9-23-88

DATA EVALUATION REPORT

1. Chemical: Ammonium-DL-homoalanin-4-yl(methyl) phosphinate

2. Test Material: HOE 039866 Technical 96.3% ai

3. Study Type: Nontarget Phytotoxicity - TIER II Seed Germination/Seedling Emergence

4. Study ID: HOE-039866 - Active Ingredient Technical Nontarget Phytotoxicity Test, Seed Germination/Seedling Emergence 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 (Unpublished study received January 28, 1988; submitted by Hoechst Celanese Corporation under EPA Accession No. 405010-12.)

5. Reviewed By: Charles R. Lewis
EEB/EFED
Signature: Charles R Lewis
Date: September 8, 1988

6. Approved By: Douglas J. Urban
Head, Section III
EEB/EFED
Signature: Douglas J Urban
Date: 9/23/88

7. Conclusions:

The study is scientifically sound, but apparently because of low temperatures and plant damage resulting from the feeding activity of birds and insects, no clear conclusions can be reached concerning the dose response of HOE 039866 to 10 species of plants.

Under conditions of this test, rates up to 1.5 lb ai/A did not adversely affect germination of cucumber, cabbage, oat, ryegrass, and corn.

From the phytotoxicity ratings, it also appears that seedling emergence was not significantly affected.

Because of the variation seen in the test results, it is recommended that the test be conducted for all 10 species under controlled conditions.

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

10. Materials and Methods:

The following plants were tested:

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

For the germination test, seeds were planted in plastic Com-Pack pots (7.5 x 7.5 x 6.0 cm) on October 5, 1987. Ten seeds per plot with each treatment/crop combination was replicated five times. Trays were placed in the field and buried so that soil in trays was at the same level as the field soil.

Treatment rates ranged from 0.09, 0.19, 0.38, 0.75, and 1.5 lb ai/A. A CO_2 backpack sprayer was used to apply the chemical.

Plants were irrigated for 6 minutes every 6 hours. At the termination of the study (7 days) soil was sieved and seeds removed. Water was used to remove soil from the seeds and they were then placed on moist paper towels until data collection the following day.

For the seedling emergence test, seeds were planted September 23, 1987 in the field following discing. Soil was fertilized with 15:15:15 (NPK) at 260 lb/A. Each treatment plot was 2 x 15 ft. Each treatment/crop was replicated five times with a total of 50 seeds per treatment. The test was terminated 21 days after treatment.

HOE 039866 was applied at 0.09, 0.19, 0.38, 0.75, and 1.5 lb ai/A with a CO_2 backpack sprayer. Irrigation duration was 6 minutes every 6 hours.

Seedling height and phytotoxicity ratings were recorded at 7, 14 and 21 days after treatment.

12. Reported Results:

"Seed Germination. The effects of compound HOE 039866 on radicle length elongation was difficult to assess. In many of the crops, there was a lack of a clear dose response relative to increasing treatment concentrations. Removal of the seeds and intact roots was difficult due to the delicate and brittle nature of the radicles. Many of the radicles were broken, especially in onion, cabbage, lettuce, and ryegrass. Although the radicle length was difficult to measure accurately, it was possible to obtain a percent seed germination from the seeds with radicle lengths exceeding 5 millimeters. Using the above criteria, there was no detrimental effect on the percent germinated seeds in cucumber, cabbage, oat, ryegrass, and corn. Each of these crops exhibited a percent seed germination equal to or greater than 88% in the control plots. Crops exhibiting low germination in the control plots were carrot (22%), tomato (6%), and onion (72%). Although lettuce seed germination was high (94% of control seeds), there was a great deal of variability in the seed germination response to the compound.

Lettuce seed germination results varied from a 37% decrease in the 0.38 lb ai/A treatment to a 2% decrease in the 1.5 lb ai/A treatment. Treatment of soybean seeds resulted in an increase in seed germination in all treatments. The cool weather which prevailed throughout the study may have affected the percentage of germinated seeds and the rate of radicle elongation. In many of the crops, the lack of a definitive dose response prohibited conducting a probit analysis of the radicle length and percent seed germination data. Due to the variablility observed among treatments, an effect level equal to or greater than 10% was considered not significant in all parameters measured. A no-effect level was identified for most of the plants tested. Overall however, HOE 039866 does not seem to have any adverse effect on seed germination.

"Seedling Emergence. Treatment of all crops, except soybean, lettuce, and onion resulted in a less than 25% effect level on seedling height, at all concentrations. Soybean and lettuce plots treated with 1.5 lb ai/A resulted in an average of 59 and 57% decrease in plant height, respectively. Probit analysis of the percent detrimental effect on seedling height resulted in ED_{50} values of 1.41, 4.15, and 673 lb ai/A of HOE 039866 for soybean, lettuce, and ryegrass, respectively. Probit analysis was not possible for the remaining crops. A no-effect level was identified for most of the plants tested.

"Soybean and onion were the only crops to exhibit detrimental effects on seedling emergence resulting from the test compound. Both crops exhibited a delay in the emergence of seedlings. Soybean plots treated with 1.5 lb ai/A had a mean percent emergence of 38, 62, and 72 at 7, 14 and 21 days after treatment, respectively. Control plots had a mean percent emergence of 68, 84, and 84 at the same observation periods. No onion seedlings had emerged in plots treated with 1.5 lb ai/A 14 days after treatment, while the control plots had 80% emerged seedlings. Twenty one days after treatment (1.5 lb ai/A), the percent emergence of onion seedlings was 72% (8% lower than the control plots), indicating a dely in emergence. Probit analysis of the percent effect on soybean, lettuce, and onion seedling emergence indicated a very flat dose response curve. The results of the effects at low concentrations were high ED_{50} values. An emergence based no-effect concentration was identified for all plants tested.

"Observable phytotoxic effects of the compound was generally limited to a single leaf and thus mean phytotoxicity ratings rarely exceeded one (1). Onion and lettuce exhibited minor leaf tip burn at the 14 and 21 day observation periods.

"The percent effect on plant dry weight did not produce a dose response curve as expected. Due to insect and bird damage in the field, many of the treatments provided inconsistent dry weight figures. Plots on the north side of the experimental plot were observed to have extensive leaf damage from birds. Ants and caterpillars also damaged leaf tissue. Due to the cooler temperatures during the study, the plants did not grow at a normal rate, thus providing a very narrow range of plant weights. Due to the size of the plants, a small variation in plant weight translated to a large effect level. For example, a 7 mg difference in mean tomato plant weight calculated to a 21% effect level."

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

"Treatment with HOE 039866 at the maximum label rate of 1.5 lb ai/A did not result in a greater than 25% effect on the germination percentage of any of the crops tested except lettuce. The poor germination of the tomato and carrot seeds in all plots makes the interpretation of the results for these plants extremely difficult. Soybean, lettuce, and onion exhibited detrimental effects on seedling height at the maximum label rate. Soybean and onion exhibited a delay in seeding emergence and a subsequent decrease in seedling height. Due to bird and insect damage, the dry weight data was not a valid criteria for determining the effects of the compound on seedling emergence and vigor.

"The results of this study are similar to those obtained in the Tier 1 test (MRID No. 40345651) conducted with HOE 039866. In both tests, soybean has been shown to be the most sensitive plant tested, relative to seedling emergence and subsequent vigor. No effects were observed for cabbage in the Tier 1 study (at 1.5 lb ai/A) or for cucumber, oats and corn in the Tier 2 study. Any differences between the two studies may be attributed to different soil types, exposure/application techniques, and indoor vs. outdoor test designs. In general, by providing no-effect levels for most of the plants and dose-response information when possible, we feel this study adequately quantitates the potential adverse effects of HOE 039866 on nontarget plant species."

A quality assurance statement was included in the report.

Reviewer's Discussion and Interpretation of the Study:

a. Test Procedures - To some extent the study followed the recommended procedures outlined in Subdivision J of the Guidelines. However, because the study was conducted under field conditions, a number of problems occurred and were noted by the author. As with the vegetative vigor

test, temperatures were apparently not high enough for good germination and subsequent plant growth. Bird and insect damage was described as extensive on some plants possibly masking any dose response for plant dry weight. In addition, the amount of irrigation water applied was not quantified. Excessive water applied to a sandy loam soil may have carried this water-soluble herbicide from the root zone.

b. Statistical Analysis - Analysis was by inspection.

c. Discussion/Results - The study provides limited information on seed germination. Under the conditions of this study, cucumber, cabbage, oat, ryegrass, and corn germination was not adversely affected at rates up to 1.5 lb ai/A. Because of the variability of data for the other test species, no conclusions can be reached for those five crops.

Seedling emergence data are also of limited value because of the variable field conditons that existed at the time of the test. For seed germination and seedling emergence tests, the Guidelines recommend that the tests be conducted under controlled conditions in growth chambers or greenhouses.

Based on data provided, no clear conclusions can be reached on the dose response of HOE 039866 to 10 cultivated plants.

d. Adequacy of the Study

1) Classification - Supplemental

2) Rationale - Refer to Section 14.a and c.

3) Repairability - Not repairable. The studies should be conducted under controlled conditions.

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

16. CBI Appendix: N/A