

US EPA ARCHIVE DOCUMENT

Plant Studies DER's EEB Copy

2-11-93

DP Barcode : D183797
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EEB Out :

To: Linda Propst
Product Manager 73
Special Review and Reregistration Division (H7508W)

From: Douglas J. Urban, Acting Chief
Ecological Effects Branch/EFED (H7507C)

Attached, please find the EEB review of...

Reg./File # : 012301
Chemical Name : Bromacil
Type Product : herbicide
Product Name :
Company Name : DuPont
Purpose : Review plant data submission.

Action Code: 627
Reviewer: Brian Montague

Date Due: 12/25/92

EEB Guideline/MRID Summary Table: The review in this package contains an evaluation of the following:

| GDLN NO | MRID NO | CAT | GDLN NO | MRID NO | CAT | GDLN NO | MRID NO | CAT |
|---------|---------|-----|---------|---------|-----|----------|---------|-----|
| 71-1(A) | | | 72-2(A) | | | 72-7(A) | | |
| 71-1(B) | | | 72-2(B) | | | 72-7(B) | | |
| 71-2(A) | | | 72-3(A) | | | 122-1(A) | | |
| 71-2(B) | | | 72-3(B) | | | 122-1(B) | | |
| 71-3 | | | 72-3(C) | | | 122-2 | | |
| 71-4(A) | | | 72-3(D) | | | 123-1(A) | | |
| 71-4(B) | | | 72-3(E) | | | 123-1(B) | | |
| 71-5(A) | | | 72-3(F) | | | 123-2 | | |
| 71-5(B) | | | 72-4(A) | | | 124-1 | | |
| 72-1(A) | | | 72-4(B) | | | 124-2 | | |
| 72-1(B) | | | 72-5 | | | 141-1 | | |
| 72-1(C) | | | 72-6 | | | 141-2 | | |
| 72-1(D) | | | | | | 141-5 | | |

Y=Acceptable (Study satisfied Guideline)/Concur
P=Partial (Study partially fulfilled Guideline but additional information is needed)
S=Supplemental (Study provided useful information but Guideline was not satisfied)
N=Unacceptable (Study was rejected)/Nonconcur

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 11 1993

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

Memorandum

Subject: Bromacil Plant Germination, Emergence, and Vegetative Vigor Studies

From: Anthony F. Maciorowski, Chief *Anthony F. Maciorowski*
Ecological Effects Branch
Environmental Fate and Effects Division (H7507C)

To: Linda Propst, Product Manager 73
Reregistration Division (H7508W)

The Ecological Effects Branch has completed review of terrestrial plant studies submitted by Du Pont de Nemours and Company, Inc. to support reregistration of Bromacil herbicide products. The studies were not found completely acceptable. Several species tested demonstrated poor control performance with less than 70% germination of seedlings. Other tests utilized seeds which had previously been treated with a fungicide and an insecticide. Please refer to the study reports regarding which plant species need to have the Tier I or II tests repeated and which species were satisfied by the submitted studies.

DATA EVALUATION RECORD

- 1. **CHEMICAL:** Bromacil.
Shaughnessey No. 012301.
- 2. **TEST MATERIAL:** Bromacil technical; 5-bromo-3-sec-butyl-6-methyluracil; Du Pont ID No. N976; Lot No. 136; 95.9% purity.
- 3. **STUDY TYPE:** 122-1 & 123-1. Non-Target Plants: Seed Germination, Seedling Emergence & Vegetative Vigor Phytotoxicity Tests - Tiers 1 & 2. Species Tested: Soybean, Sugarbeet, Pea, Tomato, Cucumber, Rape, Sorghum, Wheat, Corn, and Onion.
- 4. **CITATION:** Carski, T.H. 1992. Influence of Bromacil on Seed Germination, Seedling Emergence, and Vegetative Vigor of Several Terrestrial Plants. Du Pont Project ID No. AMR 2304-92. Conducted and submitted by E.I. du Pont de Nemours and Company, Newark and Wilmington, DE. EPA MRID No. 424911-01.

5. **REVIEWED BY:**

 Mark A. Mossler, M.S.
 Agronomist
 KBN Engineering and
 Applied Sciences, Inc.

Signature: *[Handwritten Signature]*
 Date: 1/11/93

6. **APPROVED BY:**

 Pim Kosalwat, Ph.D.
 Senior Scientist
 KBN Engineering and
 Applied Sciences, Inc.

Signature: P. Kosalwat
 Date: 1/11/93

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

Signature: *[Handwritten Signature]*
 Date: 1/11/93

7. **CONCLUSIONS:**
Seed Germination: In the Tier 1 tests, the seeds of corn, pea, sugarbeet, and cucumber were treated with fungicide and/or insecticide. The results from these four plant species are not scientifically sound and do not fulfill the requirements for a Tier 1 germination study. The control seeds of soybean and rape demonstrated less than 70% germination in the Tier 1 study. However, in the Tier 2 study with these two species, greater than 70% germination

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was observed in the controls, and no significant effects were observed. Therefore, the results of the Tier 2 study for rape and soybean fulfill the Tier 1 guidelines. The results obtained with onion, wheat, tomato, sorghum, soybean, and rape are scientifically sound and fulfill the requirements for a Tier 1 germination study. Application of bromacil at the maximum labeled rate (24.0 lb ai/A) did not have any effects on germination of these 6 species.

Seedling Emergence:

Percentage of Emerged Seedlings: The seeds of corn, pea, sugarbeet, and cucumber were treated with fungicide and/or insecticide. The results from these four species are not scientifically sound and do not fulfill the requirements for a Tier 1 seedling emergence study. The results obtained with the remaining six species are scientifically sound and fulfill the requirements for a Tier 1 seedling emergence study. Onion, wheat, sorghum, soybean, and rape were not affected at the maximum application rate (24.0 lb ai/A). The emergence of tomato was significantly reduced at the 24.0 lb ai/A rate.

In the Tier 2 tests, the seeds of corn, pea, sugarbeet, and cucumber were treated with fungicide and/or insecticide. The results obtained with these species are not scientifically sound and do not fulfill the requirements for a Tier 2 seedling emergence study. The NOELs for the six valid test species were the highest test rate for each species and EC values were not determined because the compound was not applied to the highest labeled rate (24.0 lb ai/A). The author should have applied the material to the highest rate in order to determine these values. The reviewer did not place these six species in the supplemental category because shoot height was a more sensitive parameter than emergence. The results obtained with onion, wheat, sorghum, tomato, rape, and soybean are scientifically sound and fulfill the requirements for a Tier 2 seedling emergence study. Onion, tomato, and rape were equally the most sensitive valid species with respect to emergence, with NOEL, LOEL, EC₂₅, and EC₅₀ values of 0.0938, >0.0938, >0.0938, and >0.0938 lb ai/A, respectively.

Shoot Height: Again, because of the fungicidal and/or insecticidal treatments, results from the Tier 1 tests for corn, pea, sugarbeet, and cucumber are not scientifically sound and do not fulfill the requirements for a Tier 1 seedling emergence study. The results obtained from the remaining six species are scientifically sound and fulfill the requirements for a Tier 1 seedling emergence study. The

height of onion, wheat, sorghum, soybean, tomato, and rape was significantly reduced when treated with 24.0 lb ai/A of bromacil.

Again, because of the pesticide treatments, results from the Tier 2 tests for cucumber, pea, sugarbeet, and corn are not scientifically sound and do not fulfill the requirements for a Tier 2 seedling emergence study. The results obtained from the remaining six species are scientifically sound and fulfill the requirements for a Tier 2 seedling emergence study. The most sensitive species with respect to shoot height was rape with NOEL, LOEL, EC₂₅, and EC₅₀ values of 0.0117, 0.0234, 0.0136, and 0.0211 lb ai/A, respectively. The slope of the probit curve was 3.54.

Vegetative Vigor: The seeds of cucumber, corn, sugarbeet, and pea were treated with fungicide and/or insecticide. Therefore, the results from these species are not scientifically sound and do not meet the guidelines for a Tier 2 vegetative vigor study. The results from rape are scientifically sound but do not meet the guidelines for a Tier 2 vegetative vigor study. An NOEL was not determined for rape root weight. The results from onion, wheat, sorghum, soybean, and tomato are scientifically sound and meet the guidelines for a Tier 2 vegetative vigor study. The most sensitive species parameter was rape root weight with ~~LOEL~~ EC₂₅, and EC₅₀ values of 0.0059, 0.0023, and 0.0083 lb ai/A, respectively. The slope of the probit curve was 1.21. The NOEL could not be determined.

8. **RECOMMENDATIONS:** N/A.

9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. **MATERIALS AND METHODS:**

A. **Test Plants:** Dicotyledon plants were represented by six species from five families (i.e., soybean, sugarbeet, pea, tomato, cucumber, and rape). Monocotyledon plants were represented by four species from two families (i.e., corn, sorghum, wheat, and onion). Seed source, cultivar, and lot number information were included in the report. Corn and pea seeds were treated with Captan® and cucumber and sugarbeet seeds were treated with a combination of fungicide and/or insecticide for all three studies.

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B. Test System:

Seed Germination: One or more circles of glass micro-fiber filter (125 mm diameter) paper were placed in the bottom of a glass petri plate (150 mm in diameter and 20 mm in height). The test solution was prepared in sodium phosphate buffer (pH 7.0) and applied to the petri plates.

Twenty seeds of each crop were added to each petri plate. The plates were covered and placed in a dark incubator set at 25-28°C for 5 days.

Seedling Emergence: Twenty seeds of each crop were planted in trays, measuring 32 x 12 x 10 cm and filled with a sand-amended loam soil (pH = 6.1, 1.8% organic matter content). Onion, tomato, and rape seeds were planted at a 1-cm depth, wheat and sugarbeet at 1.5 cm, and the remaining species at 2.5 cm.

The trays were sprayed with a solution of bromacil prepared in acetone. Application was accomplished with a rotating belt lab sprayer calibrated to deliver 40 gallons per acre at a pressure of 40 psi. The nozzle was positioned 14.5 inches above the tray.

Plants were allowed to emerge in a greenhouse under natural lighting which was supplemented with artificial lighting to produce a 16-hour photoperiod. The temperature was maintained at 19-35°C. Top-watering was conducted on an as needed basis with tap water.

Vegetative Vigor: Solutions of bromacil were prepared in acetone and sprayed onto established plants that were either 10-14 cm in height or had 3-4 leaves. The pots (15 x 15 cm) that each species were planted in contained either 1 plant (corn, soybean, tomato, cucumber), 3 plants (sugarbeet, pea, rape), or 6 plants (onion, wheat, sorghum). Planting, application, and growth conditions were identical to those in the seedling emergence test with the caveat that foliage was avoided when watering the pots and the temperature range was 17-35°C.

- C. Dosage:** Bromacil was applied at the rate of 24.0 lb active ingredient (ai)/acre (A) for the Tier 1 germination and seedling emergence tests. The vegetative vigor test was conducted only as a Tier 2 test. For Tier 2 tests, rates applied to selected species ranged from 0.00586 to 24.0 lb ai/A. The reported maximum application rate was 24.0 lb ai/A.

D. Design:

Seed Germination: For Tier 1 and 2 studies, the treatment/crop combination was replicated six times (i.e., 20 seeds/plate, 6 plates/treatment). After 5 days of incubation, the seeds were removed from the petri plates and the radicle lengths were measured. Percent seed germination was determined by counting the number of seeds with radicle lengths of 5 mm or greater. The physical appearance of the seedlings was also monitored.

Seedling Emergence: For Tier 1 and 2 studies, each crop/treatment combination was replicated four times (i.e., 20 seeds/tray, 4 trays/treatment level). At 7 and 14 days after treatment (DAT), each replicate tray was assessed for abnormalities, seedling emergence, and seedling height.

Vegetative Vigor: For Tier 2 studies, each crop/treatment combination was replicated four times (i.e., 1 vessel with 6 plants/replicate, 2 vessels with 3 plants/replicate, or 6 vessels with 1 plant/replicate per treatment level). At 7 and 21 DAT, each replicate pot was assessed for abnormalities and seedling height was measured. Shoot, root, and whole plant dry weights were determined by drying the plants for a minimum of 48 hours at 70°C.

Temperature, relative humidity, water applied per pot, and light intensity measured during the period of growth were provided in the report for the emergence and vegetative vigor studies. Plants were treated with an N-P-K fertilizer and iron chelate 7 DAT for the vegetative vigor study.

Test solutions for all three studies were analyzed for bromacil by liquid chromatography.

- E. Statistics:** All studies were conducted using randomized complete block designs. For Tier 1 tests, percent inhibition and the associated 95% confidence intervals (calculated using the method for ratios with unequal variances) were determined. Welch's t-test was used to determine if a statistically significant reduction of 25% or greater had occurred in comparison to the control data ($p \leq 0.1$). Tier 2 testing was conducted on species that demonstrated a greater than 25% inhibition or where a 25% or greater level of negative response could not be statistically refuted.

William's test ($p \leq 0.05$) was used to determine the no-observed-effect level (NOEL)¹. Percentage data were arcsine square root transformed prior to analysis. Height and weight data were transformed by the common logarithm. If this test indicated a normal dose response, probit analysis was used to determine the EC_{25} and EC_{50} values. The 95% confidence intervals were determined using Fieller's theorem. Variance proportional to the mean was assumed for heights and dry weights.

12. **REPORTED RESULTS:** The measured concentrations of the test solutions for all studies ranged from 91 to 104% of nominal. Therefore, results for all studies are based on nominal concentrations.

Seed Germination: Conditions inside the incubator for the Tier 1 tests were reported as a temperature of 25°C and a relative humidity of 28-59%. Responses on germination of the ten test species in the Tier 1 study, in increasing sensitivity to bromacil (in percent inhibition), are as follows (negative inhibition indicates growth stimulation):

cucumber (-0.9) < sugarbeet (1.5) < tomato (1.7) < corn (5.5) < sorghum (5.9) < wheat (6.7) < pea (8.8) < onion (9.7) < soybean (30) < rape (50).

Observations of abnormalities are presented in Table II for Tier I tests and Table IX for Tier 2 tests (attached). Only rape and soybean were advanced to Tier 2 testing based on the amount of inhibition witnessed. Conditions inside the incubator for the Tier 2 test were reported as a temperature of 25°C and a relative humidity of 27-59%. The EC_{25} and EC_{50} for germination could not be determined for either species. The NOEL was reported as >24.0 lb ai/A for both soybean and rape.

Seedling Emergence: Conditions inside the greenhouse for the Tier 1 tests were reported as a temperature of 19-35°C and a relative humidity of 8-79%. Water applied to each tray ranged between 100 and 305 ml/tray/day. Responses of the 2-week emergence of the ten test species in the Tier 1 study, in increasing sensitivity to bromacil (in percent inhibition), are as follows (negative inhibition indicates growth stimulation):

pea (-8.3) < soybean (-4.0) < cucumber (-2.6) < corn = wheat (-1.3) < onion (0) < sorghum (2.7) < rape (7.7) < sugarbeet (12) < tomato (18).

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Responses of 2-week height of the ten test species in the Tier 1 study, in increasing sensitivity to bromacil (in percent inhibition), are as follows:

pea (28) < soybean (30) < corn (49) < onion = wheat = sorghum = sugarbeet = tomato = rape = cucumber (100).

All species were advanced to Tier 2 testing based on the degree of height inhibition or plant death. Observations of abnormality are presented in Table VIII (attached) for Tier 1 tests and Table XV (attached) for Tier 2 tests.

Conditions inside the greenhouse for the Tier 2 tests were reported as a temperature of 19-33°C and a relative humidity of 15-74%. Water applied to each tray ranged between 0 and 270 ml/tray/day.

The emergence NOELs were reported to be greater than the maximum rate tested (0.0938 lb ai/A for onion, sugarbeet, tomato, rape, and cucumber, 0.375 lb ai/A for wheat, sorghum, and soybean, 1.5 lb ai/A for corn, or 6.0 lb ai/A for pea). The EC₂₅ and EC₅₀ values for these species could not be determined due to the lack of dose response.

The NOELs determined from the 2-week seedling height data of the ten test species, in increasing sensitivity to bromacil (in lb ai/A), are as follows:

soybean = corn (0.188) < pea (0.0938) < onion = sorghum = cucumber (0.0469) < tomato (>0.0234) < sugarbeet = wheat (0.0234) < rape (0.0117).

The EC values for seedling height are presented on page 31 (attached).

Vegetative Vigor: Conditions inside the greenhouse for the Tier 2 tests were reported as a temperature of 17-35°C and a relative humidity of 9-77%. Water applied to each pot ranged between 0 and 360 ml/pot/day. Observations of abnormality are presented in Table XXIV (attached).

The NOELs and EC values determined from the 3-week vegetative vigor data of the ten test species are presented on pages 32 and 33 (attached).

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:**
Percent germination was not inhibited at the highest test rate of 24.0 lb ai/A for all ten test species.

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Early seedling growth was reduced in all ten test species. Preemergence effects of 25% or greater are likely (assuming $\geq 5\%$ drift of the maximum rate) for all species except pea and corn for emergence, and for all species except pea for height.

Postemergence application of bromacil resulted in shoot height, shoot weight, and root weight inhibition. Postemergence effects of 25% or greater are likely (assuming $\geq 5\%$ drift of the maximum rate) for all species.

Good Laboratory Practice (GLP) compliance and Quality Assurance statements were included in the report indicating that the study was conducted under the EPA GLP standards set forth in 40 CFR Part 160.

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

- A. Test Procedure: For the germination studies, the test designs were generally in accordance with Subdivision J and SEP guidelines except for the following:

No germination ratings for the seeds used were reported.

Seeds of some species were treated with fungicide or insecticide.

Soybean, rape, and sugarbeet seeds were of poor quality (<70% germination in the controls) for the Tier 1 germination study.

For the seedling emergence studies, the test designs were generally in accordance with Subdivision J and SEP guidelines except for the following:

Seeds of some species were treated with fungicide or insecticide.

No spray solution or application calculations were reported.

The study was terminated at the end of 2 weeks. A 3- or 4-week evaluation was not conducted.

The application rate progression was four-fold rather than the recommended two-fold for pea.

For the vegetative vigor study, the test design was generally in accordance with Subdivision J and SEP guidelines except for the following:

Seeds of some species were treated with fungicide or insecticide.

No spray solution or application calculations were reported.

The NOEL was not determined for rape root dry weight.

B. Statistical Analysis: The reviewer used probit analysis to determine the EC values and analysis of variance (coupled with Dunnett's test) to determine the lowest-observed-effect level (LOEL) and NOEL. The most sensitive species and parameters for the Tier 2 emergence and vigor tests were rape height and rape root weight, respectively. The reviewer's results are in general agreement with the author's (see attached printouts). No statistical verification was conducted for the germination study because the results from the tests indicated no significant effects.

C. Discussion/Results: The reviewer feels that the nominal rates reported in these studies reflected the actual amount of test material applied. The discussion presented is therefore reported using nominal rates of the compound.

Seed Germination: In the Tier 1 tests, the seeds of corn, pea, sugarbeet, and cucumber were treated with fungicide and/or insecticide. The results from these four plant species are not scientifically sound and do not fulfill the requirements for a Tier 1 germination study. The control seeds of soybean and rape demonstrated less than 70% germination in the Tier 1 study. However, in the Tier 2 study with these two species, greater than 70% germination was observed in the controls, and no significant effects were observed. Therefore, the results of the Tier 2 study for rape and soybean fulfill the Tier 1 guidelines. The results obtained with onion, wheat, tomato, sorghum, soybean, and rape are scientifically sound and fulfill the requirements for a Tier 1 germination study. Application of bromacil at the maximum labeled rate (24.0 lb ai/A) did not have any effects on germination of these 6 species.

The author did not report the amount of control or treatment solution that each petri plate received. In previous studies conducted by the same laboratory, plates of corn, pea, and soybean received 30 ml of solution and plates of the remaining species received 15 ml of solution. The reviewer assumes that this was the volume applied in this study.

Seedling Emergence:

Percentage of Emerged Seedlings: The seeds of corn, pea, sugarbeet, and cucumber were treated with fungicide and/or insecticide. The results from these four species are not scientifically sound and do not fulfill the requirements for a Tier 1 seedling emergence study. The results obtained with the remaining six species are scientifically sound and fulfill the requirements for a Tier 1 seedling emergence study. Onion, wheat, sorghum, soybean, and rape were not affected at the maximum application rate (24.0 lb ai/A). The emergence of tomato was significantly reduced at the 24.0 lb ai/A rate.

In the Tier 2 tests, the seeds of corn, pea, sugarbeet, and cucumber were treated with fungicide and/or insecticide. The results obtained with these species are not scientifically sound and do not fulfill the requirements for a Tier 2 seedling emergence study. The NOELs for the six valid test species were the maximum rate tested for each species and EC values were not determined because the compound was not applied to the highest labeled rate (24.0 lb ai/A). The author should have applied the material to the highest rate in order to determine these values. The reviewer did not place these six species in the supplemental category because shoot height was a more sensitive parameter than emergence. The results obtained with onion, wheat, sorghum, tomato, rape, and soybean are scientifically sound and fulfill the requirements for a Tier 2 seedling emergence study. Onion, tomato, and rape were equally the most sensitive valid species with respect to emergence, with NOEL, LOEL, EC₂₅, and EC₅₀ values of 0.0938, >0.0938, >0.0938, and >0.0938 lb ai/A, respectively.

Shoot Height: Again, because of the fungicidal and/or insecticidal treatments, results from the Tier 1 tests for corn, pea, sugarbeet, and cucumber are not scientifically sound and do not fulfill the requirements for a Tier 1 seedling emergence study.

The results obtained from the remaining six species are scientifically sound and fulfill the requirements for a Tier 1 seedling emergence study. The height of onion, wheat, sorghum, soybean, tomato, and rape was significantly reduced when treated with 24.0 lb ai/A of bromacil.

Again, because of the pesticide treatments, results from the Tier 2 tests for cucumber, pea, sugarbeet, and corn are not scientifically sound and do not fulfill the requirements for a Tier 2 seedling emergence study. The results obtained from the remaining six species are scientifically sound and fulfill the requirements for a Tier 2 seedling emergence study. The most sensitive species with respect to shoot height was rape with NOEL, LOEL, EC₂₅, and EC₅₀ values of 0.0117, 0.0234, 0.0136, and 0.0211 lb ai/A, respectively. The slope of the probit curve was 3.54.

Vegetative Vigor: The seeds of cucumber, corn, sugarbeet, and pea were treated with fungicide and/or insecticide. Therefore, the results from these species are not scientifically sound and do not meet the guidelines for a Tier 2 vegetative vigor study. The results from rape are scientifically sound but do not meet the guidelines for a Tier 2 vegetative vigor study. An NOEL was not determined for rape root weight. The results from onion, wheat, sorghum, soybean, and tomato are scientifically sound and meet the guidelines for a Tier 2 vegetative vigor study. The most sensitive species parameter was rape root weight with LOEL, EC₂₅, and EC₅₀ values of 0.0059, 0.0023, and 0.0083 lb ai/A, respectively. The slope of the probit curve was 1.21. The NOEL could not be determined.

In the conclusions section, the author indicated that the postemergent solutions contained a surfactant. The methodology section did not contain any information as to whether a surfactant was added to the spray solutions. It should be clarified as to whether or not the spray solutions contained a surfactant and how much surfactant was present in the solutions.

The study authors concluded that the estimated environmental concentration (EEC) for ground application of bromacil was 0.24 lb ai/A, and 1.20 lb ai/A for aerial application (based on a maximum application rate of 24.0 lb ai/A). This was based on

the assumption that spray drift from ground application would be no more than 1% and no more than 5% from the air. The author did not present any rationale, or accompanying verification, for this assumption. The reviewer feels that exposure of non-target plants to bromacil could easily exceed the EEC proposed by the author.

D. Adequacy of the Study:

- (1) **Classification:** Seed Germination (Tier 1) - Invalid for sugarbeet, corn, pea, and cucumber. Core for onion, soybean, sorghum, tomato, rape, and wheat. (Tier 2) - Core for soybean and rape.

Seedling Emergence (Tier 1) - Invalid for corn, pea, sugarbeet, and cucumber. Core for wheat, sorghum, soybean, onion, tomato, and rape. (Tier 2) - Invalid for cucumber, pea, sugarbeet, and corn. Core for onion, wheat, sorghum, soybean, tomato, and rape.

Vegetative Vigor (Tier 2) - Invalid for sugarbeet, cucumber, corn, and pea. Supplemental for rape. Core for onion, wheat, sorghum, soybean, and tomato.

- (2) **Rationale:** Invalid results were due to fungicidal and/or insecticidal seed treatments. Supplemental results were due to lack of NOEL determination.

- (3) **Repairability:** No.

15. **COMPLETION OF ONE-LINER:** Yes, 1-6-92.

RIN 6995-94

EEB BROMACIL REVIEW

Page _____ is not included in this copy.

Pages 15 through 32 are not included.

The material not included contains the following type of information:

- Identity of product inert ingredients.
- Identity of product impurities.
- Description of the product manufacturing process.
- Description of quality control procedures.
- Identity of the source of product ingredients.
- Sales or other commercial/financial information.
- A draft product label:
- The product confidential statement of formula.
- Information about a pending registration action.*
- FIFRA registration data.
- The document is a duplicate of page(s) _____.
- The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

rape height

Summary Statistics and ANOVA

Transformation = None

| Group | n | Mean | s.d. | cv% |
|-------------|---|--------|--------|------|
| 1 = control | 4 | 7.1250 | 1.7557 | 24.6 |
| 2 0.00586 | 4 | 6.4750 | .4349 | 6.7 |
| 3 0.0117 | 4 | 6.1000 | 1.2936 | 21.2 |
| 4* 0.0234 | 3 | 4.2667 | .6028 | 14.1 |

NOEL = 0.0117 lb ai/A
 LOEL = 0.0234 lb ai/A

*) the mean for this group is significantly less than the control mean at alpha = 0.05 (1-sided) by a t - test with Bonferroni adjustment of alpha level

Minumum detectable difference for t-tests with Bonferroni adjustment = -2.045328
 This difference corresponds to -28.71 percent of control

 *
 * Note - the above value for the minimum
 * detectable difference is approximate as
 * the sample sizes are not the same for all of
 * the groups.
 *

Between groups sum of squares = 14.847667 with 3 degrees of freedom.
 Error mean square = 1.414697 with 11 degrees of freedom.
 Bartlett's test p-value for equality of variances = .152

rape height

Estimated EC Values and Confidence Limits

| Point | Conc. | Lower 95% Confidence | Upper Limits |
|---------|--------|-------------------------|-----------------|
| EC 1.00 | 0.0046 | | |
| EC 5.00 | 0.0072 | | |
| EC10.00 | 0.0092 | | |
| EC15.00 | 0.0107 | | |
| EC50.00 | 0.0211 | | |
| EC85.00 | 0.0413 | | |
| EC90.00 | 0.0484 | | |
| EC95.00 | 0.0613 | | |
| EC99.00 | 0.0954 | | |

$$y = 10.94 + 3.54(x)$$

$y =$ probit % inhibition

$x =$ log (rate)

$$EC_{25} = 0.0136 \text{ lb. w./A}$$

rape root weight

Summary Statistics and ANOVA

Transformation = None

| Group | n | Mean | s.d. | cv% |
|--------------------------------------|---|--------|--------|------|
| 1 = control <i>calc (16 a.1A)</i> | 4 | 6.6925 | 2.4592 | 36.7 |
| 2* 0.00586 | 4 | 3.7775 | 1.6251 | 43.0 |
| 3* 0.0117 | 4 | 2.8500 | .8406 | 29.5 |
| 4* 0.0234 | 4 | 1.9075 | .4106 | 21.5 |
| 5* 0.0468 | 4 | 1.1850 | .3243 | 27.4 |

NOEL could not be determined

NOEL = 0.0057 16 a.1A

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

Minimum detectable difference for Dunnett's test = -2.320642
This difference corresponds to -34.68 percent of control

Between groups sum of squares = 73.401250 with 4 degrees of freedom.

Error mean square = 1.933848 with 15 degrees of freedom.

Bartlett's test p-value for equality of variances = .011

rape root weight

Estimated EC Values and Confidence Limits

| Point | Conc. | Lower 95% Confidence | Upper Limits |
|---------|--------|-------------------------|-----------------|
| EC 1.00 | 0.0001 | 0.0000 | 0.0003 |
| EC 5.00 | 0.0004 | 0.0001 | 0.0008 |
| EC10.00 | 0.0007 | 0.0002 | 0.0014 |
| EC15.00 | 0.0012 | 0.0004 | 0.0021 |
| EC50.00 | 0.0083 | 0.0057 | 0.0108 |
| EC85.00 | 0.0590 | 0.0435 | 0.0922 |
| EC90.00 | 0.0939 | 0.0646 | 0.1673 |
| EC95.00 | 0.1871 | 0.1143 | 0.4098 |
| EC99.00 | 0.6817 | 0.3279 | 2.2384 |

$$y = 7.53 + 1.21(x)$$

y = probit % inhibition

x = log (rate)

$$F_{0.05} = 0.0023 \text{ lb a/A}$$

Ecological Effects Branch One-Liner Data Entry Form

Chemical Propanil Shaughnessy No. C-12501 Pesticide Use Herbicide

| MOST SENSITIVE TERRESTRIAL VEG, GERM/EMERGE | % AI | EC ₂₅ (95%CL) | DAYS | NOEC lbs/A or ppm | STUDY/REVIEW DATES | MRID/CATEGORY | LAB | RC |
|---|------|--------------------------|------|-------------------|--------------------|--|-----|-----|
| MONOCOT | | | | | | | | |
| 1. | | | | | | | | |
| 2. | | | | | | | | |
| DICOT | | | | | | | | |
| 1. All species equal | 85.7 | > 24.0 lbs/A | 5 | 0.016 u/A | 1992/1993 | Final for corn, pea, cucumber, etc. | DUF | M/M |
| 2. Rape - height Brassic rapeseed | 85.7 | 0.0136 lbs/A | 14 | 0.0117 lbs/A | 1992/1993 | Support data for the remaining species | DUF | M/M |
| VEGETATIVE VIGOR | | | | | | | | |
| MONOCOT | | | | | | | | |
| 1. | | | | | | | | |
| 2. | | | | | | | | |
| DICOT | | | | | | | | |
| 1. Rape root dry weight Brassic rapeseed | 85.7 | 0.0023 lbs/A | 21 | END* | 1992/1993 | available for corn, pea, cucumber, and support data for rape. Core for corn, pea, etc. | DUF | M/M |
| 2. | | | | | | | | |

COMMENTS: * - available not informative

Supporting studies and reports