



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

EEB file

APR 3 - 1996

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

MEMORANDUM

Subject: D223753 and D223769 -- New chemical screen for CGA-77102 [a metalochlor isomer also known as Dual Magnum Herbicide]-- (Chemical Code: 108800).

Anthony F. Maciorowski, Chief  
Ecological Effects Branch  
Environmental Fate and Effects Division  
7507C

*Maciorowski*  
04/03/96

To: Joanne Miller, PM 23  
(Eugene Wilson)  
Registration Division  
7505C

The Ecological Effects Branch (EEB) has examined, in a cursory manner, the 13 studies -- MRID Nos. 439289-06 through 439289-13 and 439289-29 through 439289-33 -- sent to EEB in support of the registration of the herbicide CGA-77102, a metalochlor isomer also known as Dual Magnum Herbicide. The studies appear to be of acceptable quality and could be used for registration purposes; however, only detailed review and evaluation of these studies can establish their final scientific acceptability.

EEB concludes that Dual Magnum Herbicide **passes the new chemical screen but with the condition** that EEB will make the determination whether further bridging data are required after review of the available CGA-77102 data and, particularly, the chronic studies with metalochlor (a 1:1 mixture of CGA-77101 and CGA-77102). A metalochlor invertebrate study is in-house awaiting EEB review. Further, it is our understanding that the metalochlor avian reproduction studies will be submitted to the Agency in May, 1996.

If we can be of further assistance, please contact Alvaro A. Yamhure of the EEB staff at (703) 305-6179.

Attachments

DP BARCODE: D223753

CASE: 046822 DATA PACKAGE RECORD DATE: 03/04/96  
SUBMISSION: S501350 BEAN SHEET Page 1 of 1

\*\*\* CASE/SUBMISSION INFORMATION \*\*\*

CASE TYPE: REGISTRATION ACTION: 100 NC-FOOD/FEED USE  
RANKING : 0 POINTS ()  
CHEMICALS: 108800 CGA-77102 %

ID#: 000100-IRA DUAL MAGNUM HERBICIDE  
COMPANY: 000100 CIBA-GEIGY CORP  
PRODUCT MANAGER: 23 JOANNE MILLER 703-305-6224 ROOM: CM2 237  
PM TEAM REVIEWER: EUGENE WILSON 703-305-6103 ROOM: CM2 245  
RECEIVED DATE: 01/26/96 DUE OUT DATE: 08/03/96

\*\*\* DATA PACKAGE INFORMATION \*\*\*

DP BARCODE: 223753 EXPEDITE: N DATE SENT: 03/04/96 DATE RET.: / /  
CHEMICAL: 108800 CGA-77102  
DP TYPE: 001 Submission Related Data Package

CSF: Y LABEL: Y  
ASSIGNED TO DATE IN DATE OUT ADMIN DUE DATE: 07/02/96  
DIV : EFED 3/18/96 // NEGOT DATE: //  
BRAN: EEB 3/18/96 // PROJ DATE: //  
SECT: IO // //  
REVR : // //  
CONTR: // //

\*\*\* DATA REVIEW INSTRUCTIONS \*\*\*

Please screen this new chemical. There are 4 product applications: 100-IRA, 100-IRL, 100-IRI and 100-IRT. One is a technical product for manufacture use only. The others are end use-products. I am sending a bean sheet for only one of the end use product (100-IRA). After it passes the screen, a bean sheet will be sent for each product, so keep the labels and CSF for each of the products that are attached. Please note the time to have the screen completed and return the pink copy to indicate if it passed your screening process or not. You have ten (10) days to complete the screen of this new chemical. If there are any questions, do not hesitate to call me at 305-6103.

Thank you, Eugene Wilson

\*\*\* DATA PACKAGE EVALUATION \*\*\*

No evaluation is written for this data package

\*\*\* ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION \*\*\*

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
223748	TSCB/IO	03/04/96	07/02/96	Y	Y	Y
223750	TB-1/IO	03/04/96	07/02/96	Y	Y	Y

DP BARCODE: D223769

CASE: 046823 DATA PACKAGE RECORD DATE: 03/04/96  
SUBMISSION: S501353 BEAN SHEET Page 1 of 1

\*\*\* CASE/SUBMISSION INFORMATION \*\*\*

CASE TYPE: REGISTRATION ACTION: 100 NC-FOOD/FEED USE  
RANKING : 0 POINTS ()  
CHEMICALS: 108800 CGA-77102 96.0000%

ID#: 000100-IRL CGA-77102 TECHNICAL  
COMPANY: 000100 CIBA-GEIGY CORP  
PRODUCT MANAGER: 23 JOANNE MILLER 703-305-6224 ROOM: CM2 237  
PM TEAM REVIEWER: EUGENE WILSON 703-305-6103 ROOM: CM2 245  
RECEIVED DATE: 01/26/96 DUE OUT DATE: 08/03/96

\*\*\* DATA PACKAGE INFORMATION \*\*\*

DP BARCODE: 223769 EXPEDITE: N DATE SENT: 03/04/96 DATE RET.: //  
CHEMICAL: 108800 CGA-77102  
DP TYPE: 001 Submission Related Data Package

CSF: Y LABEL: Y  
ASSIGNED TO DATE IN DATE OUT ADMIN DUE DATE: 07/02/96  
DIV : EFED 3/15/96 NEGOT DATE: //  
BRAN: EEB 3/18/96 PROJ DATE: //  
SECT: IO // // *Really is an EEB*  
REVR: // // *action*  
CONTR: // //

\*\*\* DATA REVIEW INSTRUCTIONS \*\*\*

Please screen, see instructions under the end-use  
bean sheet attached. Eugene Wilson 305-6103  
Thank you,

\*\*\* DATA PACKAGE EVALUATION \*\*\*

No evaluation is written for this data package

\*\*\* ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION \*\*\*

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
223762	RCAB/IO	03/04/96	07/02/96	Y Y Y		

DP Barcode : D223753  
 PC Code No : 108800  
 EEB Out : APR 3 1996

To: Joanne Miller  
 Product Manager 23  
 Registration Division (7505C)

From: Anthony F. Maciorowski, Chief  
 Ecological Effects Branch/EFED (7507C)

Attached, please find the EEB review of...

Reg./File # : 000100-IRA  
 Chemical Name : CGA-77102 (Isomer of metolachlor)  
 Type Product : Herbicide  
 Product Name : Dual Magnum Herbicide  
 Company Name : Ciba-Geigy Corporation  
 Purpose : Submission of new chemical for screening -  
 technical product.

Action Code : 100 Date Due : 03/25/96  
 Scientist : A. Yamhure Date In : 03/18/96

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  
 NR=Not Reviewed

DP Barcode : D223769  
 PC Code No : 108800  
 EEB Out : APR 3 1996

To: Joanne Miller  
 Product Manager 23  
 Registration Division (7505C)

From: Anthony F. Maciorowski, Chief  
 Ecological Effects Branch/EFED (7507C)

Attached, please find the EEB review of...

Reg./File # : 000100-IRL  
 Chemical Name : CGA-77102 (Isomer of metolachlor)  
 Type Product : Herbicide  
 Product Name : CGA-77102 Technical  
 Company Name : Ciba-Geigy Corporation  
 Purpose : Submission of new chemical for screening -  
 technical product.

Action Code : 100 Date Due : 03/25/96  
 Scientist : A. Yamhure Date In : 03/18/96

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  
 NR=Not Reviewed

Debbie McCall  
308-2718

DP BARCODE: D223769

CASE: 046823 DATA PACKAGE RECORD DATE: 03/04/96  
SUBMISSION: S501353 BEAN SHEET Page 1 of 1

\*\*\* CASE/SUBMISSION INFORMATION \*\*\*

CASE TYPE: REGISTRATION ACTION: 100 NC-FOOD/FEED USE  
RANKING : 0 POINTS ()  
CHEMICALS: 108800 CGA-77102 96.0000%

ID#: 000100-IRL CGA-77102 TECHNICAL  
COMPANY: 000100 CIBA-GEIGY CORP  
PRODUCT MANAGER: 23 JOANNE MILLER 703-305-6224 ROOM: CM2 237  
PM TEAM REVIEWER: EUGENE WILSON 703-305-6103 ROOM: CM2 245  
RECEIVED DATE: 01/26/96 DUE OUT DATE: 08/03/96

\*\*\* DATA PACKAGE INFORMATION \*\*\*

DP BARCODE: 223769 EXPEDITE: N DATE SENT: 03/04/96 DATE RET.: //  
CHEMICAL: 108800 CGA-77102  
DP TYPE: 001 Submission Related Data Package

CSF: Y LABEL: Y  
ASSIGNED TO DATE IN DATE OUT ADMIN DUE DATE: 07/02/96  
DIV : EFED 3/15/96 // NEGOT DATE: //  
BRAN: EEB // // PROJ DATE: //  
SECT: IO // // *Really is an EEB action*  
REVR: // //   
CONTR: // //

\*\*\* DATA REVIEW INSTRUCTIONS \*\*\*

Please screen, see instructions under the end-use  
bean sheet attached. Eugene Wilson 305-6103  
Thank you,

\*\*\* DATA PACKAGE EVALUATION \*\*\*

No evaluation is written for this data package

\*\*\* ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION \*\*\*

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
223762	RCAB/IO	03/04/96	07/02/96	Y	Y	Y

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\*\*\*\*\*  
 NEW CHEMICAL/FIRST FOOD USE SCREEN  
 \*\*\*\*\*

1. FILE SYMBOL/REG NO (ISB) 100-IRL
2. TOLERANCE PETITION NO. (RSB) \_\_\_\_\_
3. CHEMICAL NAME (RSB) CGA-77102 CGA-77101 CAS# 87392-12-9
4. PESTICIDE CHEMICAL CODE. (RSB) 108800 108799
5. PRODUCT NAME (ISB) CGA-77102 TECHNICAL
6. PM (ISB) 23 7. PM TEAM REVIEWER (PM) J. Wilson (3056103)
8. DATE OF RECEIPT (ISB) 01/26/96
9. USE PATTERN (PM) See labeling
0. DATE OF TRANSMISSION TO PM (ISB) \_\_\_\_\_  
 (EPA Receipt Date plus 3 days)
1. DATE OF TRANSMISSION TO HED/EFED/RSB (PM) 03-04-96  
 (PM Receipt Date plus 5 days)
2. HED/EFED/RSB DUE DATE FOR COMPLETION OF SCREEN 03-18-96  
 (HED/EFED Receipt Date plus 10 days)
3. HED/EFED/RSB REVIEWERS:
- |              |   |
|--------------|---|
| HED:         | EFED:   |
| TB _____     | EEB <input checked="" type="checkbox"/> _____ |
| DEB _____    | EFGWB _____                                   |
| OREB _____   |   |
| RD/RSB _____ |   |
4. HED/EFED/RSB COMPLETION DATE (HED) \_\_\_\_\_ (EFED) \_\_\_\_\_ (RSB) \_\_\_\_\_
5. SUBMISSION BARCODE (PM) \_\_\_\_\_

REGISTRANT PHONE CONTACT INFORMATION (PM)

DATE OF CONTACT \_\_\_\_\_

PERSON CONTACTED \_\_\_\_\_

TITLE \_\_\_\_\_

DECISION & COMMENTS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

STATUS OF PACKAGE

PASSED SCREEN

FAILED SCREEN  
 (Documentation attached)

N/FT  
Ciba Crop Protection

6  
ciba

Ciba-Geigy Corporation  
P.O. Box 18300  
Greensboro, NC 27419-8300  
Telephone 910 632 6000

January 15, 1996

439289-00

Document Processing Desk ( REDUCED RISK APPL)  
Office of Pesticide Programs (H7504C)  
U.S. Environmental Protection Agency  
401 M. Street, S.W.  
Washington, D.C. 20460-0001

Attn: Ms. JoAnne Miller, PM 23

Dear Ms. Miller:

**SUBJECT: APPLICATION FOR REGISTRATION UNDER THE AGENCY'S  
REDUCED RISK INITIATIVE - PR NOTICE 93-9  
CGA-77102 TECHNICAL - A CHIRAL METOLACHLOR**

This application filed with EPA on 1/15/96 requesting reduced risk status for accelerated review for CGA-77102 Technical, a chiral metolachlor.

CGA-77102 Technical was the subject of meetings held with the Agency in August and December, 1995. CGA-77102 is the (R,S, 1S) isomer pair in metolachlor that is responsible for most of the herbicidal activity demonstrated with use of metolachlor. Metolachlor is the most widely used herbicide in the chloroacetamide family of herbicides and is the second most widely used herbicide in the U.S. in terms of pounds applied. It was first registered in 1976 and introduced for use on corn in 1977. Since that time, metolachlor usage has expanded into many additional crops, including soybeans, peanuts, sorghum, potatoes, cotton, safflower, and legume vegetables, as well as several other minor use crops, turf and ornamentals.

Most recently, in 1995, EPA issued a Reregistration Eligibility Decision (RED) for metolachlor. That decision shows the data base for metolachlor is essentially complete with only a few outstanding studies to be submitted (2 small-scale prospective ground water studies, one of which is to be proposed to be conducted with CGA-77102; avian reproduction studies in the bobwhite quail and mallard duck, residue storage stability, and studies to support the turf use).

In developing CGA-77102, Ciba used a "bridging data" concept. Data were developed which would demonstrate the equivalency or enhanced safety profile for CGA-77102.

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DATA EVALUATION RECORD  
S 71-1 - AVIAN SINGLE-DOSE LD<sub>50</sub> TEST

1. CHEMICAL: CGA 77102 PC Code No.: 108800  
2. TEST MATERIAL: CGA 77102 technical Purity: 87.4%  
3. CITATION

Author: Joann B. Beavers  
Title: An Acute Oral Toxicity Study in the  
Mallard with CGA 77102  
Study Completion Date: July 1, 1983  
Laboratory: Wildlife International Ltd., Easton, MD  
Laboratory Report ID: 108-219  
Sponsor: Ciba-Geigy Corporation, Greensboro, NC  
MRID No.: 439289-06  
DP Barcode: D223753 & D223769

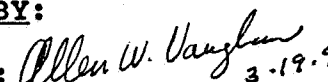

4. REVIEWED BY: Mark A. Mossler, M.S., Toxicologist,  
KBN Engineering and Applied Sciences, Inc.

Signature:  Date: 5/20/96

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

Signature: P. Kosalwat Date: 5/20/96

5. APPROVED BY:

Signature:  3.19.97  Date: 3/13/97

6. STUDY PARAMETERS

Scientific Name of Test Organism: *Anas platyrhynchos*  
Organisms Size: 900-1365 g (treatment group birds)  
Definitive Study Duration: 14 days

7. CONCLUSIONS: This study is scientifically sound and fulfills the guideline requirements for an acute oral toxicity test using the mallard. The LD<sub>50</sub> was >2510 mg/kg (>2194 mg ai/kg), which classifies CGA 77102 technical as practically non-toxic to the mallard duck. The NOEL was determined to be 2510 mg/kg (2194 mg ai/kg).

8. ADEQUACY OF THE STUDY

A. Classification: Core

B. Rationale: N/A

C. Repairability: N/A

9. GUIDELINE DEVIATIONS:

1. The age of the test birds was not reported.
2. The photoperiod (17 hr/day) was much longer than recommended. This might have artificially brought the mature birds into a reproductive state, especially since each cage contained both male and female birds.

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS

A. Test Organisms

Guideline Criteria	Reported Information
<b>Species:</b> A wild waterfowl species, preferably the mallard ( <i>Anas platyrhynchos</i> ), or an upland game bird species, preferably the bobwhite ( <i>Colinus virginianus</i> ).	<i>Anas platyrhynchos</i>
<b>Age at beginning of test:</b> At least 16 weeks old.	Mature
<b>Supplier</b>	In-house flock
<b>Acclimation period:</b> At least 15 days.	2 weeks

B. Test System

Guideline Criteria	Reported Information
<b>Pen facilities adequate?</b>	Yes
<b>Photoperiod:</b> 10-h light, 14-h dark is recommended.	17-h light; 7-h dark
<b>Diet was nutritious and appropriate for species?</b>	Yes

Guideline Criteria	Reported Information
Feed withheld at least 15 hours prior to dosing?	Yes

**C. Test Design**

Guideline Criteria	Reported Information
Range finding test?	No
<b>Definitive Test</b> Nominal concentrations: At least five, in a geometric scale, unless LD <sub>50</sub> > 2000 mg ai/kg.	398, 631, 1000, 1590, and 2510 mg/kg, not corrected for percent active ingredient (ai)
<b>Controls:</b> Water control or vehicle control (if vehicle is used)	Vehicle control
<b>Number of birds per group:</b> 10 (strongly recommended)	10, 5 male and 5 female placed in two pens. Each pen contained either 2 males and 3 females or 3 males and 2 females.
<b>Vehicle:</b> Distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic.	Corn oil
<b>Amount of vehicle per body weight:</b> Constant volume/weight % of body weight, not to exceed 1% (1 mL/100 g).	4 mL/kg of body weight
<b>Observations period:</b> At least 14 days.	14 days

12. REPORTED RESULTS

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	The study was conducted prior to the advent of GLPs. Consequently, no GLP or QA statements were included in the report.
Individual body weights measured at beginning of test, on day 14 and at end of test if extended beyond 14 days?	Body weights measured individually at test initiation, and by group on days 3, 7, and 14 of the test.
Mean feed consumption measured at beginning of test, on day 14, and at end of test if extended beyond 14 days?	Mean feed consumption measured for days 0-3, 4-7, and 8-14
Control Mortality: Not more than 10%	0%
Raw data included?	Yes
Signs of toxicity (if any) were described?	Yes

Mortality

Concentration		No. of Birds	Cumulative Number of Dead							
Nominal (mg/kg)	Actual (mg ai/kg)		Day of Study							
			1	2	3	4	5	6-8	9-11	12-14
Control	N/A	10	0	0	0	0	0	0	0	0
398	348	10	0	0	0	0	0	0	0	0
631	552	10	0	0	0	0	0	0	0	0
1000	874	10	0	0	1	1	1	1	1	1
1590	1390	10	0	0	0	0	0	0	0	0
2510	2194	10	0	0	0	0	0	0	0	0

Other Significant Results: The one mortality noted was due to aggression by a pen-mate, and was not treatment-related.

Reported Statistical Results

Statistical Method: Visual interpretation

LD<sub>50</sub>: >2510 mg/kg                      95% C.I.: N/A  
NOEL: 2510 mg/kg                      Probit Slope: N/A

**13. VERIFICATION OF STATISTICAL RESULTS**

Statistical Method: Visual interpretation

LD<sub>50</sub>: >2194 mg ai/kg                      95% C.I.: N/A  
NOEL: 2194 mg ai/kg                      Probit Slope: N/A

- 14. REVIEWER'S COMMENTS:** Although the study was conducted prior to the inception of Good Laboratory Practices, it followed pertinent EPA and ASTM guidelines (with the exception of the photoperiod length). This study is scientifically sound and fulfills the guideline requirements for an acute oral toxicity test using the mallard. The LD<sub>50</sub> was >2510 mg/kg (>2194 mg ai/kg), which classifies CGA 77102 technical as practically non-toxic to the mallard duck. The NOEL was determined to be 2510 mg/kg (2194 mg ai/kg). The study is classified as Core.

**DATA EVALUATION RECORD**  
**§ 71-1 - AVIAN SINGLE-DOSE LD<sub>50</sub> TEST**

1. **CHEMICAL:** CGA 77102 PC Code No.: 108800

2. **TEST MATERIAL:** CGA 77102 technical Purity: 87.4%

3. **CITATION**

Author: Joann B. Beavers  
Title: An Acute Oral Toxicity Study in the  
 Bobwhite with CGA 77102

Study Completion Date: August 19, 1983

Laboratory: Wildlife International Ltd., Easton, MD

Laboratory Report ID: 108-220

Sponsor: Ciba-Geigy Corporation, Greensboro, NC

MRID No.: 439289-07

DP Barcode: D223753 & D223769

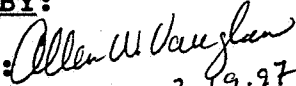
4. **REVIEWED BY:** Mark A. Mossler, M.S., Toxicologist,  
 KBN Engineering and Applied Sciences, Inc.


**Signature:**  **Date:** 5/20/96

**APPROVED BY:** Pim Kosalwat, Ph.D., Senior Scientist,  
 KBN Engineering and Applied Sciences, Inc.

**Signature:** P. Kosalwat **Date:** 5/20/96

5. **APPROVED BY:**

**Signature:**  3.19.97

 **Date:** 3/13/97

6. **STUDY PARAMETERS**

**Scientific Name of Test Organism:** *Colinus virginianus*  
**Organisms Age/Size:** 21 weeks/173-249 g (treatment birds)  
**Definitive Study Duration:** 14 days

7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements for an acute oral toxicity test using the bobwhite. The LD<sub>50</sub> was >2510 mg/kg (>2194 mg ai/kg), which classifies CGA 77102 technical as practically non-toxic to the bobwhite quail. The NOEL was determined to be 1000 mg/kg (874 mg ai/kg).

8. **ADEQUACY OF THE STUDY**

A. **Classification:** Core

B. **Rationale:** N/A

C. Repairability: N/A

9. **GUIDELINE DEVIATIONS:** The photoperiod (14 hr/day) was longer than recommended.

10. **SUBMISSION PURPOSE:**

11. **MATERIALS AND METHODS**

A. Test Organisms

Guideline Criteria	Reported Information
<b>Species:</b> A wild waterfowl species, preferably the mallard ( <i>Anas platyrhynchos</i> ), or an upland game bird species, preferably the bobwhite ( <i>Colinus virginianus</i> ).	<i>Colinus virginianus</i>
<b>Age at beginning of test:</b> At least 16 weeks old.	21 weeks old
<b>Supplier</b>	Barrett's Quail Farm, Houston, TX
<b>Acclimation period:</b> At least 15 days.	2 weeks

B. Test System

Guideline Criteria	Reported Information
<b>Pen facilities adequate?</b>	Yes
<b>Photoperiod:</b> 10-h light, 14-h dark is recommended.	14-h light; 10-h dark
<b>Diet was nutritious and appropriate for species?</b>	Yes
<b>Feed withheld at least 15 hours prior to dosing?</b>	Yes

## C. Test Design

Guideline Criteria	Reported Information
Range finding test?	No
<b>Definitive Test</b> Nominal concentrations: At least five, in a geometric scale, unless LD <sub>50</sub> > 2000 mg ai/kg.	398, 631, 1000, 1590, and 2510 mg/kg, not corrected for percent active ingredient (ai)
<b>Controls:</b> Water control or vehicle control (if vehicle is used)	Vehicle control
<b>Number of birds per group:</b> 10 (strongly recommended)	10 (5 male and 5 female)
<b>Vehicle:</b> Distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic.	Corn oil
<b>Amount of vehicle per body weight:</b> Constant volume/weight % of body weight, not to exceed 1% (1 mL/100 g).	4 mL/kg of body weight
<b>Observations period:</b> At least 14 days.	14 days

12. REPORTED RESULTS

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	The study was conducted prior to the advent of GLPs. Consequently, a GLP statement was not included in the report. A QA audit report was included in the report.
Individual body weights measured at beginning of test, on day 14 and at end of test if extended beyond 14 days?	Body weights measured individually at test initiation, and by group on days 3, 7, and 14 of the test.



Guideline Criteria	Reported Information
Mean feed consumption measured at beginning of test, on day 14, and at end of test if extended beyond 14 days?	Mean feed consumption measured for days 0-3, 4-7, and 8-14
Control Mortality: Not more than 10%	0%
Raw data included?	Yes
Signs of toxicity (if any) were described?	Yes

### Mortality

Concentration		No. of Birds	Cumulative Number of Dead							
Nominal (mg/kg)	Actual (mg ai/kg)		Day of Study							
			1	2	3	4	5	6-8	9-11	12-14
Control	N/A	10	0	0	0*	0	0	0	0	0
398	348	10	0	0	0	0	0	0	0	0
631	552	10	0	0	0	0	0	0	0	0
1000	874	10	0	0	0	0	0	0	0	0
1590	1390	10	0	0	0	0	0	0	0	0
2510	2194	10	0	0	0	0	0	0	0	0

\*One hen was noted as missing on day 3 and was assumed to have escaped.

Other Significant Results: Based on body weight losses observed in the two highest-concentration exposure groups during the first three days of the study, the NOEL was determined to be 1000 mg/kg.

### Reported Statistical Results

Statistical Method: Visual interpretation

LD<sub>50</sub>: >2510 mg/kg  
NOEL: 1000 mg/kg

95% C.I.: N/A  
Probit Slope: N/A

13. VERIFICATION OF STATISTICAL RESULTS

Statistical Method: Visual interpretation

LD<sub>50</sub>: >2194 mg ai/kg

95% C.I.: N/A

NOEL: 874 mg ai/kg

Probit Slope: N/A

14. REVIEWER'S COMMENTS: Although the study was conducted prior to the inception of Good Laboratory Practices, it followed pertinent EPA guidelines (except for the length of the photoperiod). This study is scientifically sound and fulfills the guideline requirements for an acute oral toxicity test using the bobwhite. The LD<sub>50</sub> was >2510 mg/kg (>2194 mg ai/kg), which classifies CGA 77102 technical as practically non-toxic to the bobwhite quail. The NOEL was determined to be 1000 mg/kg (874 mg ai/kg). The study is classified as Core.

**DATA EVALUATION RECORD**  
**§ 71-2 - UPLAND GAME BIRD DIETARY LC<sub>50</sub> TEST**

1. **CHEMICAL:** CGA 77102 PC Code No.: 108800

2. **TEST MATERIAL:** CGA 77102 technical Purity: 87.4%

3. **CITATION:**

Author: Joann B. Beavers  
Title: An Eight-Day Dietary LC<sub>50</sub> in Bobwhite Quail with CGA 77102

Study Completion Date: July 6, 1983

Laboratory: Wildlife International Ltd., Easton, MD

Laboratory Report ID: 108-217

Sponsor: Ciba-Geigy Corporation, Greensboro, NC

MRID No.: 439289-08

DP Barcode: D223753 & D223769

4. **REVIEWED BY:** Mark A. Mossler, M.S., Toxicologist,  
 KBN Engineering and Applied Sciences, Inc.

Signature: 

Date: 5/20/96

**APPROVED BY:** Pim Kosalwat, Ph.D., Senior Scientist,  
 KBN Engineering and Applied Sciences, Inc.

Signature: P. Kosalwat

Date: 5/20/96

5. **APPROVED BY:**

Signature:  3.15.97

Date: 3/13/97

6. **STUDY PARAMETERS**

**Scientific Name of Test Organism:** *Colinus virginianus*

**Age of Test Organisms at Test Initiation:** 12 days

**Definitive Study Duration:** 8 days

7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements for an acute dietary toxicity test using bobwhite quail. Based on nominal concentrations, the LC<sub>50</sub> was greater than 5620 ppm (4912 ppm ai), which classifies CGA 77102 as practically non-toxic to the bobwhite quail. The NOEC was determined to be 3160 ppm (2762 ppm ai).

8. **ADEQUACY OF THE STUDY**

A. **Classification:** Core

B. Rationale: N/A

C. Repairability: N/A

9. GUIDELINE DEVIATIONS: The ambient temperature and average humidity of the testing room were not reported.

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS

A. Test Organisms

Guideline Criteria	Reported Information
<b>Species:</b> An upland game bird species, preferably the bobwhite ; ( <i>Colinus virginianus</i> ).	<i>Colinus virginianus</i>
<b>Age at beginning of test:</b> 10-14 days old.	12 days old
<b>Supplier</b>	Sand Prairie Quail Farm, Maquoketa, IA
<b>Chicks appeared healthy and did not have excessive mortality before the test?</b>	Birds appeared healthy at the initiation of the test.
<b>Acclimation period:</b> As long as possible.	12 days

B. Test System

Guideline Criteria	Reported Information
<b>Pen size:</b> about 35 x 100 x 24 cm	72 x 90 x 23 cm
<b>Brooder temperature:</b> about 35°C (95°F)	38 ±1°C
<b>Room temperature:</b> 22-27°C (71-81°F)	Not reported
<b>Relative humidity:</b> 30-80%	Not reported
<b>Adequate ventilation?</b>	Not reported

Guideline Criteria	Reported Information
<b>Photoperiod</b> Minimum of 14 h of light.	14 h of light/day
<b>Diet:</b> A commercial diet for game birds.	In-house basal diet

## C. Test Design

Guideline Criteria	Reported Information
<b>Range finding test?</b>	None reported
<b>Definitive Test</b> <b>Nominal concentrations:</b> Four minimum, 5 or 6 strongly recommended, in a geometric scale, unless $LC_{50} > 5000$ ppm.	562, 1000, 1780, 3160, and 5620 ppm, not corrected for percent active ingredient (ai)
<b>Controls:</b> Control group tested with diet containing the maximum amount of vehicle used in treated diets?	5 vehicle control groups
<b>Number of birds per group:</b> 10 (strongly recommended)	10 birds per group
<b>Vehicle:</b> Distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic.	Corn oil
<b>Vehicle amount (% of diet by weight):</b> Not more than 2%	2%
<b>Test durations:</b> 5 days with treated feed and at least 3 days observation with "clean" feed.	Yes
<b>No mortality during last 72 hr of observations?</b>	No mortality noted in any group

12. REPORTED RESULTS

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	The study was conducted prior to the advent of GLPs. Consequently, no GLP or QA statements were included in the report.
Body weights measured at beginning and end of study?	Yes, by group
Estimated consumption per pen reported for pretreatment, treatment, and observation periods?	No pretreatment feed consumption values were reported.
Control Mortality: Not more than 10%	No mortality
Raw data included?	Yes
Signs of toxicity (if any) were described?	Yes

Mortality

Concentration		No. of Birds	Cumulative Number of Dead								
Nominal (ppm)	Actual (ppm ai)		Day of Study								
			1	2	3	4	5	6	7	8	
Control	N/A	50	0	0	0	0	0	0	0	0	0
562	491	10	0	0	0	0	0	0	0	0	0
1000	874	10	0	0	0	0	0	0	0	0	0
1780	1556	10	0	0	0	0	0	0	0	0	0
3160	2762	10	0	0	0	0	0	0	0	0	0
5620	4912	10	0	0	0	0	0	0	0	0	0

Other Significant Results: Based on a slight reduction in body weight gain at the highest-concentration exposure level during the first five days of the test, the NOEC was determined to be 3160 ppm (2762 ppm ai).

Statistical Results

Statistical Method: Visual interpretation

LC<sub>50</sub>: >4912 ppm ai

95% C.I.: N/A

NOEC: 2762 ppm ai

Probit Slope: N/A

**13. VERIFICATION OF STATISTICAL RESULTS**

Statistical Method: Visual interpretation

LC<sub>50</sub>: >4912 ppm ai

95% C.I.: N/A

NOEC: 2762 ppm ai

Probit Slope: N/A

- 14. REVIEWER'S COMMENTS:** Although the study was conducted prior to the inception of Good Laboratory Practices, it followed pertinent EPA and ASTM guidelines. Additionally, although the material was not tested on an active ingredient basis up to 5000 ppm ai, the reviewer believes that an additional 88 ppm ai in the diet would not have influenced the overall outcome of the test.

This study is scientifically sound and fulfills the guideline requirements for an acute dietary toxicity test using bobwhite quail. The LC<sub>50</sub> was greater than 5620 ppm (4912 ppm ai), which classifies CGA 77102 as practically non-toxic to the bobwhite quail. The NOEC was determined to be 3160 ppm (2762 ppm ai). The study is classified as Core.

**DATA EVALUATION RECORD**  
**§ 71-2 - WATERFOWL DIETARY LC<sub>50</sub> TEST**


1. **CHEMICAL:** CGA 77102 PC Code No.: 108800
2. **TEST MATERIAL:** CGA 77102 technical Purity: 87.4%

3. **CITATION:**

Author: Joann B. Beavers  
Title: An Eight-Day Dietary LC<sub>50</sub> in Mallard  
 Ducks with CGA 77102

Study Completion Date: June 17, 1983  
Laboratory: Wildlife International Ltd., Easton, MD  
Laboratory Report ID: 108-218  
Sponsor: Ciba-Geigy Corporation, Greensboro, NC  
MRID No.: 439289-09  
DP Barcode: D223753 & D223769

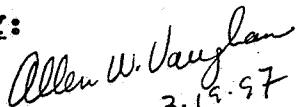
- 4.
- REVIEWED BY:**
- Mark A. Mossler, M.S., Toxicologist,
- 
- KBN Engineering and Applied Sciences, Inc.


Signature:  Date: 5/20/96

**APPROVED BY:** Pim Kosalwat, Ph.D., Senior Scientist,  
KBN Engineering and Applied Sciences, Inc.

Signature: P. Kosalwat Date: 5/20/96

- 5.
- APPROVED BY:**

Signature:  Date: 3/13/97



6. **STUDY PARAMETERS**

**Scientific Name of Test Organism:** *Anas platyrhynchos*  
**Age of Test Organisms at Test Initiation:** 10 days  
**Definitive Study Duration:** 8 days

- 7.
- CONCLUSIONS:**
- This study is scientifically sound and fulfills the guideline requirements for an acute dietary toxicity test using the mallard. Based on nominal concentrations, the LC
- <sub>50</sub>
- was greater than 5620 ppm (4912 ppm ai), which classifies CGA 77102 as practically non-toxic to the mallard duck. The NOEC was determined to be 1780 ppm (1556 ppm ai).

8. **ADEQUACY OF THE STUDY**

A. **Classification:** Core



B. Rationale: N/A

C. Repairability: N/A

9. **GUIDELINE DEVIATIONS:** The ambient temperature, average humidity, and photoperiod of the testing area were not reported.

10. **SUBMISSION PURPOSE:**

11. **MATERIALS AND METHODS**

A. Test Organisms

Guideline Criteria	Reported Information
<b>Species:</b> A wild waterfowl species, preferably the mallard ( <i>Anas platyrhynchos</i> ).	<i>Anas platyrhynchos</i>
<b>Age at beginning of test:</b> 5-10 days old (preferably 5).	10 days old
<b>Supplier</b>	Whistling Wings, Hanover, IL
<b>Ducklings appeared healthy and did not have excessive mortality before the test?</b>	Birds appeared healthy at the initiation of the test.
<b>Acclimation period:</b> As long as possible.	9 days

B. Test System

Guideline Criteria	Reported Information
<b>Pen size:</b> about 70 x 100 x 24 cm	72 x 90 x 24 cm
<b>Brooder temperature:</b> about 35°C (95°F)	35°C
<b>Room temperature:</b> 22-27°C (71-81°F)	Not reported
<b>Relative humidity:</b> 30-80%	Not reported
<b>Adequate ventilation?</b>	Not reported

25

Guideline Criteria	Reported Information
<b>Photoperiod</b> Minimum of 14 h of light.	14 h of light/day
<b>Diet:</b> A commercial waterfowl feed.	In-house basal diet

## C. Test Design

Guideline Criteria	Reported Information
<b>Range finding test?</b>	None reported
<b>Definitive Test</b> <b>Nominal concentrations:</b> Four minimum, 5 or 6 strongly recommended, in a geometric scale, unless $LC_{50} > 5000$ ppm.	562, 1000, 1780, 3160, and 5620 ppm, not corrected for percent active ingredient (ai)
<b>Controls:</b> Control group tested with diet containing the maximum amount of vehicle used in treated diets?	5 vehicle control groups
<b>Number of birds per group:</b> 10 (strongly recommended)	10 birds per group
<b>Vehicle:</b> Distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic.	Corn oil
<b>Vehicle amount (% of diet by weight):</b> Not more than 2%	2%
<b>Test durations:</b> 5 days with treated feed and at least 3 days observation with "clean" feed.	Yes
<b>No mortality during last 72 hr of observations?</b>	Yes

**12. REPORTED RESULTS**

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	The study was conducted prior to the advent of GLPs. Consequently, no GLP or QA statements were included in the report.
Body weights measured at beginning and end of study?	Yes, by group
Estimated consumption per pen reported for pretreatment, treatment, and observation periods?	No pretreatment feed consumption values were reported.
Control Mortality: Not more than 10%	No mortality in the control group
Raw data included?	Yes
Signs of toxicity (if any) were described?	Yes

**Mortality**

Concentration		No. of Birds	Cumulative Number of Dead								
Nominal (ppm)	Actual (ppm ai)		Day of Study								
			1	2	3	4	5	6	7	8	
Control	N/A	50	0	0	0	0	0	0	0	0	0
562	491	10	0	0	0	0	0	0	0	0	0
1000	874	10	0	0	0	0	2	2	2	2	
1780	1556	10	0	0	0	0	0	0	0	0	
3160	2762	10	0	0	0	0	0	0	0	0	
5620	4912	10	0	0	0	0	0	0	0	0	

**Other Significant Results:** Based on a reduction in body weight gain at the two highest-concentration exposure levels during the first five days of the test, the NOEC was determined to be 1780 ppm (1556 ppm ai).

Statistical Results

Statistical Method: Visual interpretation

LC<sub>50</sub>: >4912 ppm ai                      95% C.I.: N/A  
NOEC: 1556 ppm ai                      Probit Slope: N/A

**13. VERIFICATION OF STATISTICAL RESULTS**

Statistical Method: Visual interpretation

LC<sub>50</sub>: >4912 ppm ai                      95% C.I.: N/A  
NOEC: 1556 ppm ai                      Probit Slope: N/A

- 14. REVIEWER'S COMMENTS:** Although the study was conducted prior to the inception of Good Laboratory Practices, it followed pertinent EPA and ASTM guidelines. Additionally, although the material was not tested on an active ingredient basis up to 5000 ppm ai, the reviewer believes that an additional 88 ppm ai in the diet would not have influenced the overall outcome of the test.

This study is scientifically sound and fulfills the guideline requirements for an acute dietary toxicity test using the mallard. The LC<sub>50</sub> was greater than 5620 ppm (4912 ppm ai), which classifies CGA 77102 as practically non-toxic to the mallard duck. The NOEC was determined to be 1780 ppm (1556 ppm ai). The study is classified as **Core**.

**DATA EVALUATION RECORD**  
**§ 72-1 - ACUTE LC<sub>50</sub> TEST WITH A WARMWATER FISH**

1. **CHEMICAL:** CGA 77102 PC Code No.: 108800  
 2. **TEST MATERIAL:** CGA 77102 technical Purity: Not reported

3. **CITATION**

Author: William C. Spare  
Title: The Acute Toxicity of CGA-77102 Technical to Bluegill Sunfish, *Lepomis macrochirus*  
Study Completion Date: July 15, 1983  
Laboratory: Biospherics Inc., Rockville, MD  
Sponsor: Ciba-Geigy Corporation, Greensboro, NC  
Laboratory Report ID: 83-E-168B  
MRID No.: 439289-10  
DP Barcode: D223753 & D223769

4. **REVIEWED BY:** Mark Mossler, M.S., Toxicologist,  
 KBN Engineering and Applied Sciences, Inc.

Signature: *Mark Mossler* Date: 5/20/96

- APPROVED BY:** Pim Kosalwat, Ph.D., Senior Scientist,  
 KBN Engineering and Applied Sciences, Inc.

Signature: P. Kosalwat Date: 5/20/96

5. **APPROVED BY:**

Signature: *Allen W. Vaughan* 3.14.97 Date: 3/13/97

6. **STUDY PARAMETERS**

**Age or Size of Test Organism:** 36-47 mm  
**Definitive Test Duration:** 96 hours  
**Study Method:** Static  
**Type of Concentrations:** Initial measured

7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements. The 96-hour LC<sub>50</sub> for bluegill sunfish exposed to CGA 77102 technical was determined to be 3.2 ppm ai, which classifies this compound as moderately toxic to the bluegill sunfish.

**Results Synopsis**

LC<sub>50</sub>: 3.2 ppm ai 95% C.I.: 2.8 - 4.6 ppm ai  
 NOEC: 1.5 ppm ai Probit Slope: 14.8

**8. ADEQUACY OF THE STUDY**

- A. Classification:** Core
- B. Rationale:** Although the purity of the test substance was not reported, chemical analysis indicated that the purity was approximately 66% ai. The LC<sub>50</sub> was based on measured concentrations.
- C. Repairability:** N/A

**9. GUIDELINE DEVIATIONS**

1. The purity of the test material was not reported.
2. The loading rate (0.57 g/L) was greater than recommended (0.5 g/L).
3. The system used to control the temperature was not reported. The reviewer assumes that it was controlled by ambient air, in which case the test solution temperature should have been monitored continuously.
4. The photoperiod was not reported.
5. The pH (6.8-7.3) was slightly less than recommended (7.2-7.6).

**10. SUBMISSION PURPOSE:****11. MATERIALS AND METHODS****A. Test Organisms**

Guideline Criteria	Reported Information
<b><u>Species</u></b> Preferred species is the bluegill sunfish ( <i>Lepomis macrochirus</i> )	<i>Lepomis macrochirus</i>
<b><u>Mean Weight</u></b> 0.5-5 g	0.85 g
<b><u>Mean Standard Length</u></b> Longest not > 2x shortest	Mean: 42 mm Range: 36-47 mm
<b><u>Supplier</u></b>	Bybrook Bass Hatchery, CT
<b>All fish from same source?</b>	Yes

Guideline Criteria	Reported Information
All fish from the same year class?	Yes, approximately 7 months

## B. Source/Acclimation

Guideline Criteria	Reported Information
<u>Acclimation Period</u> Minimum 14 days	14 days
Wild caught organisms were quarantined for 7 days?	N/A
Were there signs of disease or injury?	Not reported
If treated for disease, was there no sign of the disease remaining during the 48 hours prior to testing?	N/A
<u>Feeding</u> No feeding during the study	Last fed 48 hours prior to testing
<u>Pretest Mortality</u> < 3% mortality 48 hours prior to testing	<1% mortality during the two weeks prior to testing

## C. Test System

Guideline Criteria	Reported Information
<u>Source of dilution water</u> Soft reconstituted water or water from a natural source, not dechlorinated tap water	Well water
Does water support test animals without observable signs of stress?	Yes
<u>Water Temperature</u> 17°C or 22°C	22°C
<u>pH</u> Prefer 7.2 to 7.6	6.8-7.3

Guideline Criteria	Reported Information
<u>Dissolved Oxygen</u> Static: $\geq 60\%$ during 1 <sup>st</sup> 48 hrs and $\geq 40\%$ during 2 <sup>nd</sup> 48 hrs, flow-through: $\geq 60\%$	66-91% of saturation during the first 48 hours of the test, 46-56% of saturation for the second 48 hours.
<u>Total Hardness</u> Prefer 40 to 48 mg/L as CaCO <sub>3</sub>	110 mg/L as CaCO <sub>3</sub> .
<u>Test Aquaria</u> 1. <u>Material:</u> Glass or stainless steel 2. <u>Size:</u> Volume of 18.9 L (5 gal) or 30 x 60 x 30 cm 3. <u>Fill volume:</u> 15-30 L of solution	1. Glass 2. 19-L 3. 15 L
<u>Type of Dilution System</u> Must provide reproducible supply of toxicant	N/A
<u>Flow Rate</u> Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period	N/A
<u>Biomass Loading Rate</u> Static: $\leq 0.8$ g/L at $\leq 17^\circ\text{C}$ , $\leq 0.5$ g/L at $> 17^\circ\text{C}$ ; flow- through: $\leq 1$ g/L/day	0.57 g/L
<u>Photoperiod</u> 16 hours light, 8 hours dark	Not reported
<u>Solvents</u> Not to exceed 0.5 mL/L for static tests or 0.1 mL/L for flow-through tests	Solvent: acetone Maximum conc.: 0.05 mL/L



## D. Test Design

Guideline Criteria	Reported Information
<p><b><u>Range Finding Test</u></b> If LC<sub>50</sub> &gt;100 mg/L with 30 fish, then no definitive test is required.</p>	<p>Yes, 0.01, 0.1, 1.0, 10, and 100 mg/L. Complete mortality at the two highest concentrations by 48 hours, 33% mortality at 1.0 mg/L by 48 hours.</p>
<p><b><u>Nominal Concentrations of Definitive Test</u></b> Control &amp; 5 treatment levels; dosage should be 60% of the next highest concentration; concentrations should be in a geometric series</p>	<p>Control, solvent control, 1.3, 2.2, 3.6, 6.0, and 10.0 mg/L</p>
<p><b><u>Number of Test Organisms</u></b> Minimum 10/level, may be divided among containers</p>	<p>10 fish per treatment level or control</p>
<p>Test organisms randomly or impartially assigned to test vessels?</p>	<p>Yes</p>
<p>Biological observations made every 24 hours?</p>	<p>Yes</p>
<p><b><u>Water Parameter Measurements</u></b> 1. <u>Temperature</u> Measured constantly or, if water baths are used, every 6 hrs, may not vary &gt; 1°C 2. <u>DO and pH</u> Measured at beginning of test and ever 48 h in the high, medium, and low doses and in the control</p>	<p>Temperature, DO, and pH measured daily in each control and treatment solution</p>
<p><b><u>Chemical Analysis</u></b> Needed if solutions were aerated, if chemical was volatile, insoluble, or known to absorb, if precipitate formed, if containers were not steel or glass, or if flow-through system was used</p>	<p>Yes, solutions collected at test initiation were analyzed for CGA 77102.</p>

12. REPORTED RESULTS

## A. General Results

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	The study was conducted before the advent of GLPs. Consequently, a GLP statement was not included in the report. A QA inspection statement was included in the report.
<u>Recovery of Chemical</u>	51-85%
<u>Control Mortality</u> Not more than 10% control organisms may die or show abnormal behavior.	0% mortality in both dilution water and solvent control
Raw data included?	Yes
Signs of toxicity (if any) were described?	Yes, signs observed at the 2 highest concentrations.

Mortality

Concentration (ppm)		Number of Fish	Cumulative Number Dead			
Nominal	Initial Measured		Hour of Study			
			24	48	72	96
Control	<0.01	10	0	0	0	0
Solvent Control	<0.01	10	0	0	0	0
1.3	0.66	10	0	0	0	0
2.2	1.50	10	0	0	0	0
3.6	2.59	10	0	0	1	1
6.0	3.29	10	0	1	4	6
10.0	8.51	10	7	10	10	10

Other Significant Results: Fish exposed at the two highest-concentration treatment levels were observed swimming on the surface.

**B. Statistical Results**

Statistical method: Probit analysis

96-hr LC<sub>50</sub>: 3.2 ppm ai      95% C.I.: 2.8 - 4.6 ppm ai

Probit Slope: Not reported      NOEC: 1.5 ppm ai

**13. VERIFICATION OF STATISTICAL RESULTS**

Parameter	Result
Binomial Test LC <sub>50</sub> (C.I.)	3.2 (2.6 - 8.5) ppm ai
Moving Average Angle LC <sub>50</sub> (95% C.I.)	3.5 (2.7 - 4.3) ppm ai
Probit LC <sub>50</sub> (95% C.I.)	3.2 (2.8 - 4.6) ppm ai
Probit Slope	14.8
NOEC	1.5 ppm ai

- 14. REVIEWER'S COMMENTS:** The report did not state the percentage of active ingredient in the test material. However, chemical analyses were performed on the test solutions collected at test initiation. These analyses indicated that the material contained approximately 66% active ingredient.

Although the test was conducted prior to the implementation of GLPs, the protocol followed approved EPA testing procedures. This study is scientifically sound, fulfills the guideline requirements, and can be classified as Core. The 96-hour LC<sub>50</sub> for bluegill sunfish exposed to CGA 77102 technical was determined to be 3.2 ppm ai, which classifies this compound as moderately toxic to the bluegill sunfish. The NOEC was 1.5 ppm ai.

*Lepomis macrochirus* C6A-77102

\*\*\*\*\*

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
8.51	10	10	100	9.765625E-02
3.29	10	6	60.00001	37.69531
2.59	10	1	10	1.074219
1.5	10	0	0	9.765625E-02
.66	10	0	0	9.765625E-02

THE BINOMIAL TEST SHOWS THAT 2.59 AND 8.51 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 3.149648

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	.1677541	3.503092	2.697623	4.34294

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY	
8	.7380404	1	1	

SLOPE = 14.77408  
95 PERCENT CONFIDENCE LIMITS = 2.081775 AND 27.46638

LC50 = 3.162617  
95 PERCENT CONFIDENCE LIMITS = 2.818505 AND 4.584265

LC10 = 2.594689  
95 PERCENT CONFIDENCE LIMITS = .9881319 AND 2.885221

**DATA EVALUATION RECORD**  
**§ 72-1 - ACUTE LC<sub>50</sub> TEST WITH A COLDWATER FISH**

1. **CHEMICAL:** CGA 77102 PC Code No.: 108800

2. **TEST MATERIAL:** CGA 77102 Purity: 97.6%

3. **CITATION**

Author: Maura K. Collins  
Title: CGA 77102 - Acute Toxicity to Rainbow Trout (*Oncorhynchus mykiss*) Under Static Conditions

Study Completion Date: December 12, 1995

Laboratory: Springborn Laboratories, Inc., Wareham, MA

Sponsor: Ciba-Geigy Corporation, Greensboro, NC

Laboratory Report ID: 95-9-6117

MRID No.: 439289-11

DP Barcode: D223753 & D223769

4. **REVIEWED BY:** Mark Mossler, M.S., Toxicologist,  
 KBN Engineering and Applied Sciences, Inc.,

**Signature:** *Mark Mossler*

**Date:** 5/20/96

**APPROVED BY:** Pim Kosalwat, Ph.D., Senior Scientist,  
 KBN Engineering and Applied Sciences, Inc.,

**Signature:** *P. Kosalwat*

**Date:** 5/20/96

5. **APPROVED BY:**

**Signature:** *Allen W. Vaughan*

3.19.97

**Date:** 3/13/97

6. **STUDY PARAMETERS**

Age or Size of Test Organism:	33-46 mm
Definitive Test Duration:	96 hours
Study Method:	Static
Type of Concentrations:	Mean measured

7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements. The 96-hour LC<sub>50</sub> for rainbow trout exposed to CGA 77102 was determined to be 11.9 ppm ai, which classifies this compound as slightly toxic to the rainbow trout.

**Results Synopsis**

LC<sub>50</sub>: 11.9 ppm ai

NOEC: 2.5 ppm ai

95% C.I.: 8.3 - 15 ppm ai

Probit Slope: N/A

8. ADEQUACY OF THE STUDY

- A. Classification: Core
- B. Rationale: N/A
- C. Repairability: N/A

9. GUIDELINE DEVIATIONS: The dissolved oxygen concentration fell below the recommended level in one treatment solution during the final 72 hours of the test.

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS

A. Test Organisms

Guideline Criteria	Reported Information
<u>Species</u> Preferred species is the rainbow trout ( <i>Oncorhynchus mykiss</i> )	<i>Oncorhynchus mykiss</i>
<u>Mean Weight</u> 0.5-5 g	0.65 g
<u>Mean Standard Length</u> Longest not > 2x shortest	Mean: 42 mm Range: 33-46 mm
<u>Supplier</u>	Spring Creek Hatchery, Lewistown, MT
All fish from same source?	Yes
All fish from the same year class?	Not reported

B. Source/Acclimation

Guideline Criteria	Reported Information
<u>Acclimation Period</u> Minimum 14 days	14 days
Wild caught organisms were quarantined for 7 days?	N/A

Guideline Criteria	Reported Information
Were there signs of disease or injury?	Not reported
If treated for disease, was there no sign of the disease remaining during the 48 hours prior to testing?	N/A
<u>Feeding</u> No feeding during the study	Last fed 48 hours prior to testing
<u>Pretest Mortality</u> < 3% mortality 48 hours prior to testing	<1% mortality in the 48 hours prior to testing

## C. Test System

Guideline Criteria	Reported Information
<u>Source of dilution water</u> Soft reconstituted water or water from a natural source, not dechlorinated tap water	Well water
Does water support test animals without observable signs of stress?	Yes
<u>Water Temperature</u> 12°C	10-12°C
<u>pH</u> Prefer 7.2 to 7.6	6.4-7.4
<u>Dissolved Oxygen</u> Static: ≥ 60% during 1 <sup>st</sup> 48 hrs and ≥ 40% during 2 <sup>nd</sup> 48 hrs, flow-through: ≥ 60%	38-93% saturation during the first 48 hours, 35-67% of saturation during the second half of the test
<u>Total Hardness</u> Prefer 40 to 48 mg/L as CaCO <sub>3</sub>	36 mg/L as CaCO <sub>3</sub>

Guideline Criteria	Reported Information
<b>Test Aquaria</b> 1. <u>Material:</u> Glass or stainless steel 2. <u>Size:</u> Volume of 18.9 L (5 gal) or 30 x 60 x 30 cm 3. <u>Fill volume:</u> 15-30 L of solution	1. Glass 2. 19-L 3. 15 L
<b>Type of Dilution System</b> Must provide reproducible supply of toxicant	N/A
<b>Flow Rate</b> Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period	N/A
<b>Biomass Loading Rate</b> Static: $\leq 0.8$ g/L at $\leq 17^\circ\text{C}$ , $\leq 0.5$ g/L at $> 17^\circ\text{C}$ ; flow- through: $\leq 1$ g/L/day	0.43 g/L
<b>Photoperiod</b> 16 hours light, 8 hours dark	16 hours light, 8 hours dark
<b>Solvents</b> Not to exceed 0.5 mL/L for static tests or 0.1 mL/L for flow-through tests	Solvent: acetone Maximum conc.: 0.5 mL/L

#### D. Test Design

Guideline Criteria	Reported Information
<b>Range Finding Test</b> If $\text{LC}_{50} > 100$ mg/L with 30 fish, then no definitive test is required.	Yes, 0.5, 5.0, and 50 mg ai/L. Complete mortality at the highest concentration by 96 hours and 33% mortality at the 5.0 mg ai/L level.



Guideline Criteria	Reported Information
<u>Nominal Concentrations of Definitive Test</u> Control & 5 treatment levels; dosage should be 60% of the next highest concentration; concentrations should be in a geometric series	3.8, 6.5, 11, 18, 30, and 50 mg ai/L
<u>Number of Test Organisms</u> Minimum 10/level, may be divided among containers	10 per treatment or control group
Test organisms randomly or impartially assigned to test vessels?	Yes
Biological observations made every 24 hours?	Yes
<u>Water Parameter Measurements</u> 1. <u>Temperature</u> Measured constantly or, if water baths are used, every 6 hrs, may not vary > 1°C 2. <u>DO and pH</u> Measured at beginning of test and ever 48 h in the high, medium, and low doses and in the control	1. Temperature measured daily in each solution and continuously in the control solution  2. DO and pH measured daily in each solution
<u>Chemical Analysis</u> Needed if solutions were aerated, if chemical was volatile, insoluble, or known to absorb, if precipitate formed, if containers were not steel or glass, or if flow-through system was used	Yes, analysis conducted on samples collected at test initiation and termination

## 12. REPORTED RESULTS

### A. General Results

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes

Guideline Criteria	Reported Information
<u>Recovery of Chemical</u>	67-84%
<u>Control Mortality</u> Not more than 10% control organisms may die or show abnormal behavior.	0%
Raw data included?	Yes
Signs of toxicity (if any) were described?	Yes, signs observed at all but the lowest concentration

### Mortality

Concentration (ppm)		Number of Fish	Cumulative Number Dead			
Nominal	Mean Measured		Hour of Study			
			24	48	72	96
Control	<0.28	10	0	0	0	0
Solvent Control	<0.28	10	0	0	0	0
3.8	2.5	10	0	0	0	0
6.5	5.3	10	0	0	0	0
11	8.3	10	0	0	0	0
18	15	10	0	1	7	9
30	25	10	10	10	10	10
50	42	10	10	10	10	10

Other Significant Results: Fish exposed at the five highest-concentration treatment levels demonstrated partial/complete loss of equilibrium, extended abdomen, lethargy, residing on the bottom, or death.

### B. Statistical Results

Statistical method: Nonlinear interpolation

96-hr LC<sub>50</sub>: 12 ppm ai

95% C.I.: 8.3 - 15 ppm ai

Probit Slope: N/A

NOEC: 2.5 ppm ai

**13. VERIFICATION OF STATISTICAL RESULTS**

Parameter	Result
Binomial Test LC <sub>50</sub> (C.I.)	11.9 (8.3 - 15) ppm ai
Moving Average Angle LC <sub>50</sub> (95% C.I.)	N/A
Probit LC <sub>50</sub> (95% C.I.)	N/A
Probit Slope	N/A
NOEC	2.5 ppm ai

- 14. REVIEWER'S COMMENTS:** During the first 48 hours of the study, the DO concentration fell to 38% of saturation in the 15 mg ai/L treatment solution. The DO concentrations for the lower-concentration solutions were  $\geq 60\%$  of saturation. During the second 48 hours of the test, DO in this same solution ranged between 35 and 39% of saturation. The DO of the other solutions containing live fish were again  $\geq 60\%$  of saturation during the second 48 hours of the test. Ninety percent of the fish died in the 15 mg ai/L solution over the 96 hour period, and this may have been due to the low DO concentration in this solution. However, it is apparent that the drop in DO in the solution was related to test material presence, and this may be the mode of toxicity for this chemical.

This study is scientifically sound, fulfills the guideline requirements, and can be classified as Core. The 96-hour LC<sub>50</sub> for rainbow trout exposed to CGA 77102 was determined to be 11.9 ppm ai, which classifies this compound as slightly toxic to the rainbow trout. The NOEC was 2.5 ppm ai.

MOSSLER CGA 77102 ONCORHYNCHUS MYKISS 5-14-96

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
42	10	10	100	9.765625E-02
25	10	10	100	9.765625E-02
15	10	9	90	1.074219
8.3	10	0	0	9.765625E-02
5.3	10	0	0	9.765625E-02
2.5	10	0	0	9.765625E-02

THE BINOMIAL TEST SHOWS THAT 8.3 AND 15 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 11.87652

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

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**DATA EVALUATION RECORD**  
**S 72-2 -- ACUTE EC<sub>50</sub> TEST WITH A FRESHWATER INVERTEBRATE**

1. **CHEMICAL:** CGA-77102 PC Code No.: 108800

2. **TEST MATERIAL:** CGA-77102 Purity: 97.6%

3. **CITATION:**

Authors: M. K. Collins  
Title: Acute Toxicity to Daphnids (*Daphnia magna*) Under Static Conditions

Study Completion Date: September 29, 1995

Laboratory: Springborn Laboratories, Inc., Wareham, MA


Sponsor: Ciba-Geigy Corporation, Greensboro, NC

Laboratory Report ID: 95-9-6082

MRID No.: 439289-12

DP Barcode: D223753 and D223769

4. **REVIEWED BY:** Rosemary Graham Mora, M.S., Environmental Scientist, KBN Engineering and Applied Sciences, Inc.

Signature:  Date: 5/14/96

**APPROVED BY:** Pim Kosalwat, Ph.D., Senior Scientist, KBN Engineering and Applied Sciences, Inc.

Signature: P. Kosalwat Date: 5/14/96

5. **APPROVED BY:**

Signature:  Date: 3/17/97

6. **STUDY PARAMETERS:**

<b>Scientific Name of Test Organism:</b>	<i>Daphnia magna</i>
<b>Age of Test Organism:</b>	≤24 hours
<b>Definitive Test Duration:</b>	48 hours
<b>Study Method:</b>	Static
<b>Type of Concentrations:</b>	Mean measured

7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements for a freshwater invertebrate acute toxicity test. A 48-hour EC<sub>50</sub> value of 26 ppm ai classifies CGA-77102 as slightly toxic to *Daphnia magna*. The NOEC was 4.8 ppm ai since no treatment-related sublethal effects were noted at or below this test concentration.

**Results Synopsis**

48-Hour EC<sub>50</sub>: 26 ppm ai  
 NOEL: 4.8 ppm ai

95% C.I.: 23-30 ppm ai  
 Probit Slope: 9.1

8. ADEQUACY OF THE STUDY:

- A. Classification: Core
- B. Rationale: Fulfills requirement.
- C. Repairability: N/A

9. Guideline Deviations: None.

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS:

A. Test Organisms

Guideline Criteria	Reported Information
<u>Species</u> Preferred species is <i>Daphnia magna</i>	<i>Daphnia magna</i>
All organisms are approximately the same size and weight?	Not Reported.
<u>Life Stage</u> Daphnids: 1 <sup>st</sup> instar (<24 h). Amphipods, stoneflies, and mayflies: 2 <sup>nd</sup> instar. Midges: 2 <sup>nd</sup> & 3 <sup>rd</sup> instar.	≤24 hours
<u>Supplier</u>	In-house cultures
All organisms from the same source?	Yes

B. Source/Acclimation

Guideline Criteria	Reported Information
<u>Acclimation Period</u> Minimum 7 days	Parent daphnids were cultured in similar environmental conditions as those used in the test.
Wild caught organisms were quarantined for 7 days?	N/A

Guideline Criteria	Reported Information
Were there signs of disease or injury?	Not reported.
If treated for disease, was there no sign of the disease remaining during the 48 hours prior to testing?	N/A
<u>Feeding</u> No feeding during the study.	No feeding during the study.
<u>Pretest Mortality</u> No more than 3% mortality 48 hours prior to testing.	N/A

**C. Test System:**

Guideline Criteria	Reported Information
<u>Source of dilution water</u> Soft reconstituted water or water from a natural source, not dechlorinated tap water.	A fortified well water based on the ASTM hard water formula.
Does water support test animals without observable signs of stress?	Yes
<u>Water Temperature</u> Daphnia: 20°C Amphipods and mayflies: 17°C Midges and mayflies: 22°C Stoneflies: 12°C	20-21°C in test solutions. 19-22°C in water bath.
<u>pH</u> Prefer 7.2 to 7.6.	8.1-8.3
<u>Dissolved Oxygen</u> Static: ≥ 60% during 1 <sup>st</sup> 48 h and ≥ 40% during 2 <sup>nd</sup> 48 h, flow-through: ≥ 60%.	≥82% saturation throughout the study
<u>Total Hardness</u> Prefer 40 to 48 mg/L as CaCO <sub>3</sub> .	180 mg/L as CaCO <sub>3</sub>

Guideline Criteria	Reported Information
<p><b>Test Aquaria</b></p> <p>1. <u>Material</u>: Glass or stainless steel.</p> <p>2. <u>Size</u>: 250 ml (daphnids and midges) or 3.9 L (1 gal).</p> <p>3. <u>Fill volume</u>: 200 ml (daphnids and midges) or 2-3 L.</p>	<p>1. Glass</p> <p>2. 250-ml beakers</p> <p>3. 200 ml of test solution</p>
<p><b>Type of Dilution System</b> Must provide reproducible supply of toxicant.</p>	N/A
<p><b>Flow Rate</b> Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period.</p>	N/A
<p><b>Biomass Loading Rate</b> Static: <math>\leq 0.8</math> g/L at <math>\leq 17^\circ\text{C}</math>, <math>\leq 0.5</math> g/L at <math>&gt; 17^\circ\text{C}</math>; flow-through: <math>\leq 1</math> g/L/day.</p>	Not reported.
<p><b>Photoperiod</b> 16 hours light, 8 hours dark.</p>	16 hours light, 8 hours dark
<p><b>Solvents</b> Not to exceed 0.5 ml/L for static tests or 0.1 ml/L for flow-through tests.</p>	<p><b>Solvent:</b> acetone <b>Maximum conc.:</b> 0.50 ml/L</p>

#### D. Test Design

Guideline Criteria	Reported Information
<p><b>Range Finding Test</b> If <math>EC_{50} &gt; 100</math> mg/L, then no definitive test is required.</p>	Nominal test concentrations for this study were based on the results of preliminary testing.
<p><b>Nominal Concentrations of Definitive Test</b> Control &amp; 5 treatment levels; a geometric series with each concentration being at least 60% of the next higher one.</p>	Dilution water control, solvent control and six nominal test concentrations: 3.8, 6.5, 11, 18, 30, and 50 mg ai/L.



<b><u>Number of Test Organisms</u></b> Minimum 20/level, may be divided among containers.	5 daphnids per vessel, 4 vessels per level
<b>Test organisms randomly or impartially assigned to test vessels?</b>	Yes
<b><u>Water Parameter Measurements</u></b> 1. <u>Temperature</u> Measured continuously or, if water baths are used, every 6 h, may not vary > 1°C. 2. <u>DO and pH</u> Measured at beginning of test and ever 48 h in the high, medium, and low doses and in the control.	1. Temperature was measured daily in one replicate of each treatment and continuously in the water bath.  2. DO and pH were measured daily in one replicate of each treatment.
<b><u>Chemical Analysis</u></b> Needed if solutions were aerated, if chemical was volatile, insoluble, or known to absorb, if precipitate formed, if containers were not steel or glass, or if flow-through system was used	Chemical analysis was performed at test initiation on samples of each test solution collected prior to distribution to beakers and at test termination on composite samples.

**12. REPORTED RESULTS:**

<b>Guideline Criteria</b>	<b>Reported Information</b>
<b>Quality assurance and GLP compliance statements were included in the report?</b>	Yes
<b><u>Control Mortality</u></b> Static: ≤10% Flow-through: ≤5%	10% in the dilution water control and 5% in the solvent control
<b><u>Percent Recovery of Chemical</u></b>	72-83% of nominal
<b>Raw data included?</b>	Yes

Mortality

Concentration (ppm ai)		Number of Organ- isms	Cumulative Number Immobile			
Nominal	Mean Measured		Hour of Study			
			24	48	72	96
Control	<0.01	20	0	2	NA*	NA
Solvent Control	<0.01	20	0	1	NA	NA
3.8	2.9	20	0	0	NA	NA
6.5	4.8	20	0	0	NA	NA
11	7.9	20	0	0	NA	NA
18	15	20	0	0	NA	NA
30	23	20	0	7	NA	NA
50	41	20	1	19	NA	NA

\* Not applicable.

Other Significant Results: At 48 hours, one to three daphnids were observed to be lethargic in both controls and the two lowest test concentrations. Five or more of the surviving daphnids at 7.9-23 ppm ai concentrations were observed to be lethargic. The surviving daphnid at 41 ppm ai was lethargic.

B. Statistical Results

Method: Probit analysis

48-hr EC<sub>50</sub>: 26 ppm ai

95% C.I.: 23-30 ppm ai

Probit Slope: Not reported.

NOEC: 15 ppm ai

**13. VERIFICATION OF STATISTICAL RESULTS:**

Parameter	Result
Binomial Test EC <sub>50</sub> (C.I.)	26 (15-41) ppm ai
Moving Average Angle EC <sub>50</sub> (95% C.I.)	26 (23-30) ppm ai
Probit EC <sub>50</sub> (95% C.I.)	26 (23-30) ppm ai
Probit Slope	9.1
NOEC	4.8 ppm ai

**14. REVIEWER'S COMMENTS:** The number of lethargic daphnids at test termination appeared to be treatment-related at concentrations  $\geq 7.9$  ppm ai.

This study is scientifically sound and fulfills the guideline requirements for a freshwater invertebrate acute toxicity test. A 48-hour EC<sub>50</sub> value of 26 ppm ai classifies CGA-77102 as slightly toxic to *Daphnia magna*. The NOEC was 4.8 ppm ai. This study is classified as **Core**.

RGM D.magna CGA77102

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
41	20	19	95	2.002716E-03
23	20	7	35	13.1588
15	20	0	0	9.536742E-05
7.9	20	0	0	9.536742E-05
4.8	20	0	0	9.536742E-05
2.9	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 15 AND 41 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 26.09803

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	6.572952E-02	26.23943	23.4658	29.73202

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
7	.166601	1	.9702016

SLOPE = 9.058939  
 95 PERCENT CONFIDENCE LIMITS = 5.361372 AND 12.75651

LC50 = 26.08767  
 95 PERCENT CONFIDENCE LIMITS = 23.05247 AND 30.10789

LC10 = 18.89044  
 95 PERCENT CONFIDENCE LIMITS = 14.82462 AND 21.57633

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**DATA EVALUATION RECORD**  
**ACUTE LC<sub>50</sub> TEST WITH AN ESTUARINE/MARINE SHRIMP**  
**§ 72-3(c)**

1. **CHEMICAL:** CGA-77102 PC Code No.: 108800
2. **TEST MATERIAL:** CGA-77102 Technical Purity: Not reported.

3. **CITATION:**

Authors: W.C. Spare  
Title: The Acute Toxicity of CGA-77102 Technical to *Mysidopsis bahia* (Bay Shrimp)

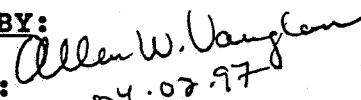
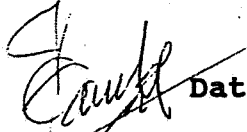
Study Completion Date: September 26, 1983  
Laboratory: Biospherics Incorporated, Rockville, MD  
Sponsor: Ciba-Geigy Corporation, Greensboro, NC  
Laboratory Report ID: 83-E-168M  
MRID No.: 439289-13  
DP Barcode: D223753 and D223769

4. **REVIEWED BY:** Rosemary Graham Mora, M.S.  
 Environmental Scientist  
 KBN Engineering and Applied Sciences, Inc.

Signature:  Date: 5/8/96

**APPROVED BY:** Pim Kosalwat, Ph.D.  
 Senior Scientist  
 KBN Engineering and Applied Sciences, Inc.

Signature: P. Kosalwat Date: 5/8/96

5. **APPROVED BY:**   
Signature:  Date: 3/13/97

6. **STUDY PARAMETERS:**

**Age or Size of Test Organism:** 1-5 days old  
**Definitive Test Duration:** 96 hours  
**Study Method:** Static  
**Type of Concentrations:** Mean Measured

7. **CONCLUSIONS:** This study is not scientifically sound and does not fulfill the guideline requirements for an acute toxicity test using estuarine invertebrates. The age of the test organisms (1-5 days at test initiation) was  $\geq 24$  hours old and was variable among the test population. A 96-hour LC<sub>50</sub> of 1.41 ppm ai classifies CGA-77102 as moderately toxic to *Mysidopsis bahia*. The NOEC was not determined.

**Results Synopsis**

96-Hour LC<sub>50</sub>: 1.41 ppm ai  
NOEC: Not determined.

95% C.I.: 1.17-1.68 ppm ai  
Probit Slope: 4.95

**8. ADEQUACY OF THE STUDY:**

- A. **Classification:** Invalid.
- B. **Rationale:** The age of the test organisms (1-5 days old at test initiation) was  $\geq 24$  hours at test initiation and was variable among the test population.
- C. **Repairability:** No.

**9. BACKGROUND:**

**10. GUIDELINE DEVIATIONS:** This study was conducted in 1983 before the EPA SEP guidance was available (1985); therefore, many deviations from the current guidelines were noted and include the following:

- 1. The age of the test organisms (1-5 days old at test initiation) was  $\geq 24$  hours and was variable among the test population. The current guidelines require mysids  $\leq 24$  hours old at test initiation.
- 2. Pretest mortality of the test population was not reported.
- 3. The concentration of solvent used in the solvent control and test solutions was not reported; the guidelines limit the solvent concentration to  $\leq 0.5$  ml/L for a static test.
- 4. The purity of the test material was not reported.
- 5. The salinity (30‰) of test solutions during this study was higher than recommended (salinity of 10-17‰) for a euryhaline species.
- 6. The pH of the test solutions (7.2-7.4) was lower than recommended (7.7-8.0) for a euryhaline species.
- 7. The construction material of the test vessels was not reported. Glass or stainless steel is recommended.
- 8. The system used to control the temperature was not reported. The reviewer assumes that it was control by

ambient air. The test temperature was recorded daily, not continuously as recommended. In addition, it is not clear from which vessel the temperature was recorded.

11. SUBMISSION PURPOSE:

12. MATERIALS AND METHODS:

A. Test Organisms

Guideline Criteria	Reported Information
<u>Species</u> Preferred species are <i>Mysidopsis bahia</i> , <i>Penaeus setiferus</i> , <i>P. duorarun</i> , <i>P. aztecus</i> and <i>Palaemonetes sp.</i>	<i>Mysidopsis bahia</i>
<u>Age</u> Juvenile, mysids should be ≤ 24 hours old	1-5 days old at test initiation
<u>Supplier</u>	Sea Plantation Inc., Salem, MA
All shrimp are from same source?	Yes
All shrimp are from the same year class?	Mysids were 1-5 days old at test initiation.

B. Source/Acclimation

Guideline Criteria	Reported Information
<u>Acclimation Period</u> minimum 10 days	Test organisms were acclimated to the dilution water for one day prior to test initiation.
Wild caught organisms were quarantined for 7 days?	N/A
Were there signs of disease or injury?	Not reported.
If treated for disease, was there no sign of the disease remaining during the 48 hours prior to testing?	N/A

Guideline Criteria	Reported Information
<u>Feeding</u> No feeding during the study and no feeding for 24 hours before the beginning of the test if organisms are over 0.5 g each.	Mysids were fed <i>Artemia</i> at test initiation.
<u>Pretest Mortality</u> <3% mortality 48 hours prior to testing	Not reported.

### C. Test System

Guideline Criteria	Reported Information
<u>Source of dilution water</u> Natural or reconstituted seawater	Reconstituted seawater, rigorously aerated before use.
Does water support test animals without observable signs of stress?	Not reported.
<u>Salinity</u> 30-34 % for marine (stenohaline) shrimp and 10-17 % for estuarine (euryhaline) shrimp, weekly range < 6%	30%
<u>Water Temperature</u> Approx. 22 ± 1 °C	21°C
<u>pH</u> 8.0-8.3 for marine (stenohaline) shrimp, 7.7-8.0 for estuarine (euryhaline) shrimp, monthly range < 0.8	7.2-7.4
<u>Dissolved Oxygen</u> Static: ≥ 60% during 1 <sup>st</sup> 48 hrs and ≥ 40% during 2 <sup>nd</sup> 48 hrs, Flow-through: ≥ 60%	≥65% saturation during 1 <sup>st</sup> 48 hrs and ≥55% during 2 <sup>nd</sup> 48 hrs
<u>Total Organic Carbon</u>	Not reported



Guideline Criteria	Reported Information
<p><b><u>Test Aquaria</u></b>  <b>1. <u>Material:</u></b>  Glass or stainless steel  <b>2. <u>Size:</u></b>  19.6 L is acceptable for organisms <math>\geq 0.5</math> g (e.g. pink shrimp, white shrimp, and brown shrimp), 3.9 L is acceptable for smaller organisms (e.g. mysids and grass shrimp).  <b>3. <u>Fill volume:</u></b>  15 L is acceptable for organisms <math>\geq 0.5</math> g, 2-3 L is acceptable for smaller organisms.</p>	<p>1. Not reported  2. 250-mL beakers  3. 200 mL test solution</p>
<p><b><u>Type of Dilution System</u></b>  Must provide reproducible supply of toxicant</p>	<p>Static system</p>
<p><b><u>Flow Rate</u></b>  Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period</p>	<p>N/A</p>
<p><b><u>Biomass Loading Rate</u></b>  Static: <math>\leq 0.8</math> g/L at <math>\leq 17^\circ\text{C}</math>, <math>\leq 0.5</math> g/L at <math>&gt; 17^\circ\text{C}</math>; flow-through: <math>\leq 1</math> g/L/day</p>	<p>Not reported</p>
<p><b><u>Photoperiod</u></b>  16 hours light, 8 hours dark</p>	<p>16 h light, 8 h dark</p>
<p><b><u>Solvents</u></b>  Not to exceed 0.5 mL/L for static tests or 0.1 mL/L for flow-through tests</p>	<p>Solvent: Acetone  Maximum conc.: Not reported</p>

## D. Test Design

Guideline Criteria	Reported Information
<p><b><u>Range Finding Test</u></b> If LC<sub>50</sub> &gt;100 mg/L with 30 shrimp, then no definitive test is required.</p>	<p>Test concentrations for the definitive study were based upon the results of preliminary testing.</p>
<p><b><u>Nominal Concentrations of Definitive Test</u></b> Control &amp; 5 treatment levels; a geometric series in which each concentration is at least 60% of the next higher one.</p>	<p>Control; solvent control; and 0.66, 1.1, 1.8, 3.0, 5.0 mg/L</p>
<p><b><u>Number of Test Organisms</u></b> Minimum 20/level, may be divided among containers</p>	<p>5 mysids per test chamber; 4 replicate test chambers per treatment and control.</p>
<p><b>Test organisms randomly or impartially assigned to test vessels?</b></p>	<p>Yes</p>
<p><b>Biological observations made every 24 hours?</b></p>	<p>Yes</p>
<p><b><u>Water Parameter Measurements</u></b> 1. <u>Temperature</u> Measured constantly or, if water baths are used, every 6 hrs, may not vary &gt; 1°C 2. <u>DO and pH</u> Measured at beginning of test and ever 48 h in the high, medium, and low doses and in the control</p>	<p>1. Temperature was recorded daily. 2. DO and pH were measured daily in each treatment and control.</p>
<p><b><u>Chemical Analysis</u></b> needed if solutions were aerated, if chemical was volatile, insoluble, or known to absorb, if precipitate formed, if containers were not steel or glass, or if flow-through system was used</p>	<p>Test solutions were analyzed using gas chromatography at test initiation and termination.</p>

**13. REPORTED RESULTS:****A. General Results**

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	The GLP statement indicated that this study was conducted prior to the implementation of GLP standards.
<u>Recovery of Chemical</u>	77-104%
<u>Control Mortality</u> Not more than 10% of control organisms may die or show abnormal behavior.	0% in both controls
Raw data included?	Mean % survival was reported.
Signs of toxicity (if any) were described?	None reported.

Mortality

Concentration		Number of Shrimp	Cumulative Number Dead			
Nominal (ppm)	Mean Measured (ppm ai)		Hour of Study			
			24	48	72	96
Control	<0.01	20	0	0	0	0
Solvent Control	<0.01	20	0	0	0	0
0.66	0.51	20	1	1	1	1
1.1	0.96	20	2	2	2	2
1.8	1.7	20	2	8	14	14
3.0	3.1	20	2	8	15	19
5.0	4.6	20	9	15	15	20

Other Significant Results: None reported.

**B. Statistical Results**

Method: Moving Average Method

96-Hour LC<sub>50</sub>: 1.4 ppm ai      95% C.I.: 1.16-1.67 ppm ai  
 Probit Slope: Not reported.      NOEC: <0.51 ppm ai

**14. VERIFICATION OF STATISTICAL RESULTS:**

Parameter	Result
Binomial Test LC <sub>50</sub> (C.I.)	1.41 (0.96-3.13) ppm ai
Moving Average Angle LC <sub>50</sub> (95% C.I.)	1.40 (1.15-1.67) ppm ai
Probit LC <sub>50</sub> (95% C.I.)	1.41 (1.17-1.68) ppm ai
Probit Slope	4.95
NOEC	Not determined.

**15. REVIEWER'S COMMENTS:** The reviewer questions whether the reported value for the hardness of the dilution water was a typographical error. The value (6,000 mg/L as CaCO<sub>3</sub>) seems unusually high.

This study is not scientifically sound and does not fulfill the guideline requirements for an acute toxicity test using estuarine invertebrates. This study was conducted in 1983 before the EPA SEP was available (1985), therefore, many deviations from the current guidelines were noted; most importantly, the age of the test organisms (1-5 days old at test initiation) was ≥24 hours at test initiation and was variable among the test population. Current guidelines require mysids which are ≤24 hours old at test initiation. This study is classified as Invalid.

A 96-hour LC<sub>50</sub> value of 1.41 ppm ai classifies CGA-77102 as moderately toxic to mysids. The NOEC could not be determined since mortality was noted at all concentrations tested.

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RGM Bay Shrimp CGA-77102

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
4.61	20	20	100	9.536742E-05
3.13	20	19	95	2.002716E-03
1.67	20	14	70	5.765915
.96	20	2	10	2.012253E-02
.51	20	1	5	2.002716E-03

THE BINOMIAL TEST SHOWS THAT .96 AND 3.13 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 1.406309

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
4	.0517176	1.403039	1.152042 1.668302

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	.1094463	1	.3183674

SLOPE = 4.945184  
 95 PERCENT CONFIDENCE LIMITS = 3.309185 AND 6.581183

LC50 = 1.407836  
 95 PERCENT CONFIDENCE LIMITS = 1.172586 AND 1.680962

LC10 = .7793569  
 95 PERCENT CONFIDENCE LIMITS = .5405514 AND .9662971

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DATA EVALUATION RECORD  
ALGAE OR DIATOM EC<sub>50</sub> TEST  
GUIDELINE 123-2 (TIER II)

1. CHEMICAL: CGA-77102 PC Code No.: 108800

2. TEST MATERIAL: CGA 77102 Purity: 97.6%

3. CITATION:

Authors: James R. Hoberg  
Title: CGA 77102: 5-Day Toxicity to the  
Freshwater Green Alga *Selenastrum*  
*capricornutum*

Study Completion Date: September 20, 1995

Laboratory: Springborn Laboratories, Inc., Wareham,  
MA

Sponsor: Ciba-Geigy Corporation, Greensboro, NC

Laboratory Report ID: 95-8-6031

DP Barcode: D223753 and D223769

MRID No.: 439289-29

4. REVIEWED BY: Max Feken, M.S., Environmental Toxicologist,  
KBN Engineering and Applied Sciences, Inc.

Signature:



Date: 5/16/96

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

Signature:

P. Kosalwat

Date: 5/16/96

5. APPROVED BY:

Signature:

Allen W. Vaughan  
3-19-97

Date: 3/13/97

6. STUDY PARAMETERS:

Definitive Test Duration: 120 hours

Type of Concentrations: Mean measured

7. CONCLUSIONS: This study is scientifically sound and fulfills  
the guideline requirements for an aquatic plant toxicity  
test.

Results Synopsis

EC<sub>50</sub>: 0.0080 ppm ai

95% C.I.: 0.0026 - 0.025 ppm ai

NOEC: 0.0015 ppm ai

Probit Slope: 3.0

8. ADEQUACY OF THE STUDY:

- A. Classification: Core
- B. Rationale: N/A
- C. Repairability: N/A

9. GUIDELINE DEVIATIONS: None

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS:

A. Test Organisms

Guideline Criteria	Reported Information
<u>Species</u> Skeletonema costatum Anabaena flos-aquae Selenastrum capricornutum Navicula pelliculosa	Selenastrum capricornutum
<u>Initial Number of Cells</u> 3,000 - 10,000 cells/mL	3,000 cells/mL
<u>Nutrients</u> Standard formula, e.g. 20XAAP	AAP medium

B. Test System

Guideline Criteria	Reported Information
<u>Solvent</u>	Acetone (0.1 mL/L)
<u>Temperature</u> Skeletonema: 20°C Others: 24-25°C	24°C
<u>Light Intensity</u> Anabaena: 2.0 Klux (±15%) Others: 4.0-5.0 Klux (±15%)	3.23 - 4.57 Klux
<u>Photoperiod</u> Skeletonema: 14 h light, 10 h dark or 16 h light, 8 h dark Others: Continuous	Continuous

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Guideline Criteria	Reported Information
<u>pH</u> Skeletonema: approx. 8.0 Others: approx. 7.5	Initial: 7.5 Final: 8.3 - 9.8

## C. Test Design

Guideline Criteria	Reported Information
<u>Dose range</u> 2X or 3X progression	2X
<u>Doses</u> at least 5	Definitive test: 0.00081, 0.0016, 0.0031, 0.0063, 0.013, 0.025, and 0.050 mg ai/L
<u>Controls</u> negative and/or solvent	Negative and solvent control
<u>Replicates per dose</u> 3 or more	3
<u>Duration of test</u> 120 hours	120 hours
Daily observations were made?	Yes
<u>Method of Observations</u>	Cellular counts
<u>Maximum Labeled Rate</u>	Not reported

12. REPORTED RESULTS:

Guideline Criteria	Reported Information
Initial and 120 h cell densities were measured?	Yes
Control cell count at 120 hr >2X initial count?	Yes
Initial chemical concentrations measured? (Optional)	Yes
Raw data included?	Yes



Dose Response

Mean Measured Concentration (mg ai/L)	Avg. Cell Density ( $\times 10^4$ cells/ml)	% reduction*	120-Hour pH
Control	152	--	9.7
Solvent Cont.	153	--	9.7
0.0009	151	1	9.7
0.0015	143	6	9.8
0.0030	142	7	9.7
0.0055	136	11	9.7
0.011	62	59	9.1
0.022	7	95	8.3
0.047	2	99	8.3

\*Compared to the pooled controls

Other Significant Results: Bloated algal cells were observed in all but the lowest concentration (0.0009 mg ai/L) at test termination. Cell fragments were also evident among algae in the 0.0030, 0.0055, 0.011, 0.022 and 0.047 mg ai/L concentrations.

Statistical Results

Statistical Method: The "best fit" linear regression based on the highest coefficient of determination ( $r^2$ ) was used for estimating the  $EC_{50}$  and Williams' test was used for mean comparisons. Results based on the mean measured concentrations.

$EC_{50}$ : 0.0080 mg ai/L      95% C.I.: 0.0026 - 0.025 mg ai/L

Probit Slope: 3.0      NOEC: 0.0030 mg ai/L

**13. VERIFICATION OF STATISTICAL RESULTS:**

Statistical Method: Weighted nonlinear model (PROC NLIN) for  $EC_{50}$  and Williams' test for mean comparisons. Results based on the mean measured concentrations.

EC<sub>50</sub>: 0.0097 ppm ai                      95% C.I.: 0.0087 - 0.0109 ppm ai

Probit Slope: N/A                      NOEC: 0.0015 ppm ai

14. REVIEWER'S COMMENTS: This study is scientifically sound and fulfills the guideline requirements for an aquatic plant toxicity test. Based on mean measured concentrations, the 120-hour EC<sub>50</sub> and NOEC for *Selenastrum capricornutum* exposed to CGA 77102 was 0.0080 and 0.0015 ppm ai, respectively. This study is categorized as Core.

GA-77102 - SELENASTRUM CAPRICORNUTUM

file: 43928929

Transform: NO TRANSFORMATION

t-test of Solvent and Blank Controls

Ho:GRP1 MEAN = GRP2 MEAN

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GRP1 (SOLVENT CTRL) MEAN = 153.0000      CALCULATED t VALUE = 0.1971  
 GRP2 (BLANK CTRL) MEAN = 151.6667      DEGREES OF FREEDOM = 4  
 DIFFERENCE IN MEANS = 1.3333

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ABLE t VALUE (0.05 (2), 4) = 2.776      NO significant difference at alpha=0.05  
 ABLE t VALUE (0.01 (2), 4) = 4.604      NO significant difference at alpha=0.01

GA-77102 - SELENASTRUM CAPRICORNUTUM

file: 43928929

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)      TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	GRPS 1&2 POOLED	6	152.333	152.333	152.333
2	0.00091	3	150.333	150.333	150.333
3	0.0015	3	143.333	143.333	143.333
4	0.0030	3	142.000	142.000	142.000
5	0.0055	3	136.000	136.000	136.000
6	0.011	3	62.333	62.333	62.333
7	0.022	3	7.333	7.333	7.333
8	0.047	3	1.667	1.667	1.667

GA-77102 - SELENASTRUM CAPRICORNUTUM

file: 43928929

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)      TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
GRPS 1&2 POOLED	152.333				
0.00091	150.333	0.386		1.73	k= 1, v=19
0.0015	143.333	1.735		1.81	k= 2, v=19
0.0030	142.000	1.992	*	1.84	k= 3, v=19
0.0055	136.000	3.148	*	1.85	k= 4, v=19
0.011	62.333	17.349	*	1.86	k= 5, v=19
0.022	7.333	27.951	*	1.87	k= 6, v=19
0.047	1.667	29.043	*	1.87	k= 7, v=19

s = 7.337

Note: df used for table values are approximate when v > 20.

NOEC = 0.0015 mg/L

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.047	100	99	99	0
.022	100	95	95	0
.011	100	59	59	0
.0055	100	11	11	0
.003	100	9	9	0
.0015	100	6	6	0
.00091	100	1	1	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 9.785657E-03

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
5	1.340491E-02	9.058489E-03	8.036996E-03	1.024307E-02

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	.2192975	8.016559	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 = 2.906033  
95 PERCENT CONFIDENCE LIMITS = 1.545161 AND 4.266906

LC50 = 8.803004E-03  
95 PERCENT CONFIDENCE LIMITS = 5.699988E-03 AND 1.408549E-02

LC10 = 3.218172E-03  
95 PERCENT CONFIDENCE LIMITS = 1.19779E-03 AND 5.089855E-03

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OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.00000	-3.04096	146	142	151	142	157	156
2	0.00091	-2.82391	147	154	150	142	157	156
3	0.00150	-2.52288	139	149	142	150	157	156
4	0.00300	-2.25964	136	153	137	136	136	136
5	0.00550	-1.95861	80	52	35	35	35	35
6	0.01100	-1.65758	6	7	9	9	9	9
7	0.02200	-1.32790	2	1	2	2	2	2
8	0.04700	0.02200	2	1	2	2	2	2

MODEL: COUNT = CO \* PROBNOORM ((LOG\_EC50 - LOG\_CONC) / SIGMA)  
 WEIGHTED REGRESSION 11:25 Wednesday, May 1, 1996

Non-Linear Least Squares Iterative Phase

Iter	Dependent Variable	LOG_EC50	SIGMA	CO	Weighted SS
0	LOG_EC50	-2.055000	0.344000	152.000000	54.361982
1	LOG_EC50	-2.001477	0.242788	149.018597	32.735734
2	LOG_EC50	-2.011877	0.242676	150.035622	34.659406
3	LOG_EC50	-2.011268	0.241909	149.990894	34.989696
4	LOG_EC50	-2.011373	0.242006	149.999608	34.954041
5	LOG_EC50	-2.011358	0.241992	149.998392	34.959173
6	LOG_EC50	-2.011360	0.241994	149.998564	34.958448
7	LOG_EC50	-2.011360	0.241994	149.998540	34.958551
8	LOG_EC50	-2.011360	0.241994	149.998544	34.958536
9	LOG_EC50	-2.011360	0.241994	149.998543	34.958538
10	LOG_EC50	-2.011360	0.241994	149.998543	34.958538

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics

Source	DF	Weighted SS	Dependent Variable	CO
Regression	3	2843.000000	Weighted MS	947.6666667
Residual	24	34.9585379	Weighted MS	1.4566057
Uncorrected Total	27	2877.9585379		
(Corrected Total)	26	2722.4123672		

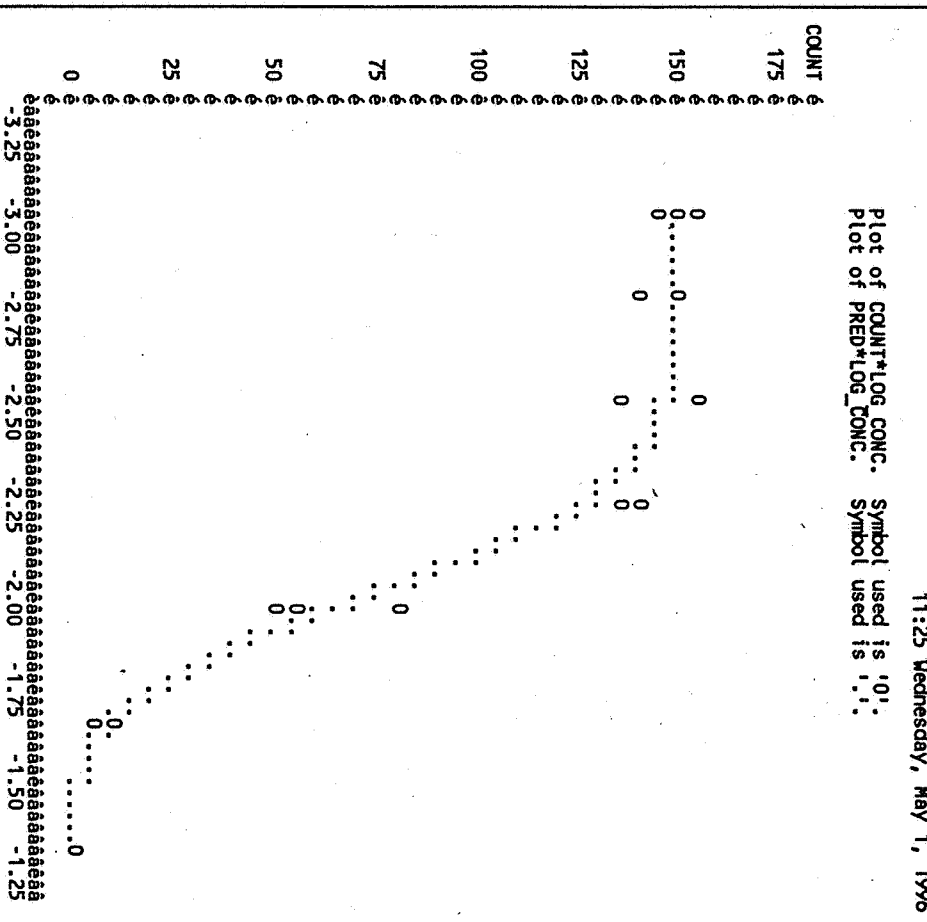
Asymptotic Correlation Matrix

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95% Confidence Interval
LOG_EC50	-2.0113602	0.0229135364	-2.05865101 -1.96406934
SIGMA	0.2419941	0.01964212519	0.20149819 0.28249008
CO	149.9985431	3.87535954544	142.00018445 157.99690184

CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM

OBS	CONC	LOG_EC50	SIGMA	CO	RESID_SS	EC50
1	0	-2.01136	0.24199	149.999	34.9585	.0097418

CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM  
 SUMMARY OF NONLINEAR REGRESSION  
 11:25 Wednesday, May 1, 1996



NOTE: 1747 obs had missing values. 1680 obs hidden.  
 CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM  
 COMPARISON OF MEANS FOR NOEL DETERMINATION  
 TEST IF TREATMENT IS LESS THAN CONTROL  
 11:25 Wednesday, May 1, 1996

General Linear Models Procedure  
 Class Level Information

Class	Levels	Values
DOSE	8	0 0.003 0.011 0.022 0.047 0.0015 0.0055 0.00091

Number of observations in data set = 48

NOTE: Due to missing values, only 27 observations can be used in this analysis.

CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM 6  
 COMPARISON OF MEANS FOR NOEL DETERMINATION  
 TEST IF TREATMENT IS LESS THAN CONTROL  
 11:25 Wednesday, May 1, 1996

General Linear Models Procedure

Dependent Variable: RESPONSE	DF	Sum of Squares	Mean Square	F Value	Pr > F
Source	7	97114.96296	13873.56614	257.76	0.0001
Model	7	97114.96296	13873.56614	257.76	0.0001
Error	19	1022.66667	53.82456		
Corrected Total	26	98137.62963			

R-Square 0.989579 C.V. 6.967503 Root MSE 7.336522 RESPONSE Mean 105.2963

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	7	97114.96296	13873.56614	257.76	0.0001
Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	7	97114.96296	13873.56614	257.76	0.0001

CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM 7  
 COMPARISON OF MEANS FOR NOEL DETERMINATION  
 TEST IF TREATMENT IS LESS THAN CONTROL  
 11:25 Wednesday, May 1, 1996

General Linear Models Procedure

Level of DOSE	N	Mean	SD
0	6	152.333333	7.4475947
0.003	3	142.000000	9.5393920
0.011	3	62.333333	15.3731367
0.022	3	7.333333	1.5275252
0.047	3	1.666667	0.5773503
0.071	3	143.333333	5.1316014
0.095	3	136.000000	2.0000000
0.00091	3	150.333333	3.5118846

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE  
 NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.  
 Alpha= 0.05 Confidence= 0.95 df= 19 MSE= 53.82456  
 Critical Value of Dunnett's T= 2.593

Comparisons significant at the 0.05 level are indicated by \*\*\*\*.  
 Simultaneous Simultaneous

DOSE Comparison	Lower Confidence Limit	Difference Between Means	Upper Confidence Limit
0 - 0	-15.450	-2.000	11.450
0.0015 - 0	-22.450	-9.000	4.450
0.003 - 0	-23.783	-10.333	3.117
0.0055 - 0	-29.783	-16.333	-2.883
0.011 - 0	-103.450	-90.000	-76.550
0.022 - 0	-158.450	-145.000	-131.550
0.047 - 0	-164.117	-150.667	-137.217

DATA EVALUATION RECORD  
ALGAE OR DIATOM EC<sub>50</sub> TEST  
GUIDELINE 123-2 (TIER II)

1. CHEMICAL: CGA-77102 PC Code No.: 108800

2. TEST MATERIAL: CGA 77102 Purity: 97.6%

3. CITATION:

Authors: James R. Hoberg  
Title: CGA 77102: 5-Day Toxicity to the Marine Diatom *Skeletonema costatum*

Study Completion Date: September 22, 1995

Laboratory: Springborn Laboratories, Inc., Wareham, MA

Sponsor: Ciba-Geigy Corporation, Greensboro, NC

Laboratory Report ID: 95-8-6062

DP Barcode: D223753 and D223769

MRID No.: 439289-30

4. REVIEWED BY: Max Feken, M.S., Environmental Toxicologist, KBN Engineering and Applied Sciences, Inc.

Signature:



Date: 5/16/96

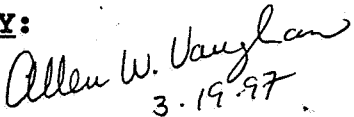
APPROVED BY: Pim Kosalwat, Ph.D., Senior Scientist, KBN Engineering and Applied Sciences, Inc.

Signature:

Date:

5. APPROVED BY:

Signature:



Allen W. Vaughan  
3.19.97

Date: 3/13/97

6. STUDY PARAMETERS:

Definitive Test Duration: 120 hours  
Type of Concentrations: Mean measured

7. CONCLUSIONS: This study is scientifically sound and fulfills the guideline requirements for an aquatic plant toxicity test.

Results Synopsis

EC<sub>50</sub>: 0.11 ppm ai                      95% C.I.: 0.091 - 0.128 ppm ai

NOEC: 0.021 ppm ai                      Probit Slope: N/A

8. ADEQUACY OF THE STUDY:

A. Classification: Core

B. Rationale: N/A

C. Repairability: N/A

9. GUIDELINE DEVIATIONS: None

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS:

A. Test Organisms

Guideline Criteria	Reported Information
<u>Species</u> <i>Skeletonema costatum</i> <i>Anabaena flos-aquae</i> <i>Selenastrum capricornutum</i> <i>Navicula pelliculosa</i>	<i>Skeletonema costatum</i>
<u>Initial Number of Cells</u> 3,000 - 10,000 cells/mL	10,000 cells/mL
<u>Nutrients</u> Standard formula, e.g. 20XAAP	Artificially enriched seawater (AES) medium

B. Test System

Guideline Criteria	Reported Information
<u>Solvent</u>	Acetone (0.1 mL/L)
<u>Temperature</u> Skeletonema: 20°C Others: 24-25°C	20 - 21°C
<u>Light Intensity</u> Anabaena: 2.0 Klux (±15%) Others: 4.0-5.0 Klux (±15%)	3.77 - 4.31 Klux
<u>Photoperiod</u> Skeletonema: 14 h light, 10 h dark or 16 h light, 8 h dark Others: Continuous	16 h light, 8 h dark

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Guideline Criteria	Reported Information
<u>pH</u> Skeletonema: approx. 8.0 Others: approx. 7.5	Initial: 8.0 Final: 8.0 - 8.5

## C. Test Design

Guideline Criteria	Reported Information
<u>Dose range</u> 2X or 3X progression	3X
<u>Doses</u> at least 5	0.0024, 0.0081, 0.027, 0.090, 0.30, and 1.0 mg ai/L
<u>Controls</u> negative and/or solvent	Negative and solvent control
<u>Replicates per dose</u> 3 or more	3
<u>Duration of test</u> 120 hours	120 hours
Daily observations were made?	Yes
<u>Method of Observations</u>	Cellular counts
<u>Maximum Labeled Rate</u>	Not reported

12. REPORTED RESULTS:

Guideline Criteria	Reported Information
Initial and 120 h cell densities were measured?	Yes
Control cell count at 120 hr $\geq$ 2X initial count?	Yes
Initial chemical concentrations measured? (Optional)	Yes
Raw data included?	Yes

Dose Response

Mean Measured Concentration (mg ai/L)	Avg. Cell Density ( $\times 10^4$ cells/ml)	% reduction*	120-Hour pH
Control	107	--	8.5
Solvent Cont.	111	--	8.4
0.0022	111	-2	8.4
0.0065	116	-6	8.4
0.021	112	-3	8.5
0.081	66	39	8.4
0.28	21	81	8.1
0.90	6	94	8.0

\*Compared to the pooled controls

Other Significant Results: Bloated algal cells were observed in all but the lowest concentration (0.0022 mg ai/L) at test termination. Cell fragments were also evident among algae in the 0.081, 0.28, and 0.90 mg ai/L concentrations.

Statistical Results

Statistical Method: A "best fit" linear regression based on the highest coefficient of determination ( $r^2$ ) was used for estimating the  $EC_{50}$  and Williams' test was used for mean comparisons. Results based on the mean measured concentrations.

$EC_{50}$ : 0.11 mg ai/L  
Probit Slope: N/A

95% C.I.: 0.041 - 0.32 mg ai/L  
NOEC: 0.021 mg ai/L

13. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Weighted nonlinear model (PROC NLIN) for  $EC_{50}$  and Williams' test for mean comparisons. Results based on the mean measured concentrations.

$EC_{50}$ : 0.11 ppm ai  
Probit Slope: N/A

95% C.I.: 0.091 - 0.128 ppm ai  
NOEC: 0.021 ppm ai

14. REVIEWER'S COMMENTS: This study is scientifically sound and fulfills the guideline requirements for an aquatic plant toxicity test. Based on mean measured concentrations, the 120-hour EC<sub>50</sub> and NOEC for *Skeletonema costatum* exposed to CGA 77102 was 0.11 and 0.021 ppm ai, respectively. This study is categorized as Core.

GA-77102 - SKELETONEMA COSTATUM

file: 43928930

Transform: NO TRANSFORMATION

t-test of Solvent and Blank Controls

Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN = 111.0000      CALCULATED t VALUE = 0.5696  
GRP2 (BLANK CRTL) MEAN = 107.3333      DEGREES OF FREEDOM = 4  
DIFFERENCE IN MEANS = 3.6667

TABLE t VALUE (0.05 (2), 4) = 2.776      NO significant difference at alpha=0.05  
TABLE t VALUE (0.01 (2), 4) = 4.604      NO significant difference at alpha=0.01

GA-77102 - SKELETONEMA COSTATUM

file: 43928930

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)      TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	GRPS 1&2 POOLED	6	109.167	109.167	111.467
2	0.0022	3	111.000	111.000	111.467
3	0.0065	3	115.667	115.667	111.467
4	0.021	3	112.333	112.333	111.467
5	0.081	3	66.000	66.000	66.000
6	0.28	3	21.333	21.333	21.333
7	0.90	3	5.667	5.667	5.667

GA-77102 - SKELETONEMA COSTATUM

file: 43928930

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)      TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
GRPS 1&2 POOLED	111.467				
0.0022	111.467	0.567		1.74	k= 1, v=17
0.0065	111.467	0.567		1.82	k= 2, v=17
0.021	111.467	0.567		1.85	k= 3, v=17
0.081	66.000	10.641	*	1.87	k= 4, v=17
0.28	21.333	21.652	*	1.87	k= 5, v=17
0.90	5.667	25.514	*	1.88	k= 6, v=17

s = 5.737

Note: df used for table values are approximate when v > 20.

NOEL = 0.071 mg/L

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.9	100	94	94	0
.28	100	81	81	0
.081	100	39	39	0
.021	100	0	0	0
.0065	100	0	0	0
.0022	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 .1103604

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	1.195013E-02	.1419063	.1180533	.173083

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	.1206985	2.678543	2.997118E-02

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

SLOPE = 2.285676  
95 PERCENT CONFIDENCE LIMITS = 1.491594 AND 3.079758

LC50 = .1290334  
95 PERCENT CONFIDENCE LIMITS = 8.570662E-02 AND .1930194

LC10 = .0358978  
95 PERCENT CONFIDENCE LIMITS = 1.558597E-02 AND 5.781935E-02

\*\*\*\*\*

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	-2.65758	113	102	118	116	104	102
2	0.0022	-2.18709	116	105	112	.	.	.
3	0.0065	-1.67778	123	115	109	.	.	.
4	0.0210	-1.09151	110	118	109	.	.	.
5	0.0810	-0.55284	62	72	64	.	.	.
6	0.2800	-0.04576	20	19	25	.	.	.
7	0.9000	-0.04576	7	6	4	.	.	.

MODEL: COUNT = CO \* PROBNORM ((LOG\_EC50 - LOG\_CONC) / SIGMA)  
 WEIGHTED REGRESSION 09:50 Thursday, May 2, 1996

Non-Linear Least Squares Iterative Phase

Iter	LOG_EC50	SIGMA	Method: Gauss-Newton	Weighted SS
0	-0.889000	0.438000	109.000000	21.481878
1	-0.979641	0.538301	113.391975	12.999040
2	-0.963398	0.516415	112.971426	12.951586
3	-0.968771	0.521886	113.166942	12.897393
4	-0.967428	0.520477	113.119605	12.906536
5	-0.967688	0.520840	113.132098	12.903880
6	-0.967771	0.520747	113.128893	12.904572
7	-0.967705	0.520765	113.129508	12.904416
8	-0.967707	0.520766	113.129549	12.904408
9	-0.967707	0.520766	113.129552	12.904407
10	-0.967707	0.520766	113.129551	12.904407
11	-0.967707	0.520766	113.129551	12.904407
12	-0.967707	0.520766	113.129551	12.904407
13	-0.967707	0.520766	113.129551	12.904407

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics

Source	DF	Weighted SS	Dependent Variable COUNT	Weighted MS
Regression	3	1951.000000		650.3333333
Residual	21	12.9044072		0.6144956
Uncorrected Total	24	1963.9044072		
(Corrected Total)	23	1355.6990476		

Parameter Estimate

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95% Confidence Interval
LOG_EC50	-0.9677067	0.0360427169	-1.04266102 -0.89275232
SIGMA	0.5207660	0.0320787238	0.45405517 0.58747685
CO	113.1295515	2.3840247007	108.17173939 118.08736357

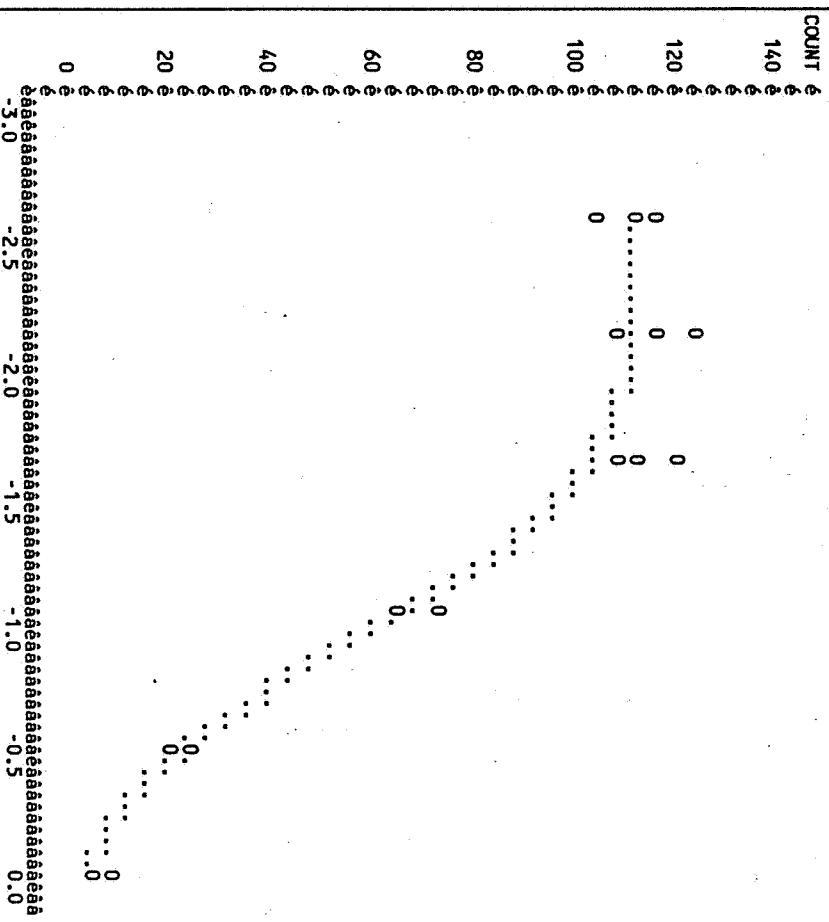
Asymptotic Correlation Matrix

	LOG_EC50	SIGMA	CO
LOG_EC50	1		
SIGMA	-0.679547075	1	
CO	0.3650789465	0.3650789465	1

CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM  
 MODEL: COUNT = CO \* PROBNORM ((LOG\_EC50 - LOG\_CONC) / SIGMA)  
 SUMMARY OF NONLINEAR REGRESSION  
 09:50 Thursday, May 2, 1996

OBS CONC LOG\_EC50 SIGMA CO RESID\_SS EC50

MODEL: COUNT = CO \* PROBNORM ((LOG\_EC50 - LOG\_CONC) / SIGMA)  
 Plot of PRED\*LOG\_CONC. Symbol used is '1'.  
 09:50 Thursday, May 2, 1996



NOTE: 2643 obs had missing values. 2571 obs hidden.  
 CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM  
 COMPARISON OF MEANS FOR NOEL DETERMINATION  
 TEST IF TREATMENT IS LESS THAN CONTROL  
 09:50 Thursday, May 2, 1996

General Linear Models Procedure  
 Class Level Information

Class	Levels	Values
DOSE	7	0 0.9 0.28 0.021 0.081 0.0022 0.0065

Number of observations in data set = 42

OBS CONC LOG\_EC50 SIGMA CO RESID\_SS EC50

CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM  
 COMPARISON OF MEANS FOR NOEL DETERMINATION  
 TEST IF TREATMENT IS LESS THAN CONTROL  
 09:50 Thursday, May 2, 1996

General Linear Models Procedure

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	42389.45833	7064.90972	214.66	0.0001
Error	17	559.50000	32.91176		
Corrected Total	23	42948.95833			
R-Square		C.V.	Root MSE	RESPONSE Mean	
	0.986973	7.057153	5.736878	81.29167	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	6	42389.45833	7064.90972	214.66	0.0001
Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	6	42389.45833	7064.90972	214.66	0.0001

CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM  
 COMPARISON OF MEANS FOR NOEL DETERMINATION  
 TEST IF TREATMENT IS LESS THAN CONTROL  
 09:50 Thursday, May 2, 1996

General Linear Models Procedure

Level of DOSE	N	Mean	SD
0	6	109.166667	7.33257572
0.9	3	5.666667	1.52752523
0.28	3	21.333333	3.21655025
0.021	3	112.333333	4.93288286
0.081	3	66.000000	5.29150262
0.0022	3	111.000000	5.56776436
0.0065	3	115.666667	7.02376917

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 17 MSE= 32.91176  
 Critical Value of Dunnett's T= 2.554

Comparisons significant at the 0.05 level are indicated by \*\*\*\*.

DOSE Comparison	Lower Confidence Limit	Difference Between Means	Upper Confidence Limit
0.0065 - 0	-3.861	6.500	16.861
0.021 - 0	-7.194	3.167	13.527
0.0022 - 0	-8.527	1.833	12.194
0.081 - 0	-53.527	-43.167	-32.806
0.28 - 0	-98.194	-87.833	-77.473
0.9 - 0	-113.861	-103.500	-93.139

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**DATA EVALUATION RECORD  
EC<sub>50</sub> TEST WITH LEMNA GIBBA  
GUIDELINE 123-2 (TIER II)**

1. **CHEMICAL:** CGA-77102 PC Code No.: 108800

2. **TEST MATERIAL:** CGA 77102 Purity: 97.6%

3. **CITATION:**

Authors: James R. Hoberg  
Title: CGA 77102: Toxicity to Duckweed Lemna gibba

Study Completion Date: September 28, 1995

Laboratory: Springborn Laboratories, Inc., Wareham, MA

Sponsor: Ciba-Geigy Corporation, Greensboro, NC

Laboratory Report ID: 95-8-6068

DP Barcode: D223753 and D223769

MRID No.: 439289-31

4. **REVIEWED BY:** Max Feken, M.S., Environmental Toxicologist,  
KBN Engineering and Applied Sciences, Inc.

Signature:



Date:

5/16/96

**APPROVED BY:** Pim Kosalwat, Ph.D., Senior Scientist,  
KBN Engineering and Applied Sciences, Inc.

Signature:

P. Kosalwat

Date:

5/16/96

5. **APPROVED BY:**

Signature:

Allen W. Vaughan  
3.19.97

Date:

3/13/97

6. **STUDY PARAMETERS:**

**Definitive Test Duration:** 14 days

**Type of Concentrations:** Mean measured

7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements for an acute aquatic plant study.

**Results Synopsis**

EC<sub>50</sub>: 0.021 ppm ai

95% C.I.: 0.019 - 0.023 ppm ai

NOEC: 0.0076 ppm ai

Probit Slope: N/A



8. ADEQUACY OF THE STUDY:

- A. Classification: Core
- B. Rationale: N/A
- C. Repairability: N/A

9. GUIDELINE DEVIATIONS: None

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS:

A. Test Organisms

Guideline Criteria	Reported Information
<u>Species</u> <i>Lemna gibba</i>	<i>Lemna gibba</i>
<u>Number of Plants/Fronds</u> 5 plants, 3 fronds per plant.	5 plants; 3 fronds per plant.
<u>Nutrients</u> Standard formula, e.g. 20X-AAP	Hoagland's medium

B. Test System

Guideline Criteria	Reported Information
<u>Solvent</u>	Acetone (0.1 mL/L)
<u>Temperature</u> 25°C	23 - 24°C
<u>Light Intensity</u> 5.0 Klux (±15%)	3.23 - 4.57 Klux
<u>Photoperiod</u> Continuous	Continuous
<u>pH</u> Approximately 5.0	New: 5.0 Aged: 5.6 - 6.2
<u>Test System</u> Static or renewal	Renewal (Day 6)

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## C. Test Design

Guideline Criteria	Reported Information
<u>Dose range</u> 2X or 3X progression	2X
<u>Doses</u> at least 5	0.0016, 0.0031, 0.0063, 0.013, 0.025, 0.050, and 0.10 mg ai/L
<u>Controls</u> negative and/or solvent	Negative and solvent control
<u>Replicates per dose</u> 3 or more	3
<u>Duration of test</u> 14 days	14 days
Daily observations were made?	Observations made on Days 3, 6, 9, 12 and 14.
<u>Method of Observations</u>	FronD counts and biomass (dry weight)
<u>Maximum Labeled Rate</u>	Not reported

## 12. REPORTED RESULTS:

Guideline Criteria	Reported Information
Initial and 14 day frond count?	Yes
Control frond count at 14 day >2X initial count?	Yes
Initial chemical concentrations measured? (Optional)	Yes
Raw data included?	Yes

## Dose Response - Frond Count

Mean Measured Concentration (mg ai/L)	Mean Frond Number	% Inhibition*	14-Day pH
Control	392	--	6.2

Mean Measured Concentration (mg ai/L)	Mean Frond Number	% Inhibition*	14-Day pH
Solvent cont.	286	--	6.1
0.0011	319	-12	6.1
0.0024	337	-18	6.2
0.0044	318	-11	6.2
0.0076	341	-19	6.1
0.018	103	64	5.8
0.032	76	73	5.8
0.070	43	85	5.6

\*Compared to the pooled controls.

Dose Response - Biomass (dry weight)

Mean Measured Concentration (mg ai/L)	Dry Weight (g)	% Inhibition*	14-Day pH
Control	0.0916	--	6.2
Solvent cont.	0.0481	--	6.1
0.0011	0.0700	-46	6.1
0.0024	0.0825	-72	6.2
0.0044	0.0832	-73	6.2
0.0076	0.0684	-42	6.1
0.018	0.0225	53	5.8
0.032	0.0143	70	5.8
0.070	0.0155	68	5.6

\*Compared to the pooled controls.

Other Significant Results: Fronds from the 0.0076, 0.018, 0.032, and 0.070 mg ai/L treatment levels were found to have less root formation than the controls. Chlorotic fronds were observed in the 0.018, 0.032, and 0.070 mg ai/L treatment levels.

Statistical Results - Frond Count

Statistical Method: A "best fit" linear regression based on the highest coefficient of determination ( $r^2$ ) was used for estimating the  $EC_{50}$  and Williams' test was used for mean comparisons. Results based on the mean measured concentrations.

$EC_{50}$ : 0.023 mg ai/L                      95% C.I.: 0.0075 - 0.071 mg ai/L

Probit Slope: N/A                      NOEC: 0.0076 mg ai/L

Statistical Results - Frond Biomass

Statistical Method: A "best fit" linear regression based on the highest coefficient of determination ( $r^2$ ) was used for estimating the  $EC_{50}$  and Williams' test was used for mean comparisons. Results based on the mean measured concentrations.

$EC_{50}$ : 0.031 mg ai/L                      95% C.I.: 0.011 - 0.091 mg ai/L

Probit Slope: 3.8                      NOEC: 0.0076 mg ai/L

**13. VERIFICATION OF STATISTICAL RESULTS:**Frond Count

Statistical Method: Moving average method for  $EC_{50}$  and Williams' test for comparing means. Results based on mean measured concentrations.

$EC_{50}$ : 0.021 ppm ai                      95% C.I.: 0.019 - 0.023 ppm ai

Probit Slope: N/A                      NOEC: 0.0076 ppm ai

Biomass

Statistical Method: Moving average method for  $EC_{50}$  and Williams' test for comparing means. Results based on mean measured concentrations.

$EC_{50}$ : 0.025 ppm ai                      95% C.I.: 0.022 - 0.028 ppm ai

Probit Slope: N/A                      NOEC: 0.0076 ppm ai

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14. REVIEWER'S COMMENTS: This study is scientifically sound and fulfills the guideline requirements for an aquatic plant toxicity study. Based on mean measured concentrations, the 14-day EC<sub>50</sub> and NOEC for *Lemna gibba* exposed to CGA 77102 was 0.021 and 0.0076 ppm ai, respectively. This study is classified as Core.

GA-77102 - LEMNA GIBBA

file: 43928931

Transform: NO TRANSFORMATION

t-test of Solvent and Blank Controls

Ho:GRP1 MEAN = GRP2 MEAN

-----

GRP1 (SOLVENT CRTL) MEAN =	286.3333	CALCULATED t VALUE =	-3.8768
GRP2 (BLANK CRTL) MEAN =	391.6667	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	-105.3333		

-----

ABLE t VALUE (0.05 (2), 4) = 2.776\*\* SIGNIFICANT DIFFERENCE at alpha=0.05  
 ABL t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

GA-77102 - LEMNA GIBBA

file: 43928931

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

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GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	SOLVENT	3	286.333	286.333	320.400
2	0.0011	3	319.333	319.333	320.400
3	0.0024	3	337.333	337.333	320.400
4	0.0044	3	318.333	318.333	320.400
5	0.0076	3	340.667	340.667	320.400
6	0.018	3	103.000	103.000	103.000
7	0.032	3	76.000	76.000	76.000
8	0.70	3	43.000	43.000	43.000

-----

GA-77102 - LEMNA GIBBA

file: 43928931

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

-----

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
SOLVENT	320.400				
0.0011	320.400	1.676		1.75	k= 1, v=16
0.0024	320.400	1.676		1.83	k= 2, v=16
0.0044	320.400	1.676		1.86	k= 3, v=16
0.0076	320.400	1.676		1.87	k= 4, v=16
0.018	103.000	9.021	*	1.88	k= 5, v=16
0.032	76.000	10.349	*	1.89	k= 6, v=16
0.70	43.000	11.973	*	1.89	k= 7, v=16

-----

s = 24.891

Note: df used for table values are approximate when v > 20.

NOEC = 0.0076

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CGA 77102 - LEMNA GIBBA (DRY WEIGHT)

File: 4392893B

Transform: NO TRANSFORMATION

t-test of Solvent and Blank Controls

Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CTRL) MEAN = 0.0481      CALCULATED t VALUE = -3.2014  
 GRP2 (BLANK CTRL) MEAN = 0.0916      DEGREES OF FREEDOM = 4  
 DIFFERENCE IN MEANS = -0.0435

TABLE t VALUE (0.05 (2), 4) = 2.776\*\*      SIGNIFICANT DIFFERENCE at alpha=0.05  
 TABLE t VALUE (0.01 (2), 4) = 4.604      NO significant difference at alpha=0.01

CGA 77102 - LEMNA GIBBA (DRY WEIGHT)

File: 4392893B

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)      TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	SOLVENT	3	0.048	0.048	0.071
2	0.0011	3	0.070	0.070	0.071
3	0.0024	3	0.082	0.082	0.071
4	0.0044	3	0.083	0.083	0.071
5	0.0076	3	0.068	0.068	0.068
6	0.018	3	0.023	0.023	0.023
7	0.032	3	0.014	0.014	0.014
8	0.070	3	0.011	0.011	0.011

CGA 77102 - LEMNA GIBBA (DRY WEIGHT)

File: 4392893B

Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)      TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
SOLVENT	0.071				
0.0011	0.071	2.027	*	1.75	k= 1, v=16
0.0024	0.071	2.027	*	1.83	k= 2, v=16
0.0044	0.071	2.027	*	1.86	k= 3, v=16
0.0076	0.068	1.798		1.87	k= 4, v=16
0.018	0.023	2.278	*	1.88	k= 5, v=16
0.032	0.014	3.009	*	1.89	k= 6, v=16
0.070	0.011	3.255	*	1.89	k= 7, v=16

\* - significantly higher than solvent control

s = 0.014

Note: df used for table values are approximate when v > 20.

NOEC = 0.0076

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MAX FEKEN CGA-77102 LEMNA GIBBA 05-02-96

\*\*\*\*\*

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
.07	100	85	85	0
.032	100	73	73	0
.018	100	64	64	0
.0076	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 1.567588E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	1.527785E-02	2.074026E-02	1.864561E-02	2.297542E-02

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	2.849318	19.93725	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 = 2.760702  
 95 PERCENT CONFIDENCE LIMITS = -1.899342 AND 7.420747

LC50 = 2.067547E-02  
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 7.168488E-03  
 95 PERCENT CONFIDENCE LIMITS = 0 AND 2.328736E-02

\*\*\*\*\*

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EPA PROBIT ANALYSIS PROGRAM  
 USED FOR CALCULATING EC VALUES  
 Version 1.4

MAX FEKEN CGA-77102 LEMNA GIBBA (DRY WEIGHT) 05-02-96

\*\*\*\*\*

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.07	100	68	68	0
.032	100	70	70	0
.018	100	53	53	0
.0076	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 1.740722E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	.0226893	2.452642E-02	2.163617E-02	.0278479

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	4.314138	22.73256	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 = 2.11282  
 95 PERCENT CONFIDENCE LIMITS = -2.275613 AND 6.501251

LC50 = 2.634646E-02  
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 6.601308E-03  
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

\*\*\*\*\*

MAX FEKEN CGA-77102 LEMNA GIBBA (DRY WEIGHT) 05-02-96

\*\*\*\*\*

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.032	100	70	70	0
.018	100	53	53	0
.0076	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.

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DATA EVALUATION RECORD  
SEEDLING EMERGENCE TEST  
§ 123-1 (TIER II)

1. CHEMICAL: CGA 77102 PC Code No.: 108800

2. TEST MATERIAL: CGA 77102 technical Purity: 97.6%

3. CITATION:

Authors: Ritchie S. Chetram and Larissa L. Schuster

Title: Tier 2 Seedling Emergence Nontarget Phytotoxicity Study Using CGA 77102

Study Completion Date: October 3, 1995

Laboratory: ABC Laboratories, Pan-Ag Division, Madera, CA

Sponsor: Ciba-Geigy Corporation, Greensboro, NC

Laboratory Report ID: 95481

MRID No.: 439289-32

DP Barcode: D223753 & D223769

4. REVIEWED BY: Mark Mossler, M.S., Toxicologist,  
KBN Engineering and Applied Sciences, Inc.

Signature: 

Date: 5/13/96

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

Signature: P. Kosalwat

Date: 5/13/96

5. APPROVED BY:

Signature: Allen W. Vaughan

3.19.97

3/13/97

Date: 

6. STUDY PARAMETERS:

Definitive Study Duration: 21 days

7. CONCLUSIONS: This study is scientifically sound but does not fulfill the guideline requirements for a Tier II seedling emergence test with terrestrial plants.

Results Synopsis

Most sensitive dicot: Lettuce

Most sensitive parameter: Dry weight

EC<sub>25</sub>: 0.0057 lb ai/A

NOEL: 0.0003 lb ai/A

Most sensitive monocot: Ryegrass  
 Most sensitive parameter: Phytotoxicity  
 EC<sub>25</sub>: 0.0048 lb ai/A  
 NOEL: 0.0010 lb ai/A

8. ADEQUACY OF THE STUDY

- A. **Classification:** Supplemental.
- B. **Rationale:** Only six species were tested, rather than the recommended ten species.
- C. **Repairability:** Yes, submit data regarding the toxicity of the test material to four other dicot species.

9. GUIDELINE DEVIATIONS: The maximum label application rate was not stated in the report.

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS

A. Test Organisms

Guideline Criteria	Reported Information
<b>Species</b> 6 dicots in 4 families, including soybean and a rootcrop; 4 monocots in 2 families, including corn.	<u>Dicots:</u> cucumber, lettuce, <u>Monocots:</u> corn, oat, onion, ryegrass
<b>Number of seeds per rep</b> 10	10
<b>Source of Seed</b>	Commercial suppliers
<b>Historical % Germination of Seed</b>	Between 85% and 99%

B. Test System

Guideline Criteria	Reported Information
<b>Solvent</b>	50% acetone
<b>Site of test</b>	Greenhouse

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Guideline Criteria	Reported Information
Planting method / type of pot	Seeds planted at 1.3- to 2.5-cm depths / 7.5-cm square pots
Method of application	Single-nozzle spray booth delivering 50 gallons per acre
Method of watering	Hand-watering for the first 48 hours post-application, overhead irrigation for the remainder of the study
Growth stage at application	Seed

### C. Test Design

Guideline Criteria	Reported Information
Dose range 2x or 3x	3x
Doses At least 5	6: rates ranging from 0.0037 to 0.89 lb ai/A
Controls Negative and solvent	Negative and solvent (50% acetone) controls
Replicates per dose At least 3	4 replicates
Duration of test 14 days	21 days
Were observations made at least weekly?	Observations made on days 10, 14, and 21 of the study
Maximum labeled rate	Not reported

### 12. REPORTED RESULTS

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
Was an NOEL observed for each species?	Yes

Guideline Criteria	Reported Information
Phytotoxic observations	Yes
Were initial chemical concentrations measured? (Optional)	Yes, recoveries between 80 and 90% of nominal
Were adequate raw data included?	Yes

Results for the most sensitive parameter\* of each species

Species	Parameter	EC <sub>25</sub> (lb ai/A)	NOEL (lb ai/A)
Cucumber	height	0.20	0.033
Lettuce	dry weight	0.0094	0.0037
Corn	dry weight	0.80	0.30
Oat	dry weight	0.20	0.033
Onion	height	0.055	0.033
Ryegrass	dry weight	0.012	0.011

\*Determination of the most sensitive parameter is based on EC<sub>25</sub> values.

Observations: Symptoms of test material toxicity included stunting, chlorosis, leaf curling, necrosis, leaf desiccation, and death.

Statistical Results

Statistical Method: Analysis of variance and Dunnett's test were used for mean separation and regression analysis was used for EC value determination. Comparisons were made to the negative control.

Most sensitive dicot: lettuce                      Parameter: dry weight  
EC<sub>25</sub> 95% C.L.: Not reported                      Probit Slope: N/A

Most sensitive monocot: ryegrass                      Parameter: dry weight  
EC<sub>25</sub> 95% C.L.: Not reported                      Probit Slope: N/A

13. VERIFICATION OF STATISTICAL RESULTS: Williams' test or Bonferroni's test was used for mean separation. Comparisons were made against the solvent control utilizing nominal

application rates. Probit analysis or visual interpolation was used for EC<sub>25</sub> and EC<sub>5</sub> determination/verification. Non-linear regression was used to recompute the EC<sub>25</sub> value for lettuce dry weight.

Results for the most sensitive parameter of each species

Species	Parameter	EC <sub>25</sub> (lb ai/A)	NOEL (lb ai/A)
Cucumber	height = dry weight	0.16	0.03
Lettuce	dry weight	0.0057	0.0003
Corn	dry weight	>0.89	0.89
Oat	dry weight	0.20	0.03
Onion	phytotoxicity	0.057	0.004
Ryegrass	phytotoxicity	0.0048	0.0010

Results for most sensitive parameter of most sensitive species

	Monocot	Dicot
Species	ryegrass	lettuce
Parameter	phytotoxicity	dry weight
EC <sub>25</sub> (lb ai/A)	0.0048	0.0057
95% C.I. (lb ai/A)	CNBD*	0.0011-0.0308
Probit Slope	N/A	0.74
NOEL (lb ai/A)	0.0010	0.0003

\*CNBD=could not be determined.

14. **REVIEWER'S COMMENTS:** Within the text of the report, the maximum label rate was not explicitly stated. Additionally, although stated in the protocol, the report also failed to reiterate that the seed used was untreated. These two pieces of information should be included in the actual report of every terrestrial plant study.

The author stated that the six species selected for testing were those found to be generally the most sensitive in previous testing with metolachlor (Pan-Ag study No. 94349, 1994). However, the authors did not give a reason as to why

only six species were tested, rather than the required ten species.

This study is scientifically sound, but does not fulfill the guideline requirements since only six, rather than the required ten species were tested. The study is classified as Supplemental.

cucumber height

file: cuc Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. cont.	4	202.250	202.250	203.875
2	0.0037 lb ai/A	4	205.500	205.500	203.875
3	0.011 lb ai/A	4	199.250	199.250	199.250
4	0.033 lb ai/A	4	196.250	196.250	196.250
5	0.099 lb ai/A	4	167.500	167.500	167.500
6	0.30 lb ai/A	4	127.000	127.000	127.000
7	0.89 lb ai/A	4	81.750	81.750	81.750

cucumber height

file: cuc Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. cont.	203.875				
0.0037 lb ai/A	203.875	0.207		1.72	k= 1, v=21
0.011 lb ai/A	199.250	0.382		1.80	k= 2, v=21
0.033 lb ai/A	196.250	0.764		1.83	k= 3, v=21
0.099 lb ai/A	167.500	4.423	*	1.84	k= 4, v=21
0.30 lb ai/A	127.000	9.577	*	1.85	k= 5, v=21
0.89 lb ai/A	81.750	15.336	*	1.85	k= 6, v=21

s = 11.112

Note: df used for table values are approximate when v > 20.

NOEL = 0.033 lb ai/A



ucumber height

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
1.00	0.0081	0.0014	0.0203
5.00	0.0279	0.0085	0.0529
10.00	0.0540	0.0219	0.0889
15.00	0.0844	0.0414	0.1271
50.00	0.5571	0.4192	0.8303
85.00	3.6764	1.9671	11.7028
90.00	5.7454	2.7819	22.3099
95.00	11.1326	4.6339	58.2191
99.00	38.4957	12.0006	353.7947

$$y = 1.26(x) + 5.32$$

$$EC_{25} = 0.16 \text{ lb ai/A}$$

cucumber dry weight

file: cuc Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. cont.	4	3.485	3.485	3.564
2	0.0037 lb ai/A	4	3.644	3.644	3.564
3	0.011 lb ai/A	4	3.355	3.355	3.406
4	0.033 lb ai/A	4	3.457	3.457	3.406
5	0.099 lb ai/A	4	3.001	3.001	3.001
6	0.30 lb ai/A	4	1.879	1.879	1.879
7	0.89 lb ai/A	4	1.045	1.045	1.045

cucumber dry weight

file: cuc Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. cont.	3.564				
0.0037 lb ai/A	3.564	0.400		1.72	k= 1, v=21
0.011 lb ai/A	3.406	0.395		1.80	k= 2, v=21
0.033 lb ai/A	3.406	0.395		1.83	k= 3, v=21
0.099 lb ai/A	3.001	2.431	*	1.84	k= 4, v=21
0.30 lb ai/A	1.879	8.072	*	1.85	k= 5, v=21
0.89 lb ai/A	1.045	12.260	*	1.85	k= 6, v=21

s = 0.281

Note: df used for table values are approximate when v > 20.

NOEL = 0.033 lb ai/A

umber dry weight

Estimated EC Values and Confidence Limits

oint	Conc.	Lower 95% Confidence Limits	Upper
c 1.00	0.0159	0.0057	0.0298
c 5.00	0.0407	0.0197	0.0642
c10.00	0.0674	0.0379	0.0973
c15.00	0.0946	0.0589	0.1293
c50.00	0.3975	0.3213	0.5052
c85.00	1.6703	1.1437	3.0273
c90.00	2.3458	1.5136	4.7181
c95.00	3.8799	2.2840	9.1394
c99.00	9.9698	4.9102	31.7862

$$y = 1.66(x) + 5.67$$

$$EC_{25} = 0.16 \text{ lb ai/A}$$

lettuce dry weight

file: let Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. cont.	4	0.596	0.596	0.596
2	0.0037 lb ai/A	4	0.473	0.473	0.473
3	0.011 lb ai/A	4	0.404	0.404	0.404
4	0.033 lb ai/A	4	0.323	0.323	0.323

lettuce dry weight

file: let Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. cont.	0.596				
0.0037 lb ai/A	0.473	2.204	*	1.78	k= 1, v=12
0.011 lb ai/A	0.404	3.440	*	1.87	k= 2, v=12
0.033 lb ai/A	0.323	4.887	*	1.90	k= 3, v=12

s = 0.079

Note: df used for table values are approximate when v > 20.

*NOEL < 0.0037, NOEL = 0.0003 lb ai/A (predicted EC<sub>5</sub>)*

lettuce dry weight

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper
EC 1.00	0.0000	0.0000	0.0003
EC 5.00	0.0003	0.0000	0.0011
EC10.00	0.0009	0.0000	0.0023
EC15.00	0.0018	0.0002	0.0039
EC50.00	0.0456	0.0250	0.2268
EC85.00	1.1263	0.2265	171.4732
EC90.00	2.4055	0.3751	836.6581
EC95.00	7.4045	0.7900	8782.5547
EC99.00	60.9976	3.1789	725723.4400

$$Y = 0.74(x) + 6.0$$

$$EC_{25} = \cancel{0.007} \quad 0.0055 \quad 16 \text{ ai/A}$$

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lettuce dry weight 14:54 Thursday, May 2, 1996

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	-2.43180	0.650	0.491	0.609	0.635	.	.
2	0.0037	-1.95861	0.560	0.462	0.436	0.435	.	.
3	0.0110	-1.95861	0.382	0.396	0.438	0.401	.	.
4	0.0330	-1.48149	0.457	0.346	0.336	0.155	.	.

MODEL: COUNT = CO \* PROBNO RM ((LOG\_EC50 - LOG\_CONC) / SIGMA)  
WEIGHTED REGRESSION 14:54 Thursday, May 2, 1996

Non-Linear Least Squares Iterative Phase

Iter	LOG_EC50	SIGMA	CO	Weighted SS
0	-1.341000	1.344000	0.596000	0.197982
1	-1.339484	1.335633	0.596281	0.197610
2	-1.339496	1.335675	0.596282	0.197612
3	-1.339496	1.335675	0.596282	0.197612

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics

Source	DF	Weighted SS	Weighted MS
Regression	3	7.1890000000	2.3963333333
Residual	13	0.1976118567	0.0152009121
Uncorrected Total	16	7.3866118567	
(Corrected Total)	15	0.5454682332	

Asymptotic Correlation Matrix

Parameter	Estimate	Asymptotic Std. Error	Confidence Interval Lower	Confidence Interval Upper
LOG_EC50	-1.339495722	0.25818145804	-1.8972625176	-0.7817289522
SIGMA	1.335675214	0.55684892951	0.1326769609	2.3386734677
CO	0.596281638	0.04751125102	0.4936398822	0.6989233944

Asymptotic Correlation Matrix

LOG_EC50	SIGMA	CO
LOG_EC50	1	0.465808611
SIGMA	0.4846749402	1
CO	-0.465808611	0.360978179

MODEL: COUNT = CO \* PROBNO RM ((LOG\_EC50 - LOG\_CONC) / SIGMA)  
SUMMARY OF NONLINEAR REGRESSION

OBS	CONC	LOG_EC50	SIGMA	CO	RESID_SS	EC50
1	0	-1.33950	1.33568	0.59628	0.19761	0.045762

NOTE: Convergence criterion met.

lettuce dry weight 14:54 Thursday, May 2, 1996

Non-Linear Least Squares Summary Statistics

Source	DF	Weighted SS	Weighted MS
Regression	3	7.1890000000	2.3963333333
Residual	13	0.1976118567	0.0152009121
Uncorrected Total	16	7.3866118567	
(Corrected Total)	15	0.5454682332	

Asymptotic Correlation Matrix

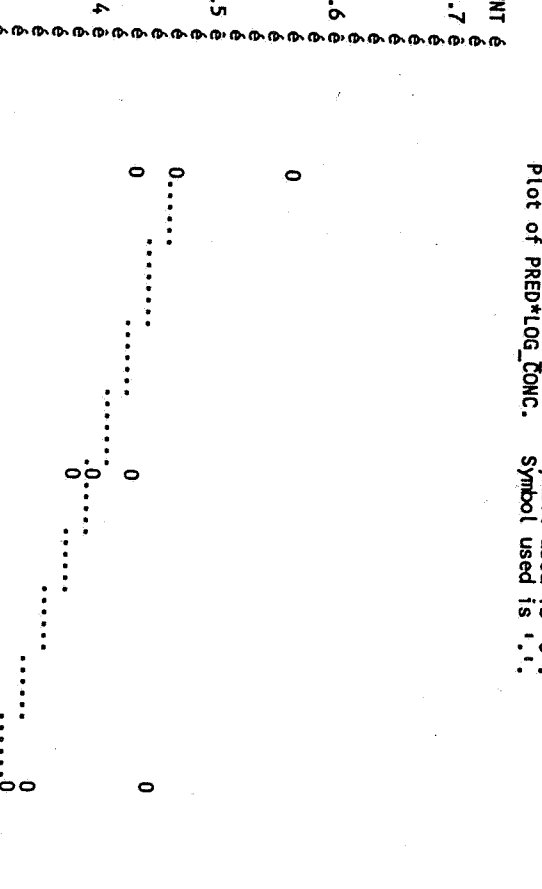
Parameter	Estimate	Asymptotic Std. Error	Confidence Interval Lower	Confidence Interval Upper
LOG_EC25	-2.240395297	0.33723405743	-2.9689447487	-1.5118458460
SIGMA	1.335675214	0.55684892961	0.1326769608	2.5386734681
CO	0.596281638	0.04751125102	0.4936398822	0.6989233944

Asymptotic Correlation Matrix

LOG_EC25	SIGMA	CO
LOG_EC25	1	0.758649924
SIGMA	-0.742673957	1
CO	-0.758649924	0.360978179

MODEL: YOUNG = CO \* PROBNO RM ((LOG\_EC25 - LOG\_CONC) / SIGMA - 0.67449)  
SUMMARY OF NONLINEAR REGRESSION

OBS	CONC	LOG_EC25	SIGMA	CO	RESID_SS	EC25
1	0	-2.24040	1.33568	0.59628	0.19761	.0057492



orn dry weight

file: cor Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. cont.	4	1.941	1.941	2.027
2	0.0037 lb ai/A	4	2.113	2.113	2.027
3	0.011 lb ai/A	4	1.934	1.934	2.022
4	0.033 lb ai/A	4	2.109	2.109	2.022
5	0.099 lb ai/A	4	1.999	1.999	2.001
6	0.30 lb ai/A	4	2.003	2.003	2.001
7	0.89 lb ai/A	4	1.567	1.567	1.567

orn dry weight

file: cor Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. cont.	2.027				
0.0037 lb ai/A	2.027	0.383		1.72	k= 1, v=21
0.011 lb ai/A	2.022	0.357		1.80	k= 2, v=21
0.033 lb ai/A	2.022	0.357		1.83	k= 3, v=21
0.099 lb ai/A	2.001	0.265		1.84	k= 4, v=21
0.30 lb ai/A	2.001	0.265		1.85	k= 5, v=21
0.89 lb ai/A	1.567	1.672		1.85	k= 6, v=21

s = 0.317

Note: df used for table values are approximate when v > 20.

NOEL = 0.89 lb ai/A

at dry weight

file: oat Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. cont.	4	1.688	1.688	1.688
2	0.0037 lb ai/A	4	1.683	1.683	1.683
3	0.011 lb ai/A	4	1.593	1.593	1.593
4	0.033 lb ai/A	4	1.485	1.485	1.485
5	0.099 lb ai/A	4	1.418	1.418	1.418
6	0.30 lb ai/A	4	1.260	1.260	1.260
7	0.89 lb ai/A	4	0.543	0.543	0.543

at dry weight

file: oat Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. cont.	1.688				
0.0037 lb ai/A	1.683	0.039		1.72	k= 1, v=21
0.011 lb ai/A	1.593	0.707		1.80	k= 2, v=21
0.033 lb ai/A	1.485	1.513		1.83	k= 3, v=21
0.099 lb ai/A	1.418	2.014	*	1.84	k= 4, v=21
0.30 lb ai/A	1.260	3.186	*	1.85	k= 5, v=21
0.89 lb ai/A	0.543	8.527	*	1.85	k= 6, v=21

s = 0.190

Note: df used for table values are approximate when v > 20.

NOEL = 0.033 lb ai/A



at dry weight

Estimated EC Values and Confidence Limits

oint	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
C 1.00	0.0185		
C 5.00	0.0497		
C10.00	0.0843		
C15.00	0.1204		
C50.00	0.5425		
C85.00	2.4448		
C90.00	3.4910		
C95.00	5.9179		
C99.00	15.9248		

$$y = 1.58(x) + 5.42$$

$$EC_{\frac{1}{2}} = 0.20 \text{ lb ai/A}$$

ion phytotoxicity

file: oni Transform: ARC SINE(SQUARE ROOT(Y))

BONFERRONI t-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Sol. cont.	1.384	0.973		
2	0.0037 lb ai/A	1.369	0.970	0.388	
3	0.011 lb ai/A	1.192	0.860	4.877	*
4	0.033 lb ai/A	1.205	0.870	4.854	*
5	0.099 lb ai/A	0.805	0.520	15.731	*
6	0.30 lb ai/A	0.349	0.118	28.151	*
7	0.89 lb ai/A	0.159	0.000	33.326	*

Bonferroni t table value = 2.63 (1 Tailed Value, P=0.05, df=19,6)

ion phytotoxicity

file: oni Transform: ARC SINE(SQUARE ROOT(Y))

BONFERRONI t-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Sol. cont.	3			
2	0.0037 lb ai/A	4	0.044	4.5	0.003
3	0.011 lb ai/A	3	0.047	4.9	0.113
4	0.033 lb ai/A	4	0.044	4.5	0.103
5	0.099 lb ai/A	4	0.044	4.5	0.453
6	0.30 lb ai/A	4	0.044	4.5	0.856
7	0.89 lb ai/A	4	0.044	4.5	0.973

NCEL = 0.0037 lb ai/A

ation phytotoxicity

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper
C 1.00	0.0116	0.0067	0.0171
C 5.00	0.0223	0.0149	0.0298
C10.00	0.0316	0.0226	0.0403
C15.00	0.0400	0.0300	0.0495
C50.00	0.1077	0.0918	0.1268
C85.00	0.2902	0.2324	0.3925
C90.00	0.3669	0.2853	0.5205
C95.00	0.5193	0.3851	0.7937
C99.00	0.9963	0.6716	1.7624

$$Y = 2.41(x) + 7.33$$

$$EC_{25} = 0.05716 \text{ ai/A}$$

ryegrass dry weight

file: rye Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. cont.	4	0.189	0.189	0.189
2	0.0037 lb ai/A	4	0.170	0.170	0.170
3	0.011 lb ai/A	4	0.134	0.134	0.134
4	0.033 lb ai/A	4	0.043	0.043	0.043

Ryegrass dry weight

file: rye Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. cont.	0.189				
0.0037 lb ai/A	0.170	0.735		1.78	k= 1, v=12
0.011 lb ai/A	0.134	2.167	*	1.87	k= 2, v=12
0.033 lb ai/A	0.043	5.736	*	1.90	k= 3, v=12

s = 0.036

Note: df used for table values are approximate when v > 20.

NOEL = 0.0037 lb ai/A

yegrass dry weight

Estimated EC Values and Confidence Limits

point	Conc.	Lower 95% Confidence Limits	Upper
C 1.00	0.0014	0.0008	0.0022
C 5.00	0.0029	0.0019	0.0040
C10.00	0.0043	0.0030	0.0056
C15.00	0.0056	0.0041	0.0070
C50.00	0.0166	0.0140	0.0202
C85.00	0.0495	0.0375	0.0740
C90.00	0.0641	0.0468	0.1020
C95.00	0.0941	0.0646	0.1644
C99.00	0.1928	0.1179	0.4051

$$Y = 2.19(x) + 0.59$$

$$EC_{25} = 0.0083 \text{ lb ai/A}$$

regress phytotoxicity

file: rye Transform: ARC SINE(SQUARE ROOT(Y))

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. cont.	4	1.000	1.412	1.412
2	0.0037 lb ai/A	4	1.000	1.412	1.412
3	0.011 lb ai/A	4	0.693	0.986	0.986
4	0.033 lb ai/A	4	0.347	0.624	0.624
5	0.099 lb ai/A	4	0.000	0.159	0.159

regress phytotoxicity

file: rye Transform: ARC SINE(SQUARE ROOT(Y))

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. cont.	1.412				
0.0037 lb ai/A	1.412	0.000		1.75	k= 1, v=15
0.011 lb ai/A	0.986	7.205	*	1.84	k= 2, v=15
0.033 lb ai/A	0.624	13.316	*	1.87	k= 3, v=15
0.099 lb ai/A	0.159	21.184	*	1.88	k= 4, v=15

= 0.084

Note: df used for table values are approximate when v > 20.

NOEL = 0.0037 lb ai/A

**DATA EVALUATION RECORD  
VEGETATIVE VIGOR TEST  
§ 123-1 (TIER II)**

1. **CHEMICAL:** CGA 77102 PC Code No.: 108800

2. **TEST MATERIAL:** CGA 77102 technical Purity: 97.6%

3. **CITATION:**

Authors: Ritchie S. Chetram and Larissa L. Schuster

Title: Tier 2 Vegetative Vigor Nontarget Phytotoxicity Study Using CGA 77102

Study Completion Date: October 3, 1995

Laboratory: ABC Laboratories, Pan-Ag Division, Madera, CA

Sponsor: Ciba-Geigy Corporation, Greensboro, NC

Laboratory Report ID: 95482

MRID No.: 439289-33

DP Barcode: D223753 & D223769

4. **REVIEWED BY:** Mark Mossler, M.S., Toxicologist,  
KBN Engineering and Applied Sciences, Inc.

Signature: 

Date: 5/13/96

**APPROVED BY:** Pim Kosalwat, Ph.D., Senior Scientist  
KBN Engineering and Applied Sciences, Inc.

Signature: P. Kosalwat

Date: 5/13/96

5. **APPROVED BY:**

Signature: Allen W. Vaughan  
3.19.97

Date: 3/13/97

6. **STUDY PARAMETERS:**

**Definitive Study Duration:** 21 days

7. **CONCLUSIONS:** This study is scientifically sound but does not fulfill the guideline requirements for a Tier II vegetative vigor test with terrestrial plants.

**Results Synopsis**

Most sensitive dicot: Cucumber

Most sensitive parameter: Phytotoxicity

EC<sub>25</sub>: 0.27 lb ai/A

NOEL: 0.01 lb ai/A

Most sensitive monocot: Ryegrass  
 Most sensitive parameter: Dry weight  
 EC<sub>25</sub>: 0.021 lb ai/A  
 NOEL: 0.011 lb ai/A

8. ADEQUACY OF THE STUDY

- A. **Classification:** Supplemental.
- B. **Rationale:** Only six species were tested, rather than the recommended ten species.
- C. **Repairability:** Yes, submit data regarding the toxicity of the test material to four other dicot species.

9. GUIDELINE DEVIATIONS: The maximum label application rate was not stated in the report.

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS

A. **Test Organisms**

Guideline Criteria	Reported Information
<b>Species</b> 6 dicots in 4 families, including soybean and a rootcrop; 4 monocots in 2 families, including corn.	<u>Dicots:</u> cucumber, tomato <u>Monocots:</u> corn, oat, onion, ryegrass
<b>Number of plants per rep</b> 5	5
<b>Source of Seed</b>	Commercial suppliers

B. **Test System**

Guideline Criteria	Reported Information
<b>Solvent</b>	50% acetone and 8 drops/L of Triton surfactant
<b>Site of test</b>	Greenhouse
<b>Planting method / type of pot</b>	seeds planted at 1.3- to 2.5-cm depths / 7.5-cm square pots

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Guideline Criteria	Reported Information
Method of application	Single-nozzle spray booth delivering 50 gallons per acre
Method of watering	Watering as needed avoiding foliage for the first 48 hours post-application, overhead irrigation for the remainder of the study
Growth stage at application Past first true leaf stage	1-3 true leaf stage; 12-22 days post-planting

### C. Test Design

Guideline Criteria	Reported Information
Dose range 2x or 3x	3x
Doses At least 5	6: rates ranging from 0.0037 to 0.89 lb ai/A
Controls Negative and solvent	Negative and solvent (50% acetone) controls
Replicates per dose At least 3	4 replicates
Duration of test 14 days	21 days
Were observations made at least weekly?	Yes
Maximum labeled rate	Not reported

### 12. REPORTED RESULTS

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
Was an NOEL observed for each species?	Yes
Phytotoxic observations	Yes

Guideline Criteria	Reported Information
Were initial chemical concentrations measured? (Optional)	Yes, recoveries between 96 and 103% of nominal
Were adequate raw data included?	Yes

Results for the most sensitive parameter\* of each species

Species	Parameter	EC <sub>25</sub> (lb ai/A)	NOEL (lb ai/A)
Cucumber	phytotoxicity	ND**	0.033
Tomato	dry weight	0.56	0.30
Corn	dry weight	>0.30	0.099
Oat	dry weight	0.30	0.099
Onion	dry weight	0.56	0.30
Ryegrass	dry weight	0.021	0.011

\*Determination of the most sensitive parameter is based on EC<sub>25</sub> values (except cucumber).

\*\*ND = not determined.

Observations: Symptoms of test material toxicity included stunting, chlorosis, leaf deformity, necrosis, leaf desiccation, and restriction of leaf expansion.

Statistical Results

Statistical Method: Analysis of variance and Dunnett's test were used for mean separation and regression analysis was used for EC value determination. Comparisons were made to the negative control.

Most sensitive dicot: cucumber                      Parameter: phytotoxicity  
EC<sub>25</sub> 95% C.L.: Not determined                      Probit Slope: N/A

Most sensitive monocot: ryegrass                      Parameter: dry weight  
EC<sub>25</sub> 95% C.L.: Not reported                      Probit Slope: N/A

13. VERIFICATION OF STATISTICAL RESULTS: Williams' test or the Kruskal-Wallis test was used for mean separation. Comparisons were made against the solvent control utilizing

nominal application rates. Probit analysis or visual interpolation was used for EC<sub>25</sub> and EC<sub>5</sub> determination/verification. Non-linear regression was used to recompute the EC<sub>25</sub> value for ryegrass dry weight and cucumber phytotoxicity.

Results for the most sensitive parameter of each species

Species	Parameter	EC <sub>25</sub> (lb ai/A)	NOEL (lb ai/A)
Cucumber	phytotoxicity	0.27	0.01
Tomato	dry weight	0.46	0.10
Corn	dry weight	0.30	0.03
Oat	dry weight	0.31	0.10
Onion	phytotoxicity	0.51	0.26
Ryegrass	dry weight	0.021	0.011

Results for most sensitive parameter of most sensitive species

	Monocot	Dicot
Species	Ryegrass	Cucumber
Parameter	dry weight	phytotoxicity
EC <sub>25</sub> (lb ai/A)	0.021	0.27
95% C.I. (lb ai/A)	0.012 - 0.037	0.12 - 0.65
Probit Slope	3.39	0.72
NOEL (lb ai/A)	0.011	0.01

14. **REVIEWER'S COMMENTS:** Within the text of the report, the maximum label rate was not explicitly stated. Additionally, the report also failed to note whether the test plants were cultivated from untreated seed. These two pieces of information should be included in the report of every terrestrial plant study.

The author stated that the six species selected for testing were those found to be generally the most sensitive in previous testing with metolachlor (Pan-Ag study No. 94350, 1994). However, the authors did not give a reason as to why only six species were tested, rather than the required ten species.

This study is scientifically sound, but does not fulfill the guideline requirements since only six, rather than the required ten species were tested. The study is classified as **Supplemental**.

cucumber phytotoxicity

file: cuc Transform: ARC SINE(SQUARE ROOT(Y))

KRUSKAL - WALLIS' ANOVA BY RANKS - TABLE 1 OF 2 (p=0.05)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	Sol. Cont.	1.345	1.000	82.000
2	0.0037 lb ai/A	1.345	1.000	82.000
3	0.011 lb ai/A	1.345	1.000	82.000
4	0.033 lb ai/A	1.345	1.000	82.000
5	0.099 lb ai/A	1.164	0.840	41.000
6	0.30 lb ai/A	1.037	0.740	24.500
7	0.89 lb ai/A	0.909	0.620	12.500

Calculated H Value = 26.307 Critical H Value Table = 12.590  
Since Calc H > Crit H REJECT Ho: All groups are equal.

cucumber phytotoxicity

file: cuc Transform: ARC SINE(SQUARE ROOT(Y))

DUNN'S MULTIPLE COMPARISON - KRUSKAL - WALLIS - TABLE 2 OF 2 (p=0.05)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP								
				0	0	0	0	0	0	0		
7	0.89 lb ai/A	0.909	0.620									
6	0.30 lb ai/A	1.037	0.740	.	\							
5	0.099 lb ai/A	1.164	0.840	.	.	\						
4	0.033 lb ai/A	1.345	1.000	*	.	.	\					
1	Sol. Cont.	1.345	1.000	*	.	.	.	\				
2	0.0037 lb ai/A	1.345	1.000	*	.	.	.	.	\			
3	0.011 lb ai/A	1.345	1.000	*	.	.	.	.	.	\		

\* = significant difference (p=0.05) . = no significant difference  
Table q value (0.05,7) = 3.038 SE = 5.243

NOEL of 0.30 > EC<sub>25</sub>, ∴ NOEL = 0.01 lb ai/A (predicted EC<sub>5</sub>)

cumber phytotoxicity

Estimated EC Values and Confidence Limits

int	Conc.	Lower 95% Confidence Limits	Upper
1.00	0.0014	0.0000	0.0104
5.00	0.0124	0.0002	0.0432
10.00	0.0395	0.0024	0.0939
15.00	0.0862	0.0132	0.1632
50.00	2.3504	1.0496	30.9264
85.00	64.0596	9.3482	52201.4300
90.00	140.0204	15.5183	306064.9400
95.00	446.0351	32.8142	4215275.5000
99.00	3918.5215	133.1612	579167300.0000

$$y = 0.72(x) + 4.73$$

$$EC_{25} = 0.28 \text{ lb ai/A}$$

cucumber phytoxicity

13:24 Monday, May 6, 1996

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.000	-1.00436	1.00	1.00	1.00	1.00	:	:
2	0.099	-0.92288	0.92	0.80	0.84	0.80	:	:
3	0.300	-0.52288	0.72	0.76	0.68	0.80	:	:
4	0.890	-0.05061	0.44	0.48	0.76	0.60	:	:

MODEL: COUNT = CO \* PROBNOORM ((LOG\_EC25 - LOG\_CONC) / SIGMA)  
 cucumber phytoxicity  
 WEIGHTED REGRESSION 13:24 Monday, May 6, 1996

NOTE: Convergence criterion met.

Non-Linear Least Squares Iterative Phase

Iter	LOG_EC25	SIGMA	CO	Weighted SS
0	0.371000	1.385000	1.000000	0.086797
1	0.372187	1.387308	1.000008	0.086781
2	0.372187	1.387307	1.000068	0.086781
3	0.372187	1.387307	1.000068	0.086781

Non-Linear Least Squares Summary Statistics

Source	DF	Weighted SS	Weighted MS
Regression	3	12.800000000	4.266666667
Residual	13	0.086780518	0.006675424
Uncorrected Total	16	12.886780518	
(Corrected Total)	15	0.471047652	

Asymptotic Correlation Matrix

Parameter	Estimate	Asymptotic Std. Error	Confidence Interval Lower	Confidence Interval Upper
LOG_EC25	0.372187217	0.19914210749	-0.05803289245	0.8024075268
SIGMA	1.387307410	0.36219351170	0.60483536867	2.1697784522
CO	1.000067855	0.04075182841	0.91202893523	1.0881067754

MODEL: COUNT = CO \* PROBNOORM ((LOG\_EC25 - LOG\_CONC) / SIGMA)  
 SUMMARY OF NONLINEAR REGRESSION  
 13:24 Monday, May 6, 1996

MODEL: YOUNG = CO \* PROBNOORM ((LOG\_EC25 - LOG\_CONC) / SIGMA - 0.67449) 1996  
 cucumber phytoxicity  
 WEIGHTED REGRESSION 13:24 Monday, May 6, 1996

Non-Linear Least Squares Iterative Phase

Iter	LOG_EC25	SIGMA	CO	Weighted SS
0	-0.553000	1.385000	1.000000	0.086541
1	-0.563553	1.387366	1.000068	0.086780
2	-0.563538	1.387307	1.000068	0.086781
3	-0.563538	1.387307	1.000068	0.086781

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics

Source	DF	Weighted SS	Weighted MS
Regression	3	12.800000000	4.266666667
Residual	13	0.086780518	0.006675424
Uncorrected Total	16	12.886780518	
(Corrected Total)	15	0.471047652	

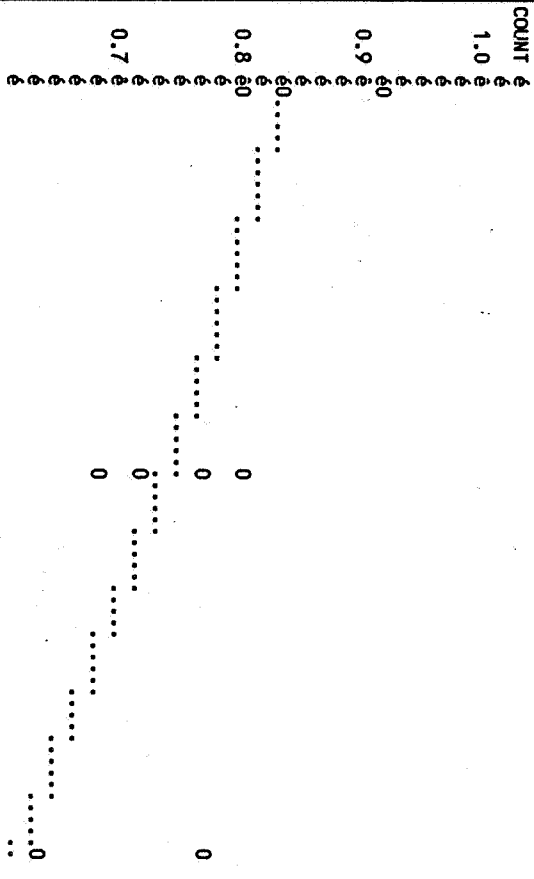
Asymptotic Correlation Matrix

Parameter	Estimate	Asymptotic Std. Error	Confidence Interval Lower	Confidence Interval Upper
LOG_EC25	-0.563537758	0.17274301922	-0.93672613906	-0.1903495773
SIGMA	1.387307411	0.36219351177	0.60483536872	2.1697784526
CO	1.000067855	0.04075182841	0.91202893524	1.0881067754

MODEL: YOUNG = CO \* PROBNOORM ((LOG\_EC25 - LOG\_CONC) / SIGMA - 0.67449) 1996  
 SUMMARY OF NONLINEAR REGRESSION  
 13:24 Monday, May 6, 1996

OBS	CONC	LOG_EC25	SIGMA	CO	RESID_SS	EC25
1	0	-0.56354	1.38731	1.00007	0.086781	0.27319

Plot of COUNT\*LOG\_CONC. Symbol used is '0'.  
 Plot of PRED\*LOG\_CONC. Symbol used is '1'.



0.6	0
0.5	0
0.4	0
-1.0	0.0

NOTE: 972 obs had missing values. 894 obs hidden.

COMPARISON OF MEANS FOR NOEL DETERMINATION  
TEST IF TREATMENT IS LESS THAN CONTROL  
13:24 Monday, May 6, 1996

General Linear Models Procedure  
Class Level Information

Class	Levels	Values
DOSE	4	0 0.3 0.89 0.099

Number of observations in data set = 24

NOTE: Due to missing values, only 16 observations can be used in this analysis.

COMPARISON OF MEANS FOR NOEL DETERMINATION  
TEST IF TREATMENT IS LESS THAN CONTROL  
13:24 Monday, May 6, 1996

General Linear Models Procedure

Dependent Variable: RESPONSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.31040000	0.10346667	21.56	0.0001
Error	12	0.05760000	0.00480000		
Corrected Total	15	0.36800000			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.843478	8.660254	0.069282	0.800000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	3	0.31040000	0.10346667	21.56	0.0001
Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	3	0.31040000	0.10346667	21.56	0.0001

cucumber phytoxicity  
COMPARISON OF MEANS FOR NOEL DETERMINATION  
TEST IF TREATMENT IS LESS THAN CONTROL  
13:24 Monday, May 6, 1996

General Linear Models Procedure

Level of DOSE	N	Mean	SD
0	4	1.00000000	0.00000000
0.3	4	0.74000000	0.05163978
0.89	4	0.62000000	0.11547005
0.099	4	0.84000000	0.05656654

COMPARISON OF MEANS FOR NOEL DETERMINATION  
TEST IF TREATMENT IS LESS THAN CONTROL  
13:24 Monday, May 6, 1996

General Linear Models Procedure

Dunnnett's One-tailed T tests for variable: RESPONSE  
NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 12 MSE= 0.0048  
Critical Value of Dunnnett's T= 2.287  
Minimum Significant Difference= 0.1121

Comparisons significant at the 0.05 level are indicated by '\*\*\*\*'.

DOSE Comparison	Simultaneous Lower Confidence Limit		Difference Between Means	Simultaneous Upper Confidence Limit	
	-0.27206	-0.16000		-0.04794	0.099
0.3	-0.37206	-0.26000	-0.14794	0.3	0
0.89	-0.49206	-0.38000	-0.26794	0.89	0

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ratio dry weight

file: tom Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. Cont.	4	7.240	7.240	7.240
2	0.0037 lb ai/A	4	6.841	6.841	6.843
3	0.011 lb ai/A	4	6.565	6.565	6.843
4	0.033 lb ai/A	4	6.742	6.742	6.843
5	0.099 lb ai/A	4	7.223	7.223	6.843
6	0.30 lb ai/A	4	6.203	6.203	6.203
7	0.89 lb ai/A	4	3.309	3.309	3.309

ratio dry weight

file: tom Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. Cont.	7.240				
0.0037 lb ai/A	6.843	0.820		1.72	k= 1, v=21
0.011 lb ai/A	6.843	0.820		1.80	k= 2, v=21
0.033 lb ai/A	6.843	0.820		1.83	k= 3, v=21
0.099 lb ai/A	6.843	0.820		1.84	k= 4, v=21
0.30 lb ai/A	6.203	2.141	*	1.85	k= 5, v=21
0.89 lb ai/A	3.309	8.117	*	1.85	k= 6, v=21

= 0.685

Note: df used for table values are approximate when v > 20.

NOEL = 0.099 lb ai/A

orn dry weight

le: cor Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. Cont.	4	9.170	9.170	9.170
2	0.0037 lb ai/A	4	9.170	9.170	9.170
3	0.011 lb ai/A	4	7.692	7.692	8.207
4	0.033 lb ai/A	4	8.722	8.722	8.207
5	0.099 lb ai/A	4	7.786	7.786	7.786
6	0.30 lb ai/A	4	6.949	6.949	6.949
7	0.89 lb ai/A	4	6.462	6.462	6.462

orn dry weight

le: cor Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. Cont.	9.170				
0.0037 lb ai/A	9.170	0.000		1.72	k= 1, v=21
0.011 lb ai/A	8.207	1.491		1.80	k= 2, v=21
0.033 lb ai/A	8.207	1.491		1.83	k= 3, v=21
0.099 lb ai/A	7.786	2.143	*	1.84	k= 4, v=21
0.30 lb ai/A	6.949	3.439	*	1.85	k= 5, v=21
0.89 lb ai/A	6.462	4.194	*	1.85	k= 6, v=21

α = 0.913

Note: df used for table values are approximate when v > 20.

*NOEL = 0.033 lb ai/A*

on dry weight

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper
1.00	0.0051	0.0001	0.0163
5.00	0.0273	0.0045	0.0522
10.00	0.0668	0.0259	0.1056
15.00	0.1224	0.0710	0.2014
50.00	1.5775	0.6252	24.7361
85.00	20.3347	3.4973	4782.3799
90.00	37.2317	5.2302	16697.9961
95.00	91.2231	9.4825	106612.7500
99.00	489.8563	28.8680	3460051.0000

$$y = 0.93(x) + 4.82$$

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

orn phytotoxicity

file: cor Transform: ARC SINE(SQUARE ROOT(Y))

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. Cont.	4	1.000	1.345	1.345
2	0.0037 lb ai/A	4	1.000	1.345	1.345
3	0.011 lb ai/A	4	0.950	1.286	1.316
4	0.033 lb ai/A	4	1.000	1.345	1.316
5	0.099 lb ai/A	4	0.900	1.226	1.226
6	0.30 lb ai/A	4	0.700	1.014	1.014
7	0.89 lb ai/A	4	0.580	0.866	0.866

orn phytotoxicity

file: cor Transform: ARC SINE(SQUARE ROOT(Y))

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. Cont.	1.345				
0.0037 lb ai/A	1.345	0.000		1.72	k= 1, v=21
0.011 lb ai/A	1.316	0.351		1.80	k= 2, v=21
0.033 lb ai/A	1.316	0.351		1.83	k= 3, v=21
0.099 lb ai/A	1.226	1.406		1.84	k= 4, v=21
0.30 lb ai/A	1.014	3.915	*	1.85	k= 5, v=21
0.89 lb ai/A	0.866	5.657	*	1.85	k= 6, v=21

s = 0.120

Note: df used for table values are approximate when v > 20.

NOEL = 0.099 lb ai/A

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rn phytotoxicity

Estimated EC Values and Confidence Limits

int	Conc.	Lower 95% Confidence Limits	Upper
1.00	0.0087	0.0008	0.0253
5.00	0.0368	0.0084	0.0736
10.00	0.0795	0.0284	0.1321
15.00	0.1337	0.0637	0.1997
50.00	1.2037	0.7704	2.8717
85.00	10.8345	4.0233	95.6971
90.00	18.2215	5.8876	221.6340
95.00	39.3642	10.3282	770.8617
99.00	166.9240	29.5209	8016.7417

$$Y = 1.39(x) + 4.91$$

$$EC_{25} = 0.29 \text{ lb ai/A}$$

t dry weight

le: oat Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. Cont.	4	3.322	3.322	3.513
2	0.0037 lb ai/A	4	3.705	3.705	3.513
3	0.011 lb ai/A	4	3.511	3.511	3.511
4	0.033 lb ai/A	4	3.287	3.287	3.465
5	0.099 lb ai/A	4	3.644	3.644	3.465
6	0.30 lb ai/A	4	2.300	2.300	2.300
7	0.89 lb ai/A	4	1.107	1.107	1.107

at dry weight

ile: oat Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. Cont.	3.513				
0.0037 lb ai/A	3.513	0.773		1.72	k= 1, v=21
0.011 lb ai/A	3.511	0.762		1.80	k= 2, v=21
0.033 lb ai/A	3.465	0.580		1.83	k= 3, v=21
0.099 lb ai/A	3.465	0.580		1.84	k= 4, v=21
0.30 lb ai/A	2.300	4.118	*	1.85	k= 5, v=21
0.89 lb ai/A	1.107	8.923	*	1.85	k= 6, v=21

t = 0.351

Note: df used for table values are approximate when v > 20.

*NOEL = 0.099 lb ai/A*

at dry weight

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
1.00	0.0727		
5.00	0.1319		
10.00	0.1811		
15.00	0.2244		
50.00	0.5547		
85.00	1.3715		
90.00	1.6990		
95.00	2.3334		
99.00	4.2312		

$$Y = 2.64(x) + 5.67$$

$$EC_{25} = 0.31 \text{ lb a/a}$$

ion phytotoxicity

le: oni Transform: ARC SINE(SQUARE ROOT(Y))

KRUSKAL - WALLIS' ANOVA BY RANKS - TABLE 1 OF 2 (p=0.05)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	Sol. Cont.	1.345	1.000	62.000
2	0.0037 lb ai/A	1.345	1.000	62.000
3	0.011 lb ai/A	1.345	1.000	62.000
4	0.033 lb ai/A	1.345	1.000	62.000
5	0.099 lb ai/A	1.345	1.000	62.000
6	0.30 lb ai/A	1.304	0.920	86.000
7	0.89 lb ai/A	0.735	0.450	10.000

Calculated H Value = 18.434 Critical H Value Table = 12.590  
Since Calc H > Crit H REJECT Ho: All groups are equal.

ion phytotoxicity

le: oni Transform: ARC SINE(SQUARE ROOT(Y))

DUNN'S MULTIPLE COMPARISON - KRUSKAL - WALLIS - TABLE 2 OF 2 (p=0.05)

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP							
				0	0	0	0	0	0	0	
7	0.89 lb ai/A	0.735	0.450	\							
6	0.30 lb ai/A	1.304	0.920	* \							
3	0.011 lb ai/A	1.345	1.000	. . \							
4	0.033 lb ai/A	1.345	1.000	. . . \							
5	0.099 lb ai/A	1.345	1.000	. . . . \							
1	Sol. Cont.	1.345	1.000	. . . . . \							
2	0.0037 lb ai/A	1.345	1.000	. . . . . \							

\* = significant difference (p=0.05) . = no significant difference  
table q value (0.05,7) = 3.038 SE = 4.635

NOEL of 0.89 lb ai/A, ∴ NOEL = 0.26 lb ai/A (estimated EC<sub>5</sub>)



regress dry weight

file: rye Transform: LOG BASE 10(Y)

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Sol. Cont.	4	0.585	0.585	0.618
2	0.0037 lb ai/A	4	0.650	0.650	0.618
3	0.011 lb ai/A	4	0.618	0.618	0.618
4	0.033 lb ai/A	4	0.321	0.321	0.321
5	0.099 lb ai/A	4	0.076	0.076	0.076
6	0.30 lb ai/A	4	0.038	0.038	0.038
7	0.89 lb ai/A	4	0.030	0.030	0.030

regress dry weight

file: rye Transform: LOG BASE 10(Y)

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Sol. Cont.	0.618				
0.0037 lb ai/A	0.618	0.505		1.72	k= 1, v=21
0.011 lb ai/A	0.618	0.501		1.80	k= 2, v=21
0.033 lb ai/A	0.321	4.111	*	1.83	k= 3, v=21
0.099 lb ai/A	0.076	7.915	*	1.84	k= 4, v=21
0.30 lb ai/A	0.038	8.513	*	1.85	k= 5, v=21
0.89 lb ai/A	0.030	8.626	*	1.85	k= 6, v=21

alpha = 0.091

Note: df used for table values are approximate when v > 20.

NOEC = 0.011 lb ai/A

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regress dry weight

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
1.00	0.0085		
5.00	0.0134		
10.00	0.0172		
15.00	0.0203		
50.00	0.0411		
85.00	0.0832		
90.00	0.0983		
95.00	0.1258		
99.00	0.1999		

$$Y = 3.39(x) + 9.69$$

$$EC_{25} = 0.026 \text{ lb ai/A}$$

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.000	-1.95861	0.490	0.468	0.807	0.576	.	.
2	0.011	-1.48149	0.567	0.758	0.522	0.623	.	.
3	0.033	-1.00436	0.246	0.215	0.428	0.395	.	.
4	0.099	-1.00436	0.065	0.089	0.091	0.059	.	.

MODEL: COUNT = CO \*  
 ryegrass dry weight  
 PROBNORM ((LOG\_EC50 - LOG\_CONC) / SIGMA)  
 WEIGHTED REGRESSION  
 13:24 Monday, May 6, 1996

Non-Linear Least Squares Iterative Phase  
 Dependent Variable COUNT Method: Gauss-Newton  
 Iter 0 LOG\_EC50 0.295000 0.585000 0.347784 Weighted SS  
 1 -1.440087 0.368667 0.617928 0.309944  
 2 -1.432258 0.358478 0.615214 0.308637  
 3 -1.435117 0.361504 0.616625 0.308733  
 4 -1.434275 0.360604 0.616210 0.308692  
 5 -1.434529 0.360874 0.616336 0.308703  
 6 -1.434453 0.360793 0.616298 0.308699  
 7 -1.434476 0.360817 0.616306 0.308700  
 8 -1.434469 0.360810 0.616306 0.308700  
 9 -1.434471 0.360812 0.616307 0.308700  
 10 -1.434470 0.360812 0.616307 0.308700  
 11 -1.434471 0.360812 0.616307 0.308700  
 12 -1.434471 0.360812 0.616307 0.308700

Non-Linear Least Squares Summary Statistics

Source	DF	Weighted SS	Weighted MS
Regression	3	6.3980000000	2.1326666667
Residual	13	0.3087000980	0.0237461614
Uncorrected Total	16	6.7067000980	
(Corrected Total)	15	3.4931163915	

Parameter Estimate Asymptotic Std. Error Asymptotic 95% Confidence Interval Lower Upper

LOG\_EC50 -1.434470514 0.07617588532 -1.5990384103 -1.2699026173  
 SIGMA 0.360811683 0.06934257081 0.2110062564 0.5106171101  
 CO 0.616306612 0.05289661362 0.5020304939 0.7305827292

Asymptotic Correlation Matrix

MODEL: COUNT = CO \* PROBNORM ((LOG\_EC50 - LOG\_CONC) / SIGMA)  
 SUMMARY OF NONLINEAR REGRESSION  
 13:24 Monday, May 6, 1996

OBS CONC LOG\_EC50 SIGMA CO RESID\_SS EC50

1 0 -1.43447 0.36081 0.61631 0.30870 0.036773

MODEL: YOUNG = CO \* PROBNORM ((LOG\_EC25 - LOG\_CONC) / SIGMA - 0.67449)  
 WEIGHTED REGRESSION  
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Iter	LOG_EC25	SIGMA	CO	Weighted SS
0	-1.585000	0.295000	0.585000	0.347802
1	-1.688752	0.368668	0.617928	0.309944
2	-1.674048	0.358478	0.615214	0.308637
3	-1.678948	0.361504	0.616625	0.308733
4	-1.677935	0.360604	0.616210	0.308692
5	-1.677935	0.360874	0.616336	0.308703
6	-1.677804	0.360793	0.616298	0.308699
7	-1.677832	0.360817	0.616309	0.308700
8	-1.677832	0.360810	0.616306	0.308700
9	-1.677835	0.360812	0.616307	0.308700
10	-1.677834	0.360812	0.616307	0.308700
11	-1.677834	0.360812	0.616307	0.308700
12	-1.677834	0.360812	0.616307	0.308700

Non-Linear Least Squares Summary Statistics

Source	DF	Weighted SS	Weighted MS
Regression	3	6.3980000000	2.1326666667
Residual	13	0.3087000980	0.0237461614
Uncorrected Total	16	6.7067000980	
(Corrected Total)	15	3.4931163915	

Parameter Estimate Asymptotic Std. Error Asymptotic 95% Confidence Interval Lower Upper

LOG\_EC25 -1.677834386 0.11404301379 -1.9242091910 -1.4314595810  
 SIGMA 0.360811683 0.06934257081 0.2110062564 0.5106171101  
 CO 0.616306612 0.05289661362 0.5020304939 0.7305827292

Asymptotic Correlation Matrix

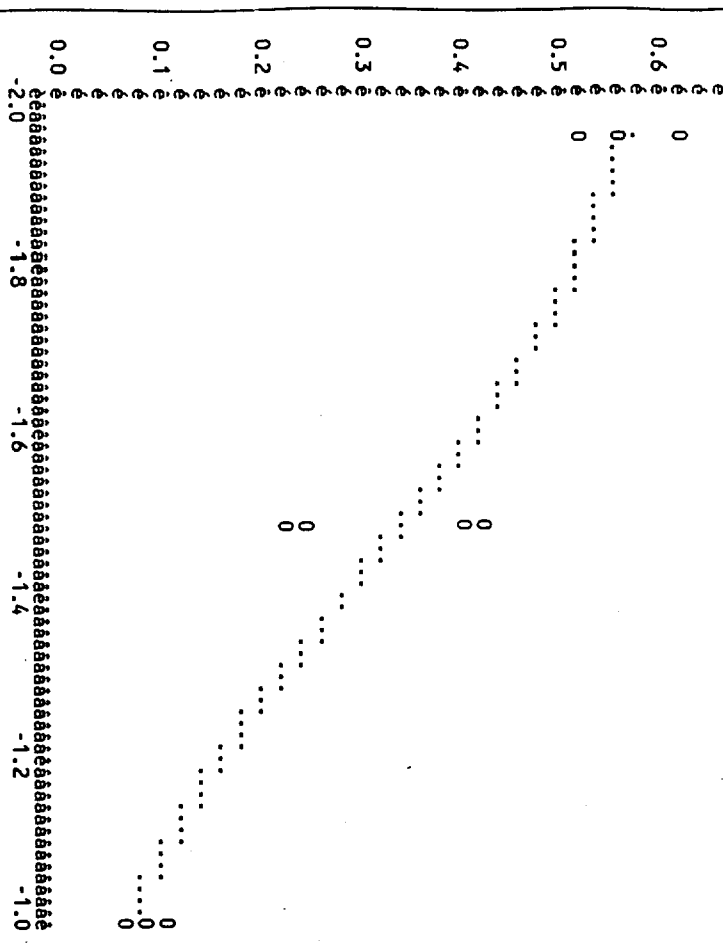
MODEL: YOUNG = CO \* PROBNORM ((LOG\_EC25 - LOG\_CONC) / SIGMA - 0.67449)  
 SUMMARY OF NONLINEAR REGRESSION  
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OBS CONC LOG\_EC25 SIGMA CO RESID\_SS EC25

1 0 -1.67783 0.36081 0.61631 0.30870 0.020997

MODEL: YOUNG = CO \* PROBNORM ((LOG\_EC25 - LOG\_CONC) / SIGMA - 0.67449)  
 Plot of COUNT\*LOG\_CONC. Symbol used is '1'.  
 13:24 Monday, May 6, 1996

COUNT 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1



NOTE: 974 obs had missing values. 888 obs hidden.

ryegrass dry weight  
COMPARISON OF MEANS FOR NOEL DETERMINATION  
TEST IF TREATMENT IS LESS THAN CONTROL  
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General Linear Models Procedure  
Class Level Information  
Class Levels Values  
DOSE 4 0 0.011 0.033 0.099  
Number of observations in data set = 24

NOTE: Due to missing values, only 16 observations can be used in this analysis.

ryegrass dry weight  
COMPARISON OF MEANS FOR NOEL DETERMINATION  
TEST IF TREATMENT IS LESS THAN CONTROL  
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General Linear Models Procedure

Dependent Variable: RESPONSE  
Sum of Mean  
Source DF Squares F Value Pr > F

Model	3	0.77152125	0.25717375	22.37	0.0001
Error	12	0.13796250	0.01149687		
Corrected Total	15	0.90948375			
R-Square		C.V.	Root MSE	RESPONSE Mean	
0.848307		26.81425	0.107223	0.399875	
Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	3	0.77152125	0.25717375	22.37	0.0001
Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	3	0.77152125	0.25717375	22.37	0.0001

ryegrass dry weight  
COMPARISON OF MEANS FOR NOEL DETERMINATION  
TEST IF TREATMENT IS LESS THAN CONTROL  
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General Linear Models Procedure

Level of DOSE	N	Mean	SD
0	4	0.58525000	0.15500403
0.011	4	0.61750000	0.10237350
0.033	4	0.52075000	0.10589106
0.099	4	0.07600000	0.01637071

ryegrass dry weight  
COMPARISON OF MEANS FOR NOEL DETERMINATION  
TEST IF TREATMENT IS LESS THAN CONTROL  
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General Linear Models Procedure  
Dunnnett's One-tailed T tests for variable: RESPONSE  
comparisons of all treatments against a control.  
Alpha= 0.05 Confidence= 0.95 df= 12 MSE= 0.011497  
Critical Value of Dunnnett's t= 2.287  
Minimum Significant Difference= 0.1734

Comparisons significant at the 0.05 level are indicated by '\*\*\*\*'.

DOSE Comparison	Simultaneous Lower Confidence Limit		Simultaneous Upper Confidence Limit	
	Lower	Difference Between Means	Upper	Upper
0.011 - 0	-0.14117	0.03225	-0.20567	0.09108
0.033 - 0	-0.43792	-0.26430	-0.09108	0.09108
0.099 - 0	-0.68267	-0.50925	-0.33583	0.09108