January 28, 1988; submitted by Hoechst Celanese Corporation under EPA Accession No. 405010-11.)

5. Reviewed By: Charles R. Lewis
EEB/EFED

Signature: *Charles R. Lewis*
Date: September 2, 1988

6. Approved By: Douglas J. Urban
Head, Section III
EEB/EFED

Signature: *Douglas J. Urban*

Date: 9/23/88

7. Conclusions:

The study does not satisfy the Guidelines requirement for a Tier II vegetative vigor test. The concentrations tested were generally at the no-effect level and a dose response was not achieved, except for tomato and lettuce. In addition, climatic conditions during the test were apparently not conducive to plant growth and bird and insect damage reduced plant weights.

8. Background:

Data submitted in support of application for registration of Ignite® Herbicide for use on soybeans, field corn, tree nuts, apples, and grapes.

9. Discussion of Individual Tests or Studies: N/A

1.5 - 5% drift = 0.075

10. Materials and Methods:

The following plants were tested:

<u>Crop</u>	<u>Family</u>	<u>Cultivar and Source</u>
Soybean <u>Glycine max</u>	Leguminosae	Williams 82 Bradley Seed Service, Inc.
Lettuce <u>Lactuca sativa</u>	Compositae	Prize Head, Zero M-1 Asgrow Seed Company
Carrot <u>Daucus carota</u>	Unbelliferae	Imperator 58 Germain's
Tomato <u>Lycopersicon esculentum</u>	Solanaceae	Bonny Best Petoseed
Cucumber <u>Cucumis sativus</u>	Cucurbitaceae	SMR-58 Asgrow Seed Company
Cabbage <u>Brassica oleracea</u>	Cruciferae	Copenhagen Market #58 Asgrow Seed Company
Oat <u>Avena sativa</u>	Gramineae	Swan Germain's
Perennial ryegrass <u>Lolium perenne</u>	Gramineae	Common Oregon Valley Seed Company
Corn <u>Zea mays</u>	Gramineae	Thermal Asgrow Seed Company
Onion <u>Allium cepa</u>	Amaryllidaceae	Stockton Early Yellow Germain's

Irrigation water was obtained from a well located on the Pan Agricultural Labs, Inc. facility. Quality of water, based on an off site analysis, was: sodium, 1.8 meq/L; calcium, 2.0 meq/L; magnesium, 1.2 meq/L; carbonate, 0.0 meq/L; bicarbonate, 2.0 meq/L; chloride, 2.9 meq/L; conductivity, 0.51 mmhos/cm; pH, 8.1; phosphorus, 0.93 ppm; potassium, 4 ppm; nitrate, 6 ppm; sulfate, 6 ppm; boron, 0.08 ppm; and total dissolved solids, 331 ppm.

The soil used was a sandy loam having the following characteristics: organic matter 0.4 percent; 82 percent sand, 11 percent silt, and 7 percent clay with a pH of 7.1. Soil was sterilized for 48 hours prior to use.

Seeds were planted in plastic Com-Pack 7.5 x 7.5 x 5.0 cm pots. Each treatment/crop combination was replicated five times. Each pot was thinned to five plants of uniform height and stage of growth. At treatment, soybean, cucumber, cabbage, oat, ryegrass, corn, and onion had been growing for 14 days while lettuce, carrot, and tomato grew for 25 days. Plants were germinated and allowed to grow outside.

HOE 39866 was applied at rates of 0.0125, 0.025, 0.05, 0.1, and 0.2 lb ai/A using a belt sprayer equipped with a single Teejet 8001-E nozzle applied at 18 inches with a nozzle pressure of 39 psi. Plants were allowed to grow for 14 days after treatment.

Plants were watered with an irrigation system providing 6 minutes of irrigation every 6 hours. Seedling height and phytotoxicity ratings were recorded at days 7 and 14. Plants were cut at the soil surface and dried for 48 hours at 70 °C after day 14.

12. Reported Results:

"Treatment with HOE 039866 generally did not result in a detrimental effect on plant height, regardless of concentration or observation period. Lettuce, carrot, and tomato were the most sensitive crops to treatment. Fourteen days after treatment with 0.20 lb ai/A, lettuce, carrot, and tomato exhibited a 27, 16, and 36% decrease in plant height, respectively. Probit analysis of the percent effect levels showed a general decrease in the ED₅₀ values from the seven day observation period to the 14 day observation period in these crops. The most sensitive crop was tomato with an ED₅₀ value of 0.361 lb ai/A at the 14 day observation. Calculated ED₅₀ values for cucumber, corn, and onion were very high due to the low effect levels obtained at all treatment rates. Probit analysis could not be conducted on soybean, oat, and ryegrass at either observation period due to low effect levels. Soybean was the only crop to exhibit a consistent increase in plant height following treatment. Possible growth enhancement effects may have resulted from the treatments.

"Observable phytotoxic effects due to the treatments were limited to a single leaf (1 rating) in all crops except lettuce, tomato, and carrot. Phytotoxic symptoms were generally limited to minor leaf tip desiccation and therefore limited to ratings of one and two, regardless of concentration. Treatment of tomato seedlings resulted in the highest phytotoxicity ratings. Treated seedlings exhibited leaf tissue necrosis with the areas surrounding the necrotic tissue becoming water soaked and slimy. None of the treatments resulted in a four (4) rating in any of the crops tested.

"A no detrimental effect concentration of HOE 039866 was observed in all crops tested, with respect to plant height and phytotoxicity ratings. The percent effect on cabbage, oat, ryegrass, corn, and onion plant height never exceeded the 10% increase or decrease level, regardless of compound concentration. For lettuce and tomato, a treatment concentration of greater than 0.10 lb ai/A was required to achieve a percent effect level above 23 percent. For carrot and cucumber, the maximum rate of 0.20 lb ai/A resulted in a 16 and 11% decrease in plant height, respectively. In all crops, the lowest three concentrations (0.0125, 0.025, and 0.05 lb ai/A) resulted in no observable phytotoxic effects.

"A reduction in plant dry weight was generally not observed with increasing compound concentrations. All crops, except lettuce, carrot, and tomato, showed erratic results in dry weight calculations. The lack of a discernible dose response curve may have been due to the cool weather conditions during the study and the bird and insect injury found on the plants. Cool conditions did not allow the plants to grow at the normal rate, thus reducing the amount of plant material present. The bird and insect injury also added to the variability since the loss of a single leaf may constitute a major portion of the plant material. Crops in which a probit analysis could be conducted showed tomato to be the most sensitive crop tested."

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

"The rates of HOE 039866 applied were insufficient to achieve a proper dose response curve in all crops except lettuce. Cool weather conditions during the study slowed the rate of growth of the plants and did not allow for a separation of the effects at different treatment levels. However, no-observed effect levels were identified for all of the species tested. In addition, the relative sensitivities of the different plant species compare favorably to the results of the Tier 1 test (MRID No. 40345652). Carrot, lettuce, and tomato were the most sensitive, and cabbage and oat the least sensitive. The lack of effect at the greater dose levels for some of the plant species was not expected, given the effects observed in the Tier 1 study. It is felt that conducting the study outside under normal, realistic conditions (Tier 1 was conducted in a greenhouse) resulted in more resistant plants and thus reduced effects. Overall, by providing no-effect levels for all plants and dose response information on the more sensitive species, this study adequately quantitates the potential adverse effects of HOE 039866 on nontarget plant species. Based on these results, a Tier 3 study is not required."

A quality assurance statement was included in the report.

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

- a. Test Procedures - The study generally followed the recommended procedures outlined in Subdivision J of the Guidelines. However, as the authors point out, the rates tested were insufficient to achieve a proper dose response curve for all crops except lettuce. In addition, weather conditions were apparently not conducive to plant growth. (Information has not been included for the month of November.) The authors also indicate that bird and insect damage may have affected the results.

Based on the data provided, lettuce sprayed with a concentration of 0.2 lb ai/A exhibited severe phytotoxic effects 14 days after treatment while tomato exhibited the same phytotoxic effects at 0.1 lb ai/A on day 14. None of the rates were high enough to produce similar phytotoxic effects in the other eight species.

A preliminary analysis of data indicated that the EC₅₀ for lettuce dry weight on day 14 is 0.138 lb ai/A and 0.097 lb ai/A for tomato dry weight on day 14.

- b. Statistical Analysis - Analysis was by inspection.
- c. Discussion/Results - Since the purpose of a Tier II test is to establish a dose response, the value of this study is limited.
- d. Adequacy of the Study
- 1) Classification - Supplemental - provided no-effect information only.
 - 2) Rationale - Refer to Section 14.c.
 - 3) Repairability - Not repairable. The study should be conducted so that a dose response is achieved for all of the test plants. Provisions should be made to assure adequate plant growth and protection from bird and insect damage.

15. Completion of One-Liner for Study: N/A

16. CBI Appendix: N/A

lewis LETTUCE DAY 14 DRI WEIGHT

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
.2	100	48	48	0
.1	100	53	53	0
.05	100	18	18	0
.025	100	23	23	0
.0125	100	0	0	0

BECAUSE THE NUMBER OF ORGANISMS USED WAS SO LARGE, THE 95 PERCENT CONFIDENCE INTERVALS CALCULATED FROM THE BINOMIAL PROBABILITY ARE UNRELIABLE. USE THE INTERVALS CALCULATED BY THE OTHER TESTS.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 0

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	.1827805	.1384478	.1069389	.2073179

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	1.205613	9.151695	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.425461
 95 PERCENT CONFIDENCE LIMITS = -.139701 AND 2.990624

LC50 = .150409
 95 PERCENT CONFIDENCE LIMITS = 5.439685E-02 AND +INFINITY

LC10 = 1.933455E-02
 95 PERCENT CONFIDENCE LIMITS = 0 AND 5.363639E-02

lewis *TOMATO DAY 14 DRY WEIGHT*

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
.2	100	54	54	0
.1	100	59	59	0
.05	100	30	30	0
.025	100	10	10	0
.0125	100	3	3	0

THE BINOMIAL TEST SHOWS THAT .05 AND .1 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .0809127

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
2	.3229802	9.785506E-02	6.395188E-02
.1466658		.097	

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	.5107761	5.084597	1.611769E-03

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.685287
 95 PERCENT CONFIDENCE LIMITS = .4808359 AND 2.889738

LC50 = .1177231
 95 PERCENT CONFIDENCE LIMITS = 6.241555E-02 AND .7290943

LC10 = 2.076255E-02
 95 PERCENT CONFIDENCE LIMITS = 8.936336E-04 AND 4.228604E-02
