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

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

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 appications: 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 indiate 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	/ /	/ /	
REVR :	/ /	/ /	
CONTR:	/ /	/ /	

Randy is an EEB action

* * * 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

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	/ /	/ /	
REVR :	/ /	/ /	Really is an EEB 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

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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) E. Wilson (305603)

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:
TB _____
DEB _____
OREB _____
RD/RSB _____

EFED:
EEB ✓
EFGWB _____

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)

MFT

Ciba Crop Protection

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

[illegible] application filed [illegible] requesting reduced risk status and 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 {aR,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
§ 71-1 - AVIAN SINGLE-DOSE LD_{50} 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: Mark A. 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. Vaughn 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_{50} 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
Species: A wild waterfowl species, preferably the mallard (*Anas platyrhynchos*), or an upland game bird species, preferably the bobwhite (*Colinus virginianus*).	*Anas platyrhynchos*
Age at beginning of test: At least 16 weeks old.	Mature
Supplier	In-house flock
Acclimation period: At least 15 days.	2 weeks

B. **Test System**

Guideline Criteria	Reported Information
Pen facilities adequate?	Yes
Photoperiod: 10-h light, 14-h dark is recommended.	17-h light; 7-h dark
Diet was nutritious and appropriate for species?	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
Definitive Test **Nominal concentrations:** At least five, in a geometric scale, unless LD_{50} > 2000 mg ai/kg.	398, 631, 1000, 1590, and 2510 mg/kg, not corrected for percent active ingredient (ai)
Controls: Water control or vehicle control (if vehicle is used)	Vehicle control
Number of birds per group: 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.
Vehicle: Distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic.	Corn oil
Amount of vehicle per body weight: Constant volume/weight % of body weight, not to exceed 1% (1 mL/100 g).	4 mL/kg of body weight
Observations period: 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							
			Day of Study							
Nominal (mg/kg)	Actual (mg ai/kg)		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.

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Reported Statistical Results

Statistical Method: Visual interpretation

LD_{50}: >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_{50}: >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_{50} 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_{50} 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: [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: [signature] 3.19.97 **Date:** [signature] 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_{50} 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
Species: A wild waterfowl species, preferably the mallard (*Anas platyrhynchos*), or an upland game bird species, preferably the bobwhite (*Colinus virginianus*).	*Colinus virginianus*
Age at beginning of test: At least 16 weeks old.	21 weeks old
Supplier	Barrett's Quail Farm, Houston, TX
Acclimation period: At least 15 days.	2 weeks

B. **Test System**

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

C. Test Design

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

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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							
			Day of Study							
Nominal (mg/kg)	Actual (mg ai/ kg)		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_{50}: >2510 mg/kg 95% C.I.: N/A
NOEL: 1000 mg/kg Probit Slope: N/A

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13. VERIFICATION OF STATISTICAL RESULTS

Statistical Method: Visual interpretation

LD_{50}: >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_{50} 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_{50} 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_{50} 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: [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: Allen W. Vaughan 3.19.97 **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_{50} 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
Species: An upland game bird species, preferably the bobwhite (*Colinus virginianus*).	*Colinus virginianus*
Age at beginning of test: 10-14 days old.	12 days old
Supplier	Sand Prairie Quail Farm, Maquoketa, IA
Chicks appeared healthy and did not have excessive mortality before the test?	Birds appeared healthy at the initiation of the test.
Acclimation period: As long as possible.	12 days

B. Test System

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

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

C. **Test Design**

Guideline Criteria	Reported Information
Range finding test?	None reported
Definitive Test **Nominal concentrations:** 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)
Controls: Control group tested with diet containing the maximum amount of vehicle used in treated diets?	5 vehicle control groups
Number of birds per group: 10 (strongly recommended)	10 birds per group
Vehicle: Distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic.	Corn oil
Vehicle amount (% of diet by weight): Not more than 2%	2%
Test durations: 5 days with treated feed and at least 3 days observation with "clean" feed.	Yes
No mortality during last 72 hr of observations?	No mortality noted in any group

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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							
			Day of Study							
Nominal (ppm)	Actual (ppm ai)		1	2	3	4	5	6	7	8
Control	N/A	50	0	0	0	0	0	0	0	0
562	491	10	0	0	0	0	0	0	0	0
1000	874	10	0	0	0	0	0	0	0	0
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 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).

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Statistical Results

Statistical Method: Visual interpretation

LC_{50}: >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_{50}: >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_{50} 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.**

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DATA EVALUATION RECORD
§ 71-2 - WATERFOWL DIETARY LC_{50} 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_{50} 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: [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: Allen W. Vaughan 3.13.97 **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_{50} 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
Species: A wild waterfowl species, preferably the mallard (*Anas platyrhynchos*).	*Anas platyrhynchos*
Age at beginning of test: 5-10 days old (preferably 5).	10 days old
Supplier	Whistling Wings, Hanover, IL
Ducklings appeared healthy and did not have excessive mortality before the test?	Birds appeared healthy at the initiation of the test.
Acclimation period: As long as possible.	9 days

B. **Test System**

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

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

C. **Test Design**

Guideline Criteria	Reported Information
Range finding test?	None reported
Definitive Test **Nominal concentrations:** 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)
Controls: Control group tested with diet containing the maximum amount of vehicle used in treated diets?	5 vehicle control groups
Number of birds per group: 10 (strongly recommended)	10 birds per group
Vehicle: Distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic.	Corn oil
Vehicle amount (% of diet by weight): Not more than 2%	2%
Test durations: 5 days with treated feed and at least 3 days observation with "clean" feed.	Yes
No mortality during last 72 hr of observations?	Yes

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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							
			Day of Study							
Nominal (ppm)	Actual (ppm ai)		1	2	3	4	5	6	7	8
Control	N/A	50	0	0	0	0	0	0	0	0
562	491	10	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).

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Statistical Results

Statistical Method: Visual interpretation

LC_{50}: >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_{50}: >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_{50} 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.**

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DATA EVALUATION RECORD
§ 72-1 - ACUTE LC_{50} 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 3.19.97 **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_{50} 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_{50}: 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_{50} 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
Species Preferred species is the bluegill sunfish (*Lepomis macrochirus*)	*Lepomis macrochirus*
Mean Weight 0.5-5 g	0.85 g
Mean Standard Length Longest not > 2x shortest	Mean: 42 mm Range: 36-47 mm
Supplier	Bybrook Bass Hatchery, CT
All fish from same source?	Yes

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

B. Source/Acclimation

Guideline Criteria	Reported Information
Acclimation Period 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
Feeding No feeding during the study	Last fed 48 hours prior to testing
Pretest Mortality < 3% mortality 48 hours prior to testing	<1% mortality during the two weeks prior to testing

C. Test System

Guideline Criteria	Reported Information
Source of dilution water 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
Water Temperature 17°C or 22°C	22°C
pH Prefer 7.2 to 7.6	6.8-7.3

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Guideline Criteria	Reported Information
Dissolved Oxygen Static: ≥ 60% during 1st 48 hrs and ≥ 40% during 2nd 48 hrs, flow-through: ≥ 60%	66-91% of saturation during the first 48 hours of the test, 46-56% of saturation for the second 48 hours.
Total Hardness Prefer 40 to 48 mg/L as $CaCO_3$	110 mg/L as $CaCO_3$.
Test Aquaria 1. Material: Glass or stainless steel 2. Size: Volume of 18.9 L (5 gal) or 30 x 60 x 30 cm 3. Fill volume: 15-30 L of solution	1. Glass 2. 19-L 3. 15 L
Type of Dilution System Must provide reproducible supply of toxicant	N/A
Flow Rate Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period	N/A
Biomass Loading Rate Static: ≤ 0.8 g/L at ≤ 17°C, ≤ 0.5 g/L at > 17°C; flow-through: ≤ 1 g/L/day	0.57 g/L
Photoperiod 16 hours light, 8 hours dark	Not reported
Solvents 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
Range Finding Test If LC_{50} >100 mg/L with 30 fish, then no definitive test is required.	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.
Nominal Concentrations of Definitive Test Control & 5 treatment levels; dosage should be 60% of the next highest concentration; concentrations should be in a geometric series	Control, solvent control, 1.3, 2.2, 3.6, 6.0, and 10.0 mg/L
Number of Test Organisms Minimum 10/level, may be divided among containers	10 fish per treatment level or control
Test organisms randomly or impartially assigned to test vessels?	Yes
Biological observations made every 24 hours?	Yes
Water Parameter Measurements 1. Temperature Measured constantly or, if water baths are used, every 6 hrs, may not vary > 1°C 2. DO and pH Measured at beginning of test and ever 48 h in the high, medium, and low doses and in the control	Temperature, DO, and pH measured daily in each control and treatment solution
Chemical Analysis 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, solutions collected at test initiation were analyzed for CGA 77102.

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.
Recovery of Chemical	51-85%
Control Mortality 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			
			Hour of Study			
Nominal	Initial Measured		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_{50}: 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_{50} (C.I.)	3.2 (2.6 - 8.5) ppm ai
Moving Average Angle LC_{50} (95% C.I.)	3.5 (2.7 - 4.3) ppm ai
Probit LC_{50} (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_{50} 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 CGA-77102

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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_{50} 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: M. 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_{50} 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_{50}: 11.9 ppm ai 95% C.I.: 8.3 - 15 ppm ai
NOEC: 2.5 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
Species Preferred species is the rainbow trout (*Oncorhynchus mykiss*)	*Oncorhynchus mykiss*
Mean Weight 0.5-5 g	0.65 g
Mean Standard Length Longest not > 2x shortest	Mean: 42 mm Range: 33-46 mm
Supplier	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
Acclimation Period 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
Feeding No feeding during the study	Last fed 48 hours prior to testing
Pretest Mortality < 3% mortality 48 hours prior to testing	<1% mortality in the 48 hours prior to testing

C. Test System

Guideline Criteria	Reported Information
Source of dilution water 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
Water Temperature 12°C	10-12°C
pH Prefer 7.2 to 7.6	6.4-7.4
Dissolved Oxygen Static: ≥ 60% during 1st 48 hrs and ≥ 40% during 2nd 48 hrs, flow-through: ≥ 60%	38-93% saturation during the first 48 hours, 35-67% of saturation during the second half of the test
Total Hardness Prefer 40 to 48 mg/L as $CaCO_3$	36 mg/L as $CaCO_3$

Guideline Criteria	Reported Information
Test Aquaria 1. Material: Glass or stainless steel 2. Size: Volume of 18.9 L (5 gal) or 30 x 60 x 30 cm 3. Fill volume: 15-30 L of solution	 1. Glass 2. 19-L 3. 15 L
Type of Dilution System Must provide reproducible supply of toxicant	N/A
Flow Rate Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period	N/A
Biomass Loading Rate Static: ≤ 0.8 g/L at ≤ 17°C, ≤ 0.5 g/L at > 17°C; flow-through: ≤ 1 g/L/day	0.43 g/L
Photoperiod 16 hours light, 8 hours dark	16 hours light, 8 hours dark
Solvents 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
Range Finding Test If 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
Nominal Concentrations of Definitive Test 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
Number of Test Organisms 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
Water Parameter Measurements 1. Temperature Measured constantly or, if water baths are used, every 6 hrs, may not vary > 1°C 2. DO and pH 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
Chemical Analysis 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
Recovery of Chemical	67-84%
Control Mortality 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			
			Hour of Study			
Nominal	Mean Measured		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_{50}: 12 ppm ai 95% C.I.: 8.3 - 15 ppm ai

Probit Slope: N/A NOEC: 2.5 ppm ai

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13. VERIFICATION OF STATISTICAL RESULTS

Parameter	Result
Binomial Test LC_{50} (C.I.)	11.9 (8.3 - 15) ppm ai
Moving Average Angle LC_{50} (95% C.I.)	N/A
Probit LC_{50} (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_{50} 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.

****

DATA EVALUATION RECORD
§ 72-2 -- ACUTE EC_{50} 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: for RGM **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: Allen W. Vaughan 3.19.97 **Date:** 3/17/97

6. **STUDY PARAMETERS:**

Scientific Name of Test Organism: *Daphnia magna*
Age of Test Organism: ≤24 hours
Definitive Test Duration: 48 hours
Study Method: Static
Type of Concentrations: 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_{50} 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_{50}: 26 ppm ai 95% C.I.: 23-30 ppm ai
NOEL: 4.8 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
Species Preferred species is *Daphnia magna*	*Daphnia magna*
All organisms are approximately the same size and weight?	Not Reported.
Life Stage Daphnids: 1st instar (<24 h). Amphipods, stoneflies, and mayflies: 2nd instar. Midges: 2nd & 3rd instar.	≤24 hours
Supplier	In-house cultures
All organisms from the same source?	Yes

B. Source/Acclimation

Guideline Criteria	Reported Information
Acclimation Period 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
Feeding No feeding during the study.	No feeding during the study.
Pretest Mortality No more than 3% mortality 48 hours prior to testing.	N/A

C. **Test System:**

Guideline Criteria	Reported Information
Source of dilution water 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
Water Temperature 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.
pH Prefer 7.2 to 7.6.	8.1-8.3
Dissolved Oxygen Static: ≥ 60% during 1st 48 h and ≥ 40% during 2nd 48 h, flow-through: ≥ 60%.	≥82% saturation throughout the study
Total Hardness Prefer 40 to 48 mg/L as $CaCO_3$.	180 mg/L as $CaCO_3$

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

D. Test Design

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

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Number of Test Organisms Minimum 20/level, may be divided among containers.	5 daphnids per vessel, 4 vessels per level
Test organisms randomly or impartially assigned to test vessels?	Yes
Water Parameter Measurements 1. Temperature Measured continuously or, if water baths are used, every 6 h, may not vary > 1°C. 2. DO and pH 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.
Chemical Analysis 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:

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

Mortality

Concentration (ppm ai)		Number of Organ-isms	Cumulative Number Immobile			
			Hour of Study			
Nominal	Mean Measured		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_{50}: 26 ppm ai

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

Probit Slope: Not reported.

NOEC: 15 ppm ai

50

13. VERIFICATION OF STATISTICAL RESULTS:

Parameter	Result
Binomial Test EC_{50} (C.I.)	26 (15-41) ppm ai
Moving Average Angle EC_{50} (95% C.I.)	26 (23-30) ppm ai
Probit EC_{50} (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_{50} 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_{50} 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: for RGM **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: Allen W. Vaughan 04.07.97 **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 ≥24 hours old and was variable among the test population. A 96-hour LC_{50} of 1.41 ppm ai classifies CGA-77102 as moderately toxic to *Mysidopsis bahia*. The NOEC was not determined.

Results Synopsis

96-Hour LC_{50}: 1.41 ppm ai 95% C.I.: 1.17-1.68 ppm ai
NOEC: Not determined. 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 ≥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 ≥24 hours and was variable among the test population. The current guidelines require mysids ≤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 ≤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
Species Preferred species are *Mysidopsis bahia*, *Penaeus setiferus*, *P. duorarun*, *P. aztecus* and *Palaemonetes sp.*	*Mysidopsis bahia*
Age Juvenile, mysids should be ≤ 24 hours old	1-5 days old at test initiation
Supplier	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
Acclimation Period 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

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Guideline Criteria	Reported Information
Feeding 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 *Artemia* at test initiation.
Pretest Mortality <3% mortality 48 hours prior to testing	Not reported.

C. Test System

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

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

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D. Test Design

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

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.
Recovery of Chemical	77-104%
Control Mortality 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.

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B. Statistical Results

Method: Moving Average Method

96-Hour LC_{50}: 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_{50} (C.I.)	1.41 (0.96-3.13) ppm ai
Moving Average Angle LC_{50} (95% C.I.)	1.40 (1.15-1.67) ppm ai
Probit LC_{50} (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 $CaCO_3$) 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_{50} 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

****

DATA EVALUATION RECORD
ALGAE OR DIATOM EC_{50} 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: [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_{50}: 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
Species *Skeletonema costatum* *Anabaena flos-aquae* *Selenastrum capricornutum* *Navicula pelliculosa*	*Selenastrum capricornutum*
Initial Number of Cells 3,000 - 10,000 cells/mL	3,000 cells/mL
Nutrients Standard formula, e.g. 20XAAP	AAP medium

B. Test System

Guideline Criteria	Reported Information
Solvent	Acetone (0.1 mL/L)
Temperature Skeletonema: 20°C Others: 24-25°C	24°C
Light Intensity Anabaena: 2.0 Klux (±15%) Others: 4.0-5.0 Klux (±15%)	3.23 - 4.57 Klux
Photoperiod 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
pH Skeletonema: approx. 8.0 Others: approx. 7.5	Initial: 7.5 Final: 8.3 - 9.8

C. **Test Design**

Guideline Criteria	Reported Information
Dose range 2X or 3X progression	2X
Doses at least 5	Definitive test: 0.00081, 0.0016, 0.0031, 0.0063, 0.013, 0.025, and 0.050 mg ai/L
Controls negative and/or solvent	Negative and solvent control
Replicates per dose 3 or more	3
Duration of test 120 hours	120 hours
Daily observations were made?	Yes
Method of Observations	Cellular counts
Maximum Labeled Rate	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

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Dose Response

Mean Measured Concentration (mg ai/L)	Avg. Cell Density (x 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.

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EC_{50}: 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_{50} and NOEC for *Selenastrum capricornutum* exposed to CGA 77102 was 0.0080 and 0.0015 ppm ai, respectively. This study is categorized as **Core.**

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GA-77102 - SELENASTRUM CAPRICORNUTUM
ile: 43928929 Transform: NO TRANSFORMATION

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

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

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
ile: 43928929 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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
ile: 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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MAX FEKEN CGA-77102 SELENASTRUM CAPRICORNUTUM 05-01-96

****

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

****

CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM 1
11:25 Wednesday, May 1, 1996

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.00000	.	146	162	151	142	157	156
2	0.00091	-3.04096	147	154	150	.	.	.
3	0.00150	-2.82391	139	149	142	.	.	.
4	0.00300	-2.52288	136	153	137	.	.	.
5	0.00550	-2.25964	134	138	136	.	.	.
6	0.01100	-1.95861	80	52	55	.	.	.
7	0.02200	-1.65758	6	7	9	.	.	.
8	0.04700	-1.32790	2	1	2	.	.	.

CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM 2
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION 11:25 Wednesday, May 1, 1996

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	C0	Weighted SS
0	-2.055000	0.344000	152.000000	54.361982
1	-2.001477	0.242788	149.018597	32.735734
2	-2.011877	0.242676	150.035622	34.659406
3	-2.011268	0.241909	149.990894	34.989696
4	-2.011373	0.242006	149.999608	34.954041
5	-2.011358	0.241992	149.998392	34.959173
6	-2.011360	0.241994	149.998564	34.958448
7	-2.011360	0.241994	149.998540	34.958551
8	-2.011360	0.241994	149.998544	34.958536
9	-2.011360	0.241994	149.998543	34.958538
10	-2.011360	0.241994	149.998543	34.958538

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	2843.0000000	947.6666667
Residual	24	34.9585379	1.4566057
Uncorrected Total	27	2877.9585379	
(Corrected Total)	26	2722.4123672	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-2.0113602	0.0229135364	-2.05865101	-1.96406934
SIGMA	0.2419941	0.0196212519	0.20149819	0.28249008
C0	149.9985431	3.8753954544	142.00018445	157.99690184

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	C0
LOG_EC50	1	-0.641625092	-0.481985376
SIGMA	-0.641625092	1	0.3183030295
C0	-0.481985376	0.3183030295	1

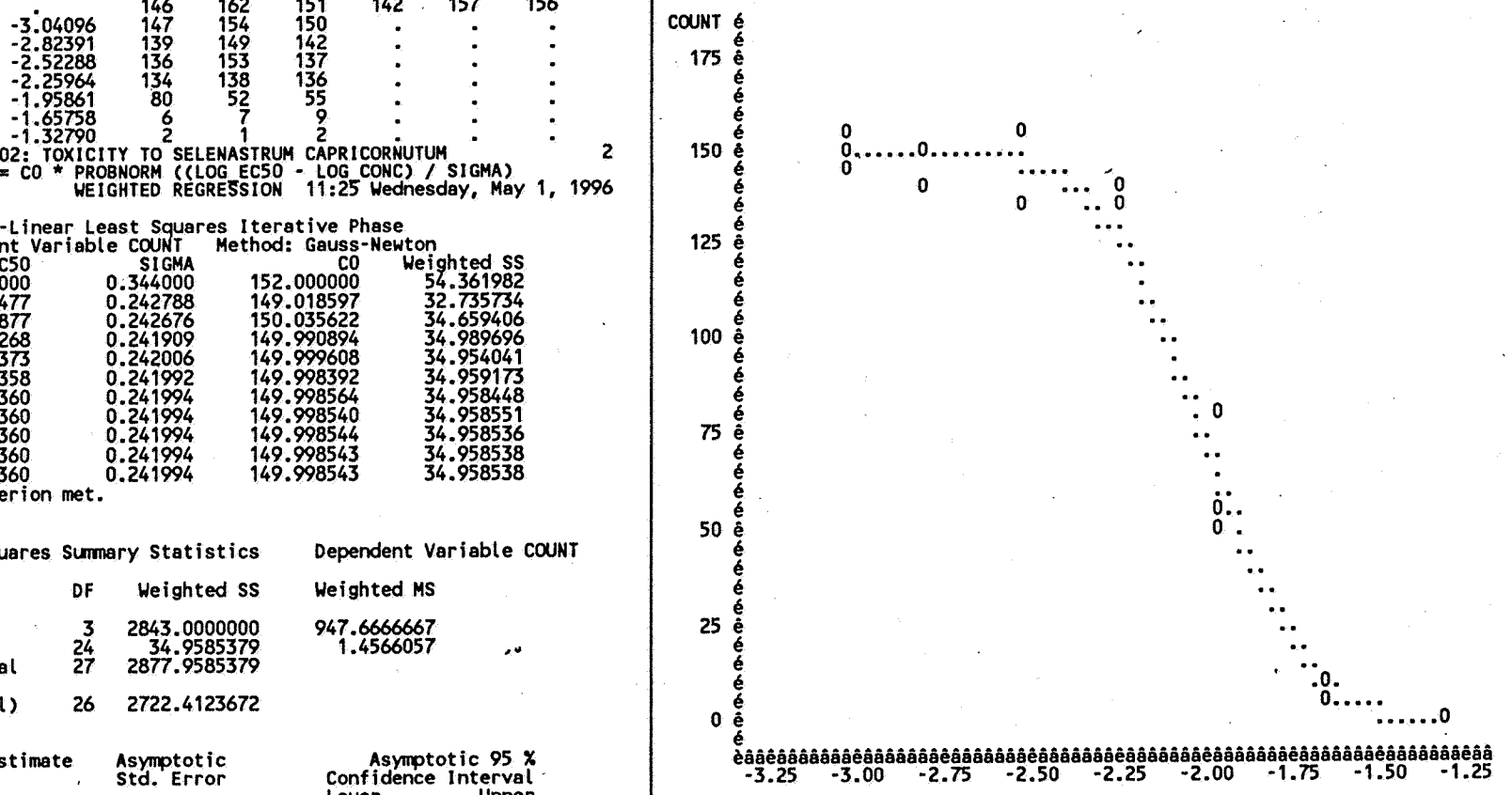
CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM 3
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
11:25 Wednesday, May 1, 1996

OBS	CONC	LOG_EC50	SIGMA	C0	RESID_SS	EC50
1	0	-2.01136	0.24199	149.999	34.9585	.0097418

CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM 4

MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
11:25 Wednesday, May 1, 1996

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.



NOTE: 1747 obs had missing values. 1680 obs hidden.

CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM 5
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

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

R-Square	C.V.	Root MSE	RESPONSE Mean
0.989579	6.967503	7.336522	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	RESPONSE Mean	RESPONSE 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
0.0015	3	143.333333	5.1316014
0.0055	3	136.000000	2.0000000
0.00091	3	150.333333	3.5118846

CGA-77102: TOXICITY TO SELENASTRUM CAPRICORNUTUM 8
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
11:25 Wednesday, May 1, 1996

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 '***'.

DOSE Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.00091 - 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_{50} 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_{50}: 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
Species *Skeletonema costatum* *Anabaena flos-aquae* *Selenastrum capricornutum* *Navicula pelliculosa*	*Skeletonema costatum*
Initial Number of Cells 3,000 - 10,000 cells/mL	10,000 cells/mL
Nutrients Standard formula, e.g. 20XAAP	Artificially enriched seawater (AES) medium

   B. Test System

Guideline Criteria	Reported Information
Solvent	Acetone (0.1 mL/L)
Temperature Skeletonema: 20°C Others: 24-25°C	20 - 21°C
Light Intensity Anabaena: 2.0 Klux (±15%) Others: 4.0-5.0 Klux (±15%)	3.77 - 4.31 Klux
Photoperiod 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
pH Skeletonema: approx. 8.0 Others: approx. 7.5	Initial: 8.0 Final: 8.0 - 8.5

C. **Test Design**

Guideline Criteria	Reported Information
Dose range 2X or 3X progression	3X
Doses at least 5	0.0024, 0.0081, 0.027, 0.090, 0.30, and 1.0 mg ai/L
Controls negative and/or solvent	Negative and solvent control
Replicates per dose 3 or more	3
Duration of test 120 hours	120 hours
Daily observations were made?	Yes
Method of Observations	Cellular counts
Maximum Labeled Rate	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

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Dose Response

Mean Measured Concentration (mg ai/L)	Avg. Cell Density (x 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 95% C.I.: 0.041 - 0.32 mg ai/L
Probit Slope: N/A 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 95% C.I.: 0.091 - 0.128 ppm ai
Probit Slope: N/A NOEC: 0.021 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 test. Based on mean measured concentrations, the 120-hour EC_{50} and NOEC for *Skeletonema costatum* exposed to CGA 77102 was 0.11 and 0.021 ppm ai, respectively. This study is categorized as **Core.**

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GA-77102 - SKELETONEMA COSTATUM
ile: 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		

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 - SKELETONEMA COSTATUM
ile: 43928930 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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.

NOEC = 0.021 mg/L

MAX FEKEN CGA-77102 SKELETONEMA COSTATUM 05-02-96

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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

****

CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM 1
09:50 Thursday, May 2, 1996

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

CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM 2
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION 09:50 Thursday, May 2, 1996

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	C0	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	-0.967778	0.520840	113.132098	12.903880
6	-0.967688	0.520747	113.128893	12.904545
7	-0.967711	0.520771	113.129721	12.904372
8	-0.967705	0.520765	113.129508	12.904416
9	-0.967707	0.520766	113.129563	12.904405
10	-0.967707	0.520766	113.129549	12.904408
11	-0.967707	0.520766	113.129552	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 Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	1951.0000000	650.3333333
Residual	21	12.9044072	0.6144956
Uncorrected Total	24	1963.9044072	
(Corrected Total)	23	1355.6990476	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-0.9677067	0.0360427169	-1.04266102	-0.89275232
SIGMA	0.5207660	0.0320787238	0.45405517	0.58747685
C0	113.1295515	2.3840247007	108.17173939	118.08736357

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	C0
LOG_EC50	1	-0.679547075	-0.539220198
SIGMA	-0.679547075	1	0.3650789465
C0	-0.539220198	0.3650789465	1

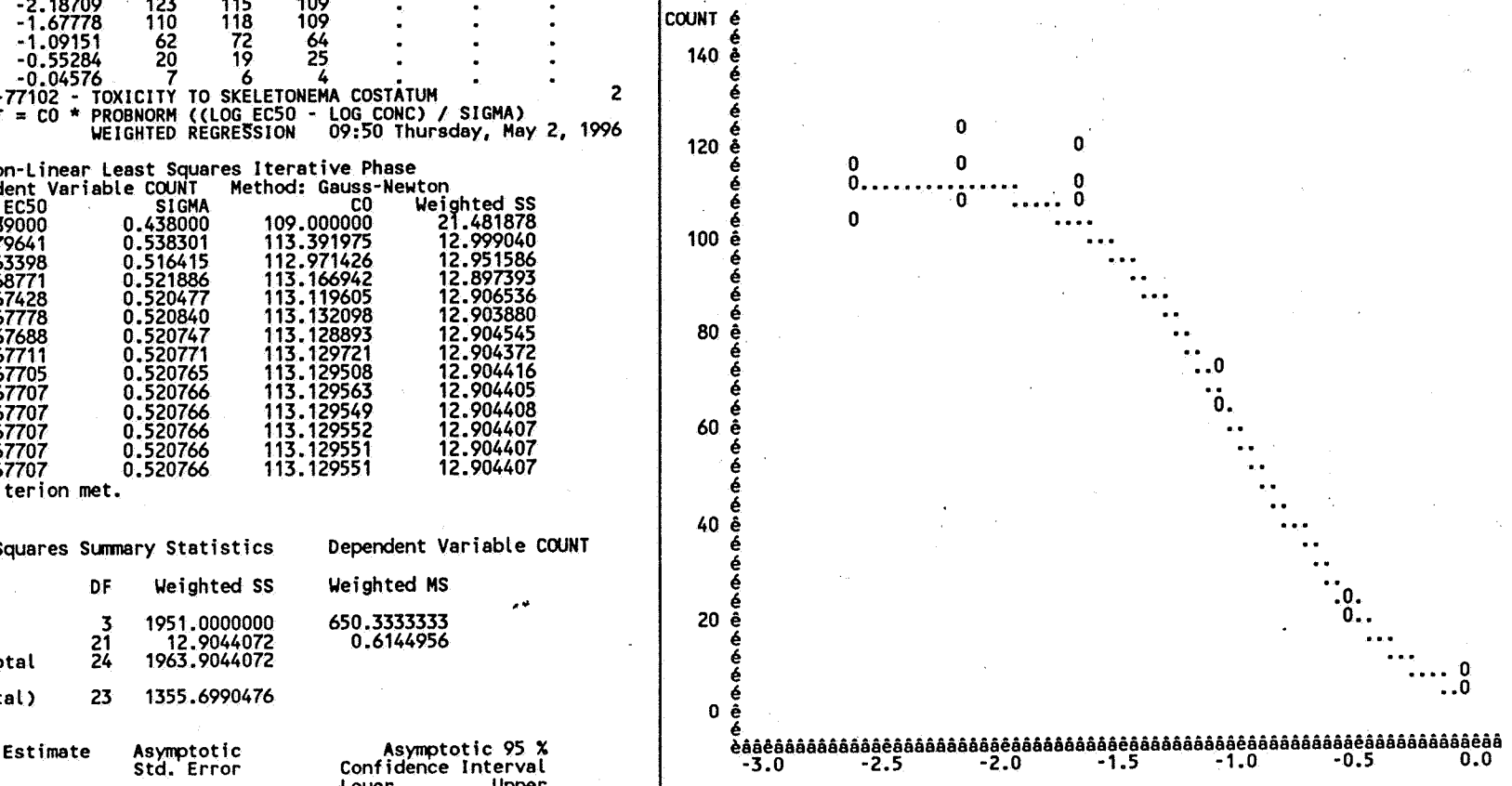
CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM 3
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
09:50 Thursday, May 2, 1996

OBS	CONC	LOG_EC50	SIGMA	C0	RESID_SS	EC50

1	0	-0.96771	0.52077	113.130	12.9044	0.10772

CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM 4
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
09:50 Thursday, May 2, 1996

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.



NOTE: 2643 obs had missing values. 2571 obs hidden.

CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM 5
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

NOTE: Due to missing values, only 24 observations can be used in this analysis.

CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM 6
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:50 Thursday, May 2, 1996

General Linear Models Procedure

Dependent Variable: RESPONSE

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 7
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	RESPONSE Mean	RESPONSE SD
0	6	109.166667	7.33257572
0.9	3	5.666667	1.52752523
0.28	3	21.333333	3.21455025
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

CGA-77102 - TOXICITY TO SKELETONEMA COSTATUM 8
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:50 Thursday, May 2, 1996

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	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous 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	***

DATA EVALUATION RECORD
EC_{50} 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: Max Feken **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_{50}: 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
Species *Lemna gibba*	*Lemna gibba*
Number of Plants/Fronds 5 plants, 3 fronds per plant.	5 plants; 3 fronds per plant.
Nutrients Standard formula, e.g. 20X-AAP	Hoagland's medium

   B. Test System

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

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C. Test Design

Guideline Criteria	Reported Information
Dose range 2X or 3X progression	2X
Doses at least 5	0.0016, 0.0031, 0.0063, 0.013, 0.025, 0.050, and 0.10 mg ai/L
Controls negative and/or solvent	Negative and solvent control
Replicates per dose 3 or more	3
Duration of test 14 days	14 days
Daily observations were made?	Observations made on Days 3, 6, 9, 12 and 14.
Method of Observations	Frond counts and biomass (dry weight)
Maximum Labeled Rate	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.

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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

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_{50} and NOEC for *Lemna gibba* exposed to CGA 77102 was 0.021 and 0.0076 ppm ai, respectively. This study is classified as **Core.**

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GA-77102 - LEMNA GIBBA
ile: 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
ABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

GA-77102 - LEMNA GIBBA
ile: 43928931 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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
ile: 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 CRTL) MEAN =	0.0481	CALCULATED t VALUE =	-3.2014
GRP2 (BLANK CRTL) 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

s = 0.014
Note: df used for table values are approximate when v > 20.

⊛ - significantly higher than solvent control

NOEC = 0.0076

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

****

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.

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: M. Mossler **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_{25}: 0.0057 lb ai/A
NOEL: 0.0003 lb ai/A

Most sensitive monocot: Ryegrass
Most sensitive parameter: Phytotoxicity
EC_{25}: 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
Species 6 dicots in 4 families, including soybean and a rootcrop; 4 monocots in 2 families, including corn.	Dicots: cucumber, lettuce, Monocots: corn, oat, onion, ryegrass
Number of seeds per rep 10	10
Source of Seed	Commercial suppliers
Historical % Germination of Seed	Between 85% and 99%

B. Test System

Guideline Criteria	Reported Information
Solvent	50% acetone
Site of test	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

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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_{25} (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_{25} 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_{25} 95% C.L.: Not reported — Probit Slope: N/A

Most sensitive monocot: ryegrass — Parameter: dry weight
EC_{25} 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

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application rates. Probit analysis or visual interpolation was used for EC_{25} and EC_5 determination/verification. Non-linear regression was used to recompute the EC_{25} value for lettuce dry weight.

Results for the most sensitive parameter of each species

Species	Parameter	EC_{25} (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_{25} (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

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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.**

ucumber height
ile: cuc Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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

ıcumber height

Estimated EC Values and Confidence Limits

›int	Conc.	Lower 95% Confidence Limits	Upper 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

$Y = 1.26(x) + 5.32$

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

ucumber dry weight
ile: cuc Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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

ucumber dry weight
ile: 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

ucumber dry weight

Estimated EC Values and Confidence Limits

oint	Conc.	Lower 95% Confidence Limits	Upper Limits
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

$Y = 1.66(x) + 5.67$

$EC_{25} = 0.1616$ a.i./A

ettuce dry weight
ile: let Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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

ettuce dry weight
ile: 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 = 0.0037 lb ai/A (predicted EC_5)

ettuce dry weight

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
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

$Y = 0.74(x) + 6.0$

$EC_{25} = \cancel{0.007}$ 0.0055 lb ai/A

lettuce dry weight 1
14:54 Thursday, May 2, 1996

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	.	0.650	0.491	0.609	0.635	.	.
2	0.0037	-2.43180	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	.	.

lettuce dry weight 2
MODEL: COUNT = CO * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION 14:54 Thursday, May 2, 1996

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

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 Dependent Variable COUNT

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	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-1.339495722	0.25818145804	-1.8972625176	-0.7817289262
SIGMA	1.335675214	0.55684892951	0.1326769609	2.5386734677
CO	0.596281638	0.04751125102	0.4936398822	0.6989233944

Asymptotic Correlation Matrix

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

lettuce dry weight 3
MODEL: COUNT = CO * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
14:54 Thursday, May 2, 1996

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

lettuce dry weight 4
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION 14:54 Thursday, May 2, 1996

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	CO	Weighted SS
0	-2.260000	1.344000	0.596000	0.199303
1	-2.240353	1.335764	0.596281	0.197605
2	-2.240395	1.335675	0.596282	0.197612
3	-2.240395	1.335675	0.596282	0.197612

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

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	

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

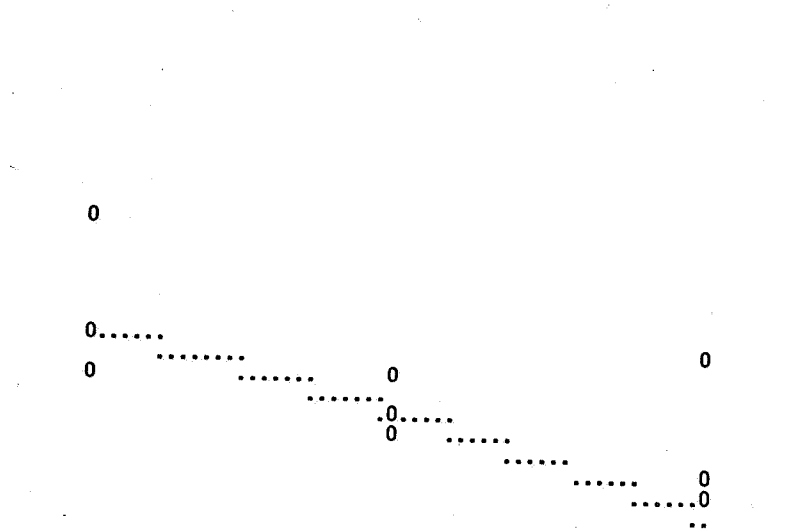
Corr	LOG_EC25	SIGMA	CO
LOG_EC25	1	-0.742673957	-0.758649924
SIGMA	-0.742673957	1	0.360978179
CO	-0.758649924	0.360978179	1

lettuce dry weight 5
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
14:54 Thursday, May 2, 1996

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

lettuce dry weight 6
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
14:54 Thursday, May 2, 1996

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.



orn dry weight
ile: cor Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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
ile: 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.

)t dry weight
:le: oat Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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
:ile: 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 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		

$Y = 1.58(x) + 5.42$

$EC_{50} = 0.20$ lb ai/A

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

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

OUP	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	*

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

nion phytotoxicity
ile: oni Transform: ARC SINE(SQUARE ROOT(Y))

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

ROUP	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

NOEL = 0.0037 lb ai/A

ıion phytotoxicity

Estimated EC Values and Confidence Limits

oint	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
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

$Y = 2.41(x) + 7.33$

$EC_{25} = 0.057$ lb a.i./A

yegrass dry weight
ile: 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

oint	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
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

$Y = 2.19(x) + 8.59$

$EC_{25} = 0.0083$ 16 ai/A

/egrass phytotoxicity
le: 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

/egrass phytotoxicity
ile: 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
ote: 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: Mark L. Mossler **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_{25}: 0.27 lb ai/A
NOEL: 0.01 lb ai/A

Most sensitive monocot: Ryegrass
Most sensitive parameter: Dry weight
EC_{25}: 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
Species 6 dicots in 4 families, including soybean and a rootcrop; 4 monocots in 2 families, including corn.	Dicots: cucumber, tomato Monocots: corn, oat, onion, ryegrass
Number of plants per rep 5	5
Source of Seed	Commercial suppliers

B. **Test System**

Guideline Criteria	Reported Information
Solvent	50% acetone and 8 drops/L of Triton surfactant
Site of test	Greenhouse
Planting method / type of pot	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_{25} (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_{25} 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_{25} 95% C.L.: Not determined — Probit Slope: N/A

Most sensitive monocot: ryegrass — Parameter: dry weight
EC_{25} 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

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nominal application rates. Probit analysis or visual interpolation was used for EC_{25} and EC_5 determination/ verification. Non-linear regression was used to recompute the EC_{25} value for ryegrass dry weight and cucumber phytotoxicity.

Results for the most sensitive parameter of each species

Species	Parameter	EC_{25} (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_{25} (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.

115

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.**

icumber phytotoxicity
le: cuc Transform: ARC SINE(SQUARE ROOT(Y))

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

ROUP	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.

ucumber phytotoxicity
ile: 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 6 5 4 1 2 3
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_{25}, ∴ NOEL = 0.01 lb a:/A (predicted EC_5)

cumber phytotoxicity

Estimated EC Values and Confidence Limits

int	Conc.	Lower 95% Confidence Limits	Upper Confidence Limits
: 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 lb ai/A

cucumber phytoxicity 1
13:24 Monday, May 6, 1996

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.000	.	1.00	1.00	1.00	1.00	.	.
2	0.099	-1.00436	0.92	0.80	0.80	0.84	.	.
3	0.300	-0.52288	0.72	0.76	0.68	0.80	.	.
4	0.890	-0.05061	0.64	0.48	0.76	0.60	.	.

cucumber phytoxicity 2
MODEL: COUNT = C0 * 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	LOG_EC50	SIGMA	C0	Weighted SS
0	0.371000	1.385000	1.000000	0.086797
1	0.372187	1.387308	1.000068	0.086781
2	0.372187	1.387307	1.000068	0.086781
3	0.372187	1.387307	1.000068	0.086781

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

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	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	0.372187217	0.19914210749	-.05803289245	0.8024073268
SIGMA	1.387307410	0.36219351170	0.60483636867	2.1697784522
C0	1.000067855	0.04075182841	0.91202893523	1.0881067754

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	C0
LOG_EC50	1	0.714270157	-0.233414232
SIGMA	0.714270157	1	0.3894194832
C0	-0.233414232	0.3894194832	1

cucumber phytoxicity 3
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
13:24 Monday, May 6, 1996

OBS	CONC	LOG_EC50	SIGMA	C0	RESID_SS	EC50
1	0	0.37219	1.38731	1.00007	0.086781	2.35606

cucumber phytoxicity 4
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION 13:24 Monday, May 6, 1996

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	C0	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 Dependent Variable COUNT

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	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC25	-0.563537758	0.17274301922	-.93672613906	-0.1903493773
SIGMA	1.387307411	0.36219351177	0.60483636872	2.1697784526
C0	1.000067855	0.04075182841	0.91202893524	1.0881067754

Asymptotic Correlation Matrix

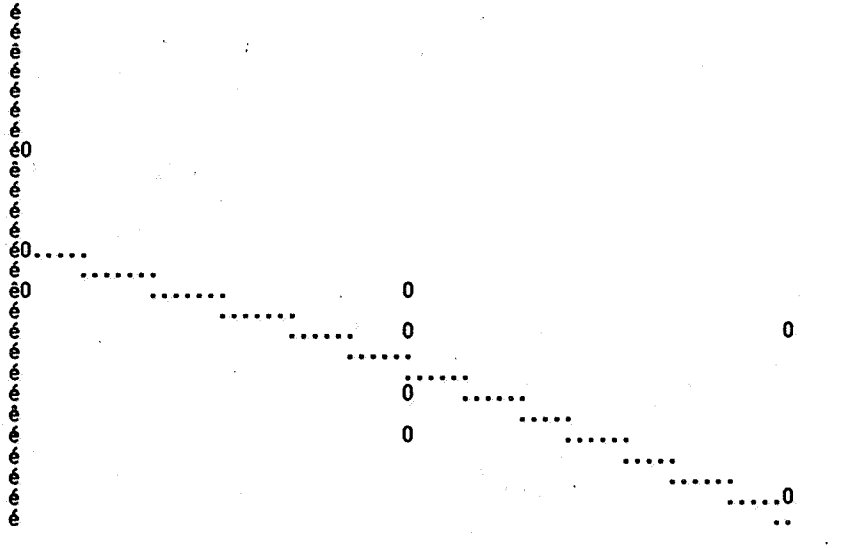
Corr	LOG_EC25	SIGMA	C0
LOG_EC25	1	-0.590788779	-0.819808444
SIGMA	-0.590788779	1	0.3894194831
C0	-0.819808444	0.3894194831	1

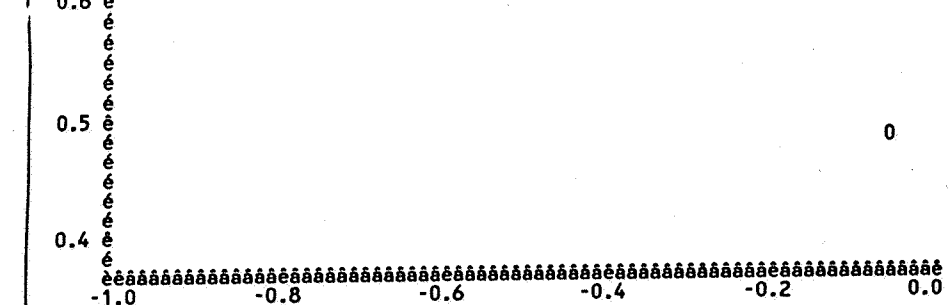
cucumber phytoxicity 5
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
13:24 Monday, May 6, 1996

OBS	CONC	LOG_EC25	SIGMA	C0	RESID_SS	EC25
1	0	-0.56354	1.38731	1.00007	0.086781	0.27319

cucumber phytoxicity 6
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
13:24 Monday, May 6, 1996

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.





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

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.

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

General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE 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	0.05656854

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= 12 MSE= 0.0048
Critical Value of Dunnett'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	
0.099 - 0	-0.27206	-0.16000	-0.04794	***
0.3 - 0	-0.37206	-0.26000	-0.14794	***
0.89 - 0	-0.49206	-0.38000	-0.26794	***

mato dry weight
le: tom Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

OUP	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

mato dry weight
ile: 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
ote: df used for table values are approximate when v > 20.

NOEL = 0.099 lb ai/A

rn dry weight
le: cor Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

OUP	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
ile: 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

; = 0.913
lote: df used for table values are approximate when v > 20.

NOEL = 0.033 lb ai/A

rn dry weight

Estimated EC Values and Confidence Limits

›int	Conc.	Lower 95% Confidence Limits	Upper Confidence Limits
: 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

$Y = 0.93(x) + 4.82$

$EC_{25} = 0.30$ 16 ai/A

orn phytotoxicity
ile: cor Transform: ARC SINE(SQUARE ROOT(Y))

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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
ile: 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

rn phytotoxicity

Estimated EC Values and Confidence Limits

int	Conc.	Lower 95% Confidence Limits	Upper Confidence Limits
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

$Y = 1.39(x) + 4.91$

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

t dry weight
le: oat Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

OUP	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

; = 0.351
lote: df used for table values are approximate when v > 20.

NOEL = 0.099 lb ai/A

ıt dry weight

Estimated EC Values and Confidence Limits

ɔint	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
ɔ 1.00	0.0727		
ɔ 5.00	0.1319		
ɔ10.00	0.1811		
ɔ15.00	0.2244		
ɔ50.00	0.5547		
ɔ85.00	1.3715		
ɔ90.00	1.6990		
ɔ95.00	2.3334		
ɔ99.00	4.2312		

$Y = 2.64(x) + 5.67$

$EC_{25} = 0.31$ lb ai/A

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

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

OUP	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.

ıion phytotoxicity
ile: oni Transform: ARC SINE(SQUARE ROOT(Y))

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

ROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP 0 0 0 0 0 0 0 7 6 3 4 5 1 2
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
able 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_5)

/egrass dry weight
ile: rye Transform: LOG BASE 10(Y)

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

ROUP	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

yegrass dry weight
ile: 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

s = 0.091
Note: df used for table values are approximate when v > 20.

NOEC = 0.011 lb ai/A

'egrass dry weight

Estimated EC Values and Confidence Limits

)int	Conc.	Lower 95% Confidence Limits	Upper 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		

$Y = 3.39(x) + 9.69$

$EC_{05} = 0.026$ lb ai/A

ryegrass dry weight 11
13:24 Monday, May 6, 1996

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.000	.	0.490	0.468	0.807	0.576	.	.
2	0.011	-1.95861	0.567	0.758	0.522	0.623	.	.
3	0.033	-1.48149	0.246	0.215	0.428	0.394	.	.
4	0.099	-1.00436	0.065	0.089	0.091	0.059	.	.

ryegrass dry weight 12
MODEL: COUNT = C0 * 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	LOG_EC50	SIGMA	C0	Weighted SS
0	-1.386000	0.295000	0.585000	0.347784
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	0.616309	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

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

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
C0	0.616306612	0.05289661362	0.5020304939	0.7305827292

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	C0
LOG_EC50	1	-0.703872178	-0.704288207
SIGMA	-0.703872178	1	0.504269351
C0	-0.704288207	0.504269351	1

ryegrass dry weight 13
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
13:24 Monday, May 6, 1996

OBS	CONC	LOG_EC50	SIGMA	C0	RESID_SS	EC50
1	0	-1.43447	0.36081	0.61631	0.30870	0.036773

ryegrass dry weight 14
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION 13:24 Monday, May 6, 1996

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	C0	Weighted SS
0	-1.585000	0.295000	0.585000	0.347802
1	-1.688752	0.368668	0.617929	0.309944
2	-1.674048	0.358478	0.615214	0.308637
3	-1.678948	0.361504	0.616625	0.308733
4	-1.677498	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	-1.677843	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

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

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
C0	0.616306612	0.05289661362	0.5020304939	0.7305827292

Asymptotic Correlation Matrix

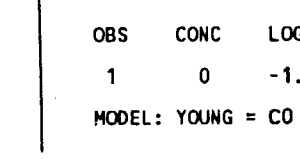
Corr	LOG_EC25	SIGMA	C0
LOG_EC25	1	-0.880272746	-0.677243539
SIGMA	-0.880272746	1	0.504269351
C0	-0.677243539	0.504269351	1

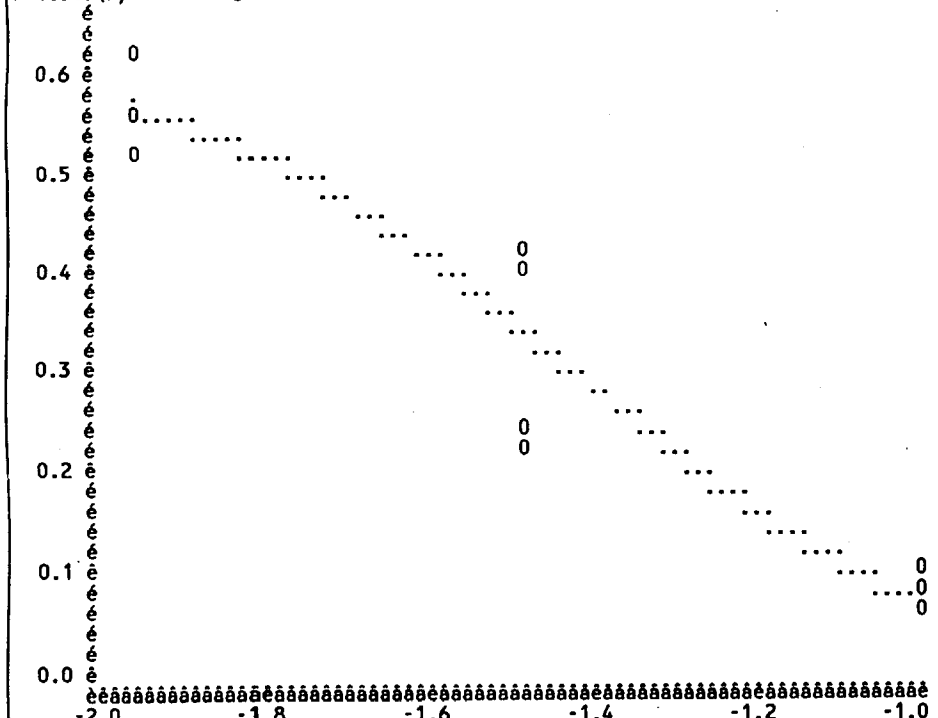
ryegrass dry weight 15
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
13:24 Monday, May 6, 1996

OBS	CONC	LOG_EC25	SIGMA	C0	RESID_SS	EC25
1	0	-1.67783	0.36081	0.61631	0.30870	0.020997

ryegrass dry weight 16
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
13:24 Monday, May 6, 1996

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.





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
13:24 Monday, May 6, 1996

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
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	0.77152125	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
13:24 Monday, May 6, 1996

General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE SD
0	4	0.58525000	0.15500403
0.011	4	0.61750000	0.10237350
0.033	4	0.32075000	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
13:24 Monday, May 6, 1996

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= 12 MSE= 0.011497
Critical Value of Dunnett'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	Difference Between Means	Simultaneous Upper Confidence Limit	
0.011 - 0	-0.14117	0.03225	0.20567	
0.033 - 0	-0.43792	-0.26450	-0.09108	***
0.099 - 0	-0.68267	-0.50925	-0.33583	***