2002075

MRID No. 416732-03

DATA EVALUATION RECORD 7/23/1992

1. **CHEMICAL:** Propiconazole.
Shaughnessey No. 122101.

2. **TEST MATERIAL:** Propiconazole technical; 1-[(2-[2,4-dichlorophenyl]-4-propyl-1,3-dioxolan-2-yl)methyl]-1H-1,2,4-triazole; CAS No. 60207-90-1; Lot No. FL-850083; 92.0% purity; an amber colored oily liquid.

3. **STUDY TYPE:** Non-Target Plants: Seedling Emergence Phytotoxicity Test - Tier 2. Species Tested: Soybean, Lettuce, Carrot, Tomato, Cucumber, Cabbage, Oat, Ryegrass, Corn, Onion.

4. **CITATION:** Maggio, R.M. 1990. Tier 2 Seedling Emergence Nontarget Phytotoxicity Study Using Propiconazole. Laboratory Study No. LR90-420. Conducted by Pan-Agricultural Laboratories, Inc., Madera, CA. Submitted by Ciba-Geigy Corporation, Greensboro, NC. EPA MRID No. 416732-03.

5. REVIEWED BY:

Kathryn F. Valente, M.S. **Signature:** Kathryn F. Valente
Biologist
Ecological Effects Branch **Date:** 7/1/92
Environmental Fate and Effects Division (H7507C)

6. **APPROVED BY:**

Allen Vaughan **Signature:** Allen W. Vaughan 7.22.92
Acting Head, Section 2
Ecological Effects Branch **Date:**
Environmental Fate and Effects Division (H7507C)

Henry T. Craven, M.S. **Signature:** Henry T. Craven 7/22/92
Head, Section 1
Ecological Effects Branch **Date:**
Environmental Fate and Effects Division (H7507C)

7. **CONCLUSIONS:** This study is scientifically sound and meets the guideline requirements for a Tier 2 seedling emergence test using non-target plants.

Percent emergence: Cabbage was the most sensitive species with NOEC, LOEC, EC_{25}, and EC_{50} values of 0.5, 1.5, 0.40, and >1.5 lb ai/A, respectively.

Phytotoxicity rating: Cabbage and ryegrass were equally the most sensitive species with an NOEC and LOEC of 0.167 and 0.5 lb ai/A, respectively. The EC values were not determined.

Plant height: All of the test species were affected by propiconazole at some tested rate. The most sensitive species was determined to be cabbage (based on the EC_{25} value) with NOEC, LOEC, EC_{25}, and EC_{50} values of 0.056, 0.167, 0.22, and 0.68 lb ai/A, respectively.

Plant dry weight: The most sensitive species (based on the EC_{50} value) was cabbage with NOEC, LOEC, EC_{25}, and EC_{50} values of 0.056, 0.167, 0.18, and 0.56 lb ai/A, respectively.

8. **RECOMMENDATIONS:** N/A

9. **BACKGROUND:** This study was submitted in support of reregistration of products containing propiconazole.

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). Monocotyledon plants were represented by four species from two families (i.e., corn, oat, ryegrass, and onion). Cultivars, seed sources, lot numbers, and germination ratings were provided in the report.

B. **Test System:** Ten seeds of each crop were planted in plastic pots (7.5 x 7.5 x 6.0 cm) filled with sterilized soil (pH of 7.7-7.8 and organic matter content of 0.5-0.6%) obtained from the laboratory facility. Perlite was incorporated into the soil to facilitate drainage. A plexiglass template was used to create planting holes in the soil, thus allowing for uniform planting depth and seed distribution. Soybean, cucumber, oat, and corn were planted at a depth of 2.5 cm, while the remaining six species were planted at a depth of 1.3 cm. The ten crops were planted on May 7, 1990. Because of poor and erratic emergence, carrot, cabbage, and onion were replanted and treated on June 12, 1990.

Each treatment replicate was placed on an aluminum tray (6.125 x 31.125 cm). The spray plot was 3.21 x 1.67 ft (i.e., 5.36 ft^2). All applications were performed with a belt sprayer equipped with a single nozzle. A nozzle height of 12 inches and a nozzle pressure of 50 psi were used. The test spray solutions were prepared by dissolving propiconazole in a 5% acetone/well water solution, and serially diluting. The plants were sprayed at the equivalent of 468 l/ha (50 gpa) of water.

The pots were watered three times a day for either 5, 6, 9, or 10 minutes. Duration of irrigation increased as the plants matured. The total amount of water applied ranged from 22 to 50 ml per pot per time frame.

C. **Dosage:** Propiconazole was applied at the rates of 0.0185, 0.056, 0.167, 0.5, and 1.5 lb active ingredient (ai)/acre (A) to the soil in which the test species were planted. Treatment application rates were adjusted for the percent ai of the test material (92%).

D. **Design:** Each crop/treatment combination was replicated three times (i.e., 10 seeds/pot, 3 pots/treatment level). After treatment, all pots were randomized in an on-site greenhouse. The percentage of the ten seeds planted in each pot which emerged was calculated for each treatment. Seedling emergence was recorded at 10 and 14 days after treatment (DAT). Phytotoxicity ratings were recorded at 10, 14, and 21 DAT. Twenty-one days after treatment, seedling survival and height (measured by extending the seedling to its maximum height) were recorded and plants in treatment replicates (pots) were cut at the soil level and dried in pre-weighed aluminum foil sheets at 70°C for a minimum of 48 hours.

The phytotoxicity ratings evaluated five observable toxic effects: 0-indicates no effect; 1-indicates slight plant effect; 2-indicates a moderate effect (e.g., mild stunting or chlorosis); 3-indicates a severe effect; and 4-indicates a total effect or plant death.

Temperature, relative humidity, and photoperiod during the period of growth were provided in the report.

E. **Statistics:** All data were entered into a Lotus 1-2-3 spreadsheet. The spreadsheet calculated replicate means, treatment means, standard deviations, and

analysis of variance tables. Treatment means were used to calculate the percent effect resulting from the treatment. The percent effect was calculated using the following equation:

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

A one-way analysis of variance was performed on the data. Treatment means were separated using Duncan's New Multiple Range Test ($p < 0.05$) to determine the no-observed-effect concentration (NOEC).

The percent effect values were input into a probit analysis program. The program ignores positive values and transforms the dose by natural logarithms. For seedling emergence, the probit is calculated using all data points. For all other parameters, the probit is calculated using replicate means.

12. **REPORTED RESULTS:**

Percent emergence: Through 14 DAT, percent emergence at all rates for lettuce, carrot, tomato, cucumber, oat, ryegrass, corn, and onion did not differ significantly from the control (Tables 1 and 2, attached). The NOEC for percent emergence at 14 DAT was 1.5 lb ai/A. The NOEC for soybean and cabbage was 0.5 lb ai/A. Due to the lack of a significant rate effect or a lack of true dose response for seedling emergence, probit analysis was not conducted on nine of the ten test species. An EC_{50} value was only determined for cabbage (4.52 lb ai/A).

Seedling survival: At 21 DAT, only cabbage had a lower survival rate as compared to the control. The NOEC for cabbage based on survival was 0.5 lb ai/A. Due to the lack of a significant rate effect or a lack of true dose response for seedling survival, probit analysis was not conducted on nine of the ten test species. An EC_{50} value was only determined for cabbage (2.536 lb ai/A).

Phytotoxicity rating: Results of the phytotoxicity ratings on all ten crops are listed in Tables 3 and 4 (attached). At 21 DAT, carrot, oat, and corn showed no difference from the control (NOEC = 1.5 lb ai/A). The NOEC for soybean, lettuce, tomato, cucumber, and onion was 0.5 lb ai/A. The NOEC for cabbage and ryegrass was 0.167 lb ai/A.

Plant height: The results for plant height data are listed in Tables 5 and 6 (attached). All test species were affected by application of propiconazole at some tested

rate. The NOEC values (in lb ai/A), in order of increasing sensitivity are:

soybean = lettuce = carrot = cucumber (0.5) < tomato = ryegrass = corn = onion (0.167) < cabbage = oat (0.056).

Soybean did not show a true dose response; therefore, EC values were not determined. The EC_{25} and EC_{50} values for the ten crops are reported in Table 9 (attached).

Plant dry weight: The results of plant dry weight data are presented in Tables 7 and 8 (attached). There were no effects on lettuce, carrot, and cucumber (NOEC = 1.5 lb ai/A). The NOEC for soybean and oat was 0.5 lb ai/A. The NOEC for tomato, ryegrass, and onion was 0.167 lb ai/A and the NOEC for cabbage and corn was 0.056 lb ai/A.

Due to a lack of dose responses, EC values were not determined for lettuce, carrot, and cucumber. The remaining seven species demonstrated dose related response curves and EC values were determined for these plants (Table 9).

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** No conclusions other than those stated above or tabularized were made by the author.

The Quality Assurance Unit of Pan-Agricultural Laboratories, Inc., stated that Good Laboratory Practice (GLP) Standards as set forth in 40 CFR Part 160 were employed. Statements of Compliance with GLPs and Quality Assurance were provided.

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

A. **Test Procedure:** The test procedures followed the SEP and Subdivision J guidelines, except for the following:

The rate progression was 3-fold rather than 2-fold. The 3-fold rate increase was requested after conferring with the EPA (Appendix III, page 3, attached).

The maximum labeled use rate was not specified. The maximum use rate was obtained from the current labelling and is 0.9 lb a.i./A, based on 4 applications at 0.225 lb a.i./A.

It was not stated if the control was sprayed with a 5% acetone solution.

B. **Statistical Analysis:** Probit and Dunnett's analyses were conducted on cabbage (the most sensitive species)

data for plant dry weight (see attached printouts). The reviewer's results are in agreement with the study author's.

C. **Discussion/Results:**

Percent emergence: By 21 DAT, none of the tested species except cabbage responded to any rate of propiconazole, resulting in an NOEC of 1.5 lb ai/A. Only cabbage exhibited a dose response; however, it did not extend to 50% inhibition. Therefore, the EC_{50} determined by the author is invalid and should be reported as >1.5 lb ai/A. The subsequent NOEC, lowest-observed-effect concentration (LOEC), EC_{25}, and EC_{50} were 0.5, 1.5, 0.40, and >1.5 lb ai/A, respectively.

Phytotoxicity rating: Four test species were unaffected by application of propiconazole. Cabbage and ryegrass were equally the most sensitive species with an NOEC and LOEC of 0.167 and 0.5 lb ai/A, respectively. The EC values were not determined.

Plant height: The EC values for soybean height could have been determined by some other means than probit analysis. These were calculated by the reviewer using the TOXANAL computer program (see attached). All of the test species were affected by propiconazole at some tested rate. The EC_{50} values listed for lettuce, carrot, cucumber, oat, and corn are invalid due to a response that does not extend to 50%. This is also the case for the EC_{25} values for carrot and oat. In these cases, the EC values should be reported as >1.5 lb ai/A. The most sensitive species was determined to be cabbage (based on the EC_{25} value) with NOEC, LOEC, EC_{25}, and EC_{50} values of 0.056, 0.167, 0.22, and 0.68 lb ai/A, respectively.

Plant dry weight: The dry weight of three test species was not affected by the maximum application of 1.5 lb ai/A of propiconazole. The EC_{50} values listed for oat and corn are invalid due to a response that does not extend to 50%. This is also the case for the EC_{25} value for oat. In these cases, the EC values should be reported as >1.5 lb ai/A. The most sensitive species (based on the EC_{50} value) was cabbage with NOEC, LOEC, EC_{25}, and EC_{50} values of 0.056, 0.167, 0.18, and 0.56 lb ai/A, respectively.

This study is scientifically sound and meets the guideline requirements for a Tier 2 seedling emergence test using non-target plants.

6

D. **Adequacy of the Study:**

(1) **Classification:** Core

(2) **Rationale:** N/A

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

15. **COMPLETION OF ONE-LINER:** Yes (7/1/92).

MRID# 416732-03

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