

US EPA ARCHIVE DOCUMENT



## DATA EVALUATION RECORD

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: Seed Germination Phytotoxicity Test - Tier 2. Species Tested: Soybean, Lettuce, Carrot, Tomato, Cucumber, Cabbage, Oat, Ryegrass, Corn, Onion.
4. **CITATION:** Maggio, R.M. 1990. Tier 2 Seed Germination Nontarget Phytotoxicity Study Using Propiconazole. Laboratory Study No. LR90-419. Conducted by Pan-Agricultural Laboratories, Inc., Madera, CA. Submitted by Ciba-Geigy Corporation, Greensboro, NC. EPA MRID No. 416732-02.

5. **REVIEWED BY:**

Kathryn F. Valente, M.S.  
Biologist  
Ecological Effects Branch  
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Signature: *Kathryn F. Valente*  
Date: 7/21/92

6. **APPROVED BY:**

Allen Vaughan  
Acting Head, Section 2  
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Signature: *Allen W. Vaughan*  
Date: 7.23.92

Henry T. Craven, M.S.  
Head, Section 4  
Ecological Effects Branch  
Environmental Fate and Effects Division (H7507C)

Signature:  
Date:

7. **CONCLUSIONS:** This study is scientifically sound and meets ~~the~~ guideline requirements for a Tier 2 non-target plant phytotoxicity test.

No significant decreases in germination were observed between the control and any rate of propiconazole for the

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5. **REVIEWED BY:**

Thomas A. Bewick, Ph.D.  
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6/22/92

6. **APPROVED BY:**

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Signature: *Mark A. Mossler*  
Date: 6/22/92

Henry T. Craven, M.S.  
Supervisor, EEB/EFED  
USEPA

Signature: *Henry T. Craven*  
Date: 7/22/92

- 7. **CONCLUSIONS:** This study is scientifically sound but does not meet the guideline requirements for a Tier 2 non-target plant phytotoxicity test. The maximum use rate was not specified.

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ten species tested. The NOEC and LOEC for all plants were 1.5 and >1.5 lb ai/A, respectively. No EC values could be determined.

For radicle length, no significant reduction in elongation was determined for six of the ten test species. The most sensitive species was determined to be soybean, with NOEC, LOEC, EC<sub>25</sub>, and EC<sub>50</sub> values of 0.0167, 0.5, 0.30, and >1.5 lb ai/A, respectively.

8. **RECOMMENDATIONS:** Submit the information concerning the maximum labeled rate of propiconazole.
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). Monocotyledon plants were represented by four species from two families (i.e., corn, oat, ryegrass, and onion). Cultivars, sources, lot numbers, and germination ratings were provided in the report.

B. **Test System:** Two circles of blue blotter were placed in the bottom of a glass petri dish. Twelve milliliters of the test solution were added to each dish of soybean, cucumber, oat, and corn. Ten milliliters were added to dishes of lettuce, carrot, tomato, cabbage, ryegrass, and onion.

Ten seeds of each crop were added to each petri dish after the test solution was absorbed into the paper. The dishes containing crops with the same concentration were then randomly placed in plastic boxes (12.25 x 9.0 x 4.1 inches) with tight-fitting lids to prevent moisture loss. The petri dishes were incubated in the dark at 25 ±1°C, except lettuce, which was incubated at 20 ±1°C, for seven days.

C. **Dosage:** The highest test solution was prepared with a 1.25% acetone/deionized water solution and then diluted serially to achieve the lower concentrations. 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 all plant species. The test solutions

were corrected for the percent purity of the test material (92%).

D. **Design:** Each treatment/crop combination was replicated three times (i.e., 10 seeds/dish, 3 dishes/treatment). After incubation, the seeds were removed from the petri dish and the radicle lengths were measured to the nearest millimeter. Percent seed germination was calculated for all germinated seeds. Seeds were considered germinated if the radicle was at least 5 mm long.

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.

The percent effect values were input into a probit analysis program. The program ignores positive values and transforms the dose by natural logarithms. For seed germination, the probit is calculated using all data points. For radicle length, the probit is calculated using replicate means.

12. **REPORTED RESULTS:** The results of the statistical analysis of the germination percentage and radicle length for this study with propiconazole are presented on Tables 1 and 2 (attached). No significant ( $p < 0.05$ ) difference in germination percentage existed between the control and any concentration for soybean, lettuce, carrot, tomato, cucumber, cabbage, oat, ryegrass, corn, and onion. The no-observed-effect concentration (NOEC) based on germination percentage for the ten crops was the maximum concentration of 1.5 lb ai/A.

Due to a lack of significant rate effects and a lack of a true dose response, a probit analysis was not conducted nor  $EC_{25}$  and  $EC_{50}$  values determined for all ten crops.

Treatment of six species with propiconazole did not result in a significant difference in radicle length between the control and any of the rates tested (Tables 1 and 2). The NOEC values (in lb ai/A) for the ten test species (in increasing sensitivity) were as follows:

lettuce = carrot = tomato = cabbage = ryegrass = onion (1.5)  
 < oat = corn (0.5) < soybean (0.167) < cucumber (0.056).

Due to a lack of significant rate effects or a lack of a true dose response, a probit analysis was not conducted nor EC<sub>25</sub> and EC<sub>50</sub> values determined on lettuce, carrot, tomato, cucumber, cabbage, ryegrass, and onion. Soybean, oat, and corn demonstrated a radicle length dose response; therefore, a probit analysis was conducted on the data for each of these crops. The resulting EC<sub>25</sub> and EC<sub>50</sub> values are presented in Table 3 (attached).

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:**  
 No other 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 to GLPs and QA were enclosed in the report.

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:

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

~~The maximum use rate was not specified. This information was obtained by the reviewer from the current approved labeling, and is 0.9 lb a.i./A, based on 4 applications at 0.225 lb a.i./A.~~

- B. **Statistical Analysis:** Based on NOEC values, cucumber radicle length was the most sensitive parameter; however, due to a lack of a response, EC values could not be determined. Therefore, Dunnett's comparison test and probit analysis was conducted on soybean radicle length data (see attached printouts). The NOEC was determined to be 0.5 lb ai/A. The reported NOEC was 0.167 lb ai/A. Since the reported NOEC is more conservative than that determined by the reviewer, it

will be taken to be actual value. The  $EC_{25}$  was 0.30 lb ai/A, which was slightly more conservative than the author's.

- C. **Discussion/Results:** No significant decreases in germination were observed between the control and any rate of propiconazole for the ten species tested. The NOEC and lowest-observed-effect concentration (LOEC) for all plants were 1.5 and >1.5 lb ai/A, respectively. No EC values could be determined.

The  $EC_{50}$  for radicle length for oat, corn, and soybean are invalid due to maximum responses that did not extend to 50%. These values should be reported as >1.5 lb ai/A. For radicle length, no significant reduction in elongation was determined for six of the ten test species. The most sensitive species was determined to be soybean, with NOEC, LOEC,  $EC_{25}$ , and  $EC_{50}$  values of 0.0167, 0.5, 0.30, and >1.5 lb ai/A, respectively.

~~This study is scientifically sound and meets the guideline requirements for a Tier-2 non-target plant phytotoxicity test.~~

- D. **Adequacy of the Study:**

- (1) Classification: Core  
 (2) Rationale: N/A  
 (3) Repairability: N/A

15. **COMPLETION OF ONE-LINER:** Yes, 7/21/92.

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Pages 7 through 10 are not included in this copy.

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SOYBEAN-SEED GERMINATION-RADICLE LENGTH-PROPICONAZOLE

Summary Statistics and ANOVA

Group	Transformation =	None		
<i>rate (lb ai/A)</i>	n	Mean	s.d.	CV%
1 = control	3	43.0000	9.5394	22.2
2 0.0185 <sup>0</sup>	3	41.0000	8.0000	19.5
3 0.056	3	39.6667	8.0208	20.2
4 0.167	3	34.0000	5.1962	15.3
5 0.5	3	29.3333	4.5092	15.4
6* 1.5	3	23.0000	6.9282	30.1

*NIEC = 0.5 lb ai/A*  
*LOEC = 1.5 lb ai/A*

\* the mean for this group is significantly less than the control mean at alpha = 0.05 (1-sided) by Dunnett's test

*0 Rates given in lb ai/A.*

Minimum detectable difference for Dunnett's test = -14.782372  
 This difference corresponds to -34.38 percent of control

Between groups sum of squares = 896.666667 with 5 degrees of freedom.

Error mean square = 52.444444 with 12 degrees of freedom.

Bartlett's test p-value for equality of variances = .937

SOYBEAN-SEED GERMINATION-RADICLE LENGTH-PROPICONAZOLE

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence	Upper Limits
EC 1.00	0.0032	0.0007	0.0083
EC 5.00	0.0206	0.0079	0.0380
EC10.00	0.0553	0.0281	0.0875
EC15.00	0.1076	0.0645	0.1578
EC50.00	1.7966	1.1012	3.7408
EC85.00	29.9986	11.2352	148.3097
EC90.00	58.3937	19.2734	357.7270
EC95.00	156.6585	42.7752	1321.7239
EC99.00	997.2594	189.9445	15404.9131

$$y = 4.78 + 0.85(x)$$

$y = \text{probit } z_i \text{ inhibition}$

$x = \log(\text{rate})$

$$EC_{25} = 0.30 \text{ lb ai/A}$$