

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD
LEMNA GIBBA EC₅₀ TEST
GUIDELINE 123-2 (TIER II)

(4)

1. **CHEMICAL:** Metolachlor
Shaughnessey #: 108801
2. **TEST MATERIAL:** Metolachlor technical
Purity: 97.3%
3. **CITATION:**

Authors: Hoberg, J.R.
Title: Metolachlor technical - toxicity to
duckweed (*Lemna gibba*).
Date: 1994
Laboratory: Springborn Laboratories, Inc., Wareham,
MA
Sponsor: Ciba Crop Protection, Greensboro, NC
Lab. Report No.: 94-8-5404
MRID No.: 434871-05

4. **REVIEWED BY:**

William Erickson
Biologist
EEB/EFED

Signature: *W. Erickson*

Date: 1/26/95

5. **APPROVED BY:**

Harry Craven
Section Head 4
EEB/EFED

Signature: *Harry Craven*

Date: 2/15/95

6. **CONCLUSION:** The study is scientifically sound and fulfills the guideline requirement for a Tier 2 aquatic plant growth study with duckweed. The EC₅₀ value is 0.048 mg ai/l, which classifies technical metolachlor as very highly toxic to duckweed. The NOEC is 0.0084 mg ai/l.
7. **ADEQUACY OF THE STUDY:** Core.
8. **MAJOR GUIDELINE DEVIATIONS:** None.
9. **MATERIALS AND METHODS:**



A. Test Organism:

Guideline Criteria	Reported Information
Species: <i>Lemna gibba</i>	<i>Lemna gibba</i> G3
Number of Plants: 5 Number of fronds per plant: 3	5 3
Nutrients:	Hoagland's medium

B. Test System:

Guideline Criteria	Reported Information
Solvent used:	None
Site of test: Growth Chamber	Environmental chamber
Temperature: 20° C for <i>Skeletonema</i> sp.; others are 24-25°C	24-25 °C
Light Intensity: 2.0 Lux for <i>Anabaena</i> sp.; others are 4-5.0	3.8-4.8
Photoperiod:	Continuous illumination
pH: 5.0	5.0
Static or Renewal System	Static

C. Test Design:

Guideline Criteria	Reported Information
Dose range: 2X or 3X	2X
Doses: at least 5	7
Controls: negative and/or solvent	Negative
Three or more replicates per dose:	3
Duration of test: 14 days	14 days
Daily Observations?	No; 3-day intervals
Method of Observations:	Not specified
Maximum Labeled Rate:	Not reported

10. REPORTED RESULTS:

Guideline Criteria	Reported Information
Initial and 14 day frond count?	Yes
control frond count at 14 days increase $\geq 2X$?	Yes
Measured Initial Chemical Concentrations? Optional	Yes
Raw data included? (Y/N)	Excerpted
Quality Assurance Measures?	Yes

Dose Response

doses→ mg ai/l	control	0.0011	0.0021	0.0042	0.0084	0.015	0.030	0.058
inhibit %	-	2	11	6	2	18	20	61
pH: 0 /14 day	5.0 6.4	5.0 6.4	5.0 6.4	4.9 6.4	4.9 6.4	4.9 6.2	4.9 6.2	4.9 6.0

Observations: Fronds at the 0.058 mg ai/l level had little root formation and were smaller and chlorotic in comparison to the controls. Fronds at 0.0084-0.030 mg ai/l were slightly chlorotic. Several fronds in control and at dosages of 0.0011-0.0042 mg ai/l were observed to be chlorotic.

Statistical Results:

Method: **Linear Regression (EC₅₀); Williams' Test (NOEC)**

Frond density:

EC₅₀: 0.051 mg ai/l 95% C.L.: 0.037-0.066 mg ai/l

NOEC: 0.0084 mg ai/l

Frond biomass:

EC₅₀: 0.043 mg ai/l 95% C.L.: 0.018-0.12 mg ai/l

NOEC: 0.015 mg ai/l

11. REVIEWER'S DISCUSSION/INTERPRETATION:

Test Procedures: Test procedures met guideline criteria.

Statistical Analysis: Frond density

Method: EPA Toxanol program; Williams' Test

EC₅₀: 0.048 mg ai/l **95% C.L.:** 0.043-0.056 mg ai/l

NOEC: 0.0084 mg ai/l

Discussion: The study is scientifically sound and fulfills the guideline requirement for a Tier 2 aquatic plant growth study with duckweed.

12. COMPLETION OF STUDY ONE-LINER: 1/26/95.

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 4.897321E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
1	.1043968	4.897321E-02	4.396628E-02

5.662954E-02

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
4	.7148472	9.371648

GOODNESS OF FIT PROBABILITY
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 = 1.169028
95 PERCENT CONFIDENCE LIMITS = .1806308 AND 2.157426

LC50 = 7.721045E-02
95 PERCENT CONFIDENCE LIMITS = 2.679345E-02 AND 704.6784

LC10 = 6.328546E-03
95 PERCENT CONFIDENCE LIMITS = 2.764061E-05 AND 1.640182E-02

LEMNA GIBBA FROND PRODUCTION

File: A:LEMNA.DAT

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	0	3	417.000	481.000	442.667
2	0.0011	3	413.000	474.000	435.667
3	0.0021	3	376.000	404.000	393.333
4	0.0042	3	380.000	478.000	417.333
5	0.0084	3	415.000	444.000	434.000
6	0.015	2	357.000	371.000	364.000
7	0.030	3	323.000	375.000	353.333
8	0.058	3	169.000	180.000	173.667

LEMNA GIBBA FROND PRODUCTION

File: A:LEMNA.DAT

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	0	1144.333	33.828	19.531
2	0.0011	1114.333	33.382	19.273
3	0.0021	229.333	15.144	8.743
4	0.0042	2809.333	53.003	30.601
5	0.0084	271.000	16.462	9.504
6	0.015	98.000	9.899	7.000
7	0.030	732.333	27.062	15.624
8	0.058	32.333	5.686	3.283

LEMNA GIBBA FROND PRODUCTION

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Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	0	3	442.667	442.667	442.667
2	0.0011	3	435.667	435.667	435.667
3	0.0021	3	393.333	393.333	414.889
4	0.0042	3	417.333	417.333	414.889
5	0.0084	3	434.000	434.000	414.889
6	0.015	2	364.000	364.000	364.000
7	0.030	3	353.333	353.333	353.333
8	0.058	3	173.667	173.667	173.667

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LEMNA GIBBA FROND PRODUCTION

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WILLIAMS TEST (Isotonic regression model)

TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
0	442.667				
0.0011	435.667	0.294		1.75	k= 1, v=15
0.0021	414.889	1.166		1.84	k= 2, v=15
0.0042	414.889	1.166		1.87	k= 3, v=15
0.0084	414.889	1.166		1.88	k= 4, v=15
0.015	364.000	2.954	*	1.89	k= 5, v=15
0.030	353.333	3.751	*	1.90	k= 6, v=15
0.058	173.667	11.294	*	1.90	k= 7, v=15

s = 29.171

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

