3-16-80
FILES

DATA EVALUATION RECORD

1. Chemical: Metalaxyl (Shaughnessy #113501)

2. Formulation: CGA-48988 (Technical, 90.1% purity)

3. Citation: Wilson, Brenda F., et. al. 1980. The toxicity of CGA-48988 to Fathead minnow (Pimephales promelas) eggs and fry. [within Accession #244183].

4. Reviewed by: James D. Felkel
Wildlife Biologist
Ecological Effects Branch/HED

5. Date Reviewed: 3/16/80

6. Test Type: Fish embryo-larvae

A. Test Species: Fathead minnow (Pimephales promelas)

7. Reported Results: The minimum threshold concentration (MTC) of this compound to fathead minnow eggs and fry was estimated to be greater than 9.1 mg/l (the highest concentration tested) since exposure as high as this had no effect on percentage hatch of eggs, or survival, mean total length, or average wet weight of fry.

8. Reviewer's Conclusions: The study is scientifically sound and demonstrates that a maximum acceptable toxicant concentration for metalaxyl, based on the fathead minnow, would be greater than 9.1 mg/l. While not requested by EEB, this study would fulfill a requirement for this test should it be requested in the future and if the test concentrations are above expected environmental concentrations (since a specific MATC value or range was not obtained).

Should really analyze raw data for all parameters before giving this study a Core rating

Materials/Methods Reported

Dilution water was well water supplemented with untreated, unchlorinated municipal water (Town of Wareham, Mass.), aerated, and heated to 25 ± 1°C. A proportional diluter with a 0.50 dilution factor delivered the test concentrations to the aquaria. Since the highest nominal test concentration deliverable by this system was 10 mg/l, Ciba-Geigy decided to test the following concentrations: 10, 5, 2.5, 1.2, and 0.62 mg/l, plus a control.

Duplicate, 15-liter aquaria were used at each test concentration. Twelve hours of light were provided each day. A test temperature of 25°C was maintained.

The experiment was began by impartially placing 60 fathead minnow eggs into each of 12 egg cups, one of which was suspended in each of the aquaria. All eggs had been fertilized within 48 hours prior to the experiment at the fathead minnow culture unit at EG & G, Bionomics.

After hatching, 40 fry were impartially selected from each egg cup to begin the 30-day fry exposure. Fry were fed live brine shrimp (Artemia salina) 3 times daily on weekdays and twice daily on weekends. Aquaria were cleaned twice each week. Behavior and appearance of fry were observed daily. Fry were counted twice weekly beyond 6 days post-hatch. At 30 days post-hatch, all fry were anaesthetized and percent survival, mean total length, and average wet weight determined. Fish were measured individually but weighed as groups from each aquarium.

Dissolved oxygen, pH, and water temperature were measured daily, alternating between aquaria such that each aquarium was measured once each week. Total hardness as $CaCO_3$ was measured weekly in alternating replicates of the high and low test concentrations and both controls. Actual toxicant concentrations were also measured.

Statistical Analyses Reported

Percentage hatch of eggs, and survival, length, and weight of fry after 30 days exposure were examined by ANOVA ($p = 0.05$) and Dunnett's procedure. Percentages were transformed to arc sin $\sqrt{\text{percentage}}$ prior to analysis.

Results Reported

Water quality varied minimally among treatments (Table 3). Mean measured toxicant concentrations averaged 91% of nominal (Table 4). Hatchability of eggs and survival and growth of fry exposed to mean measured toxicant levels as high as 9.1 mg/l were unaffected compared to controls (Table 5). The MTC was thus estimated to be greater than 9.1 mg/l.

Reviewer's Evaluation

A. Materials/Methods

Procedures were generally consistent with accepted protocols.

B. Statistical Analyses

No statistical analysis was necessary, given the lack of negative response to the treatments (e.g., lowest percent survival in any vessel was 92%).

C. Results

As reported, the minimum threshold level (or maximum acceptable toxicant concentration) is greater than 9.1 mg/kg for the fathead minnow.

D. Conclusions

1. Category: Core (if requested)

2. Rationale: Although this study was not requested by EEB, it would be satisfactory for registration purpose should this test be needed in the future and if the test concentrations are above expected environmental concentrations.

3. Repairability: N/A

Table 3. Water quality analysis of test solutions during the exposure of fathead minnow (Pimephales promelas) eggs and fry to CGA-48988.

Mean measured concentration (mg/ℓ)	Dissolved oxygen (mg/ℓ)	Temperature (°C)	Total hardness (mg/ℓ $CaCO_3$)	pH range
9.1	8.8(0.4)[a]	24(1)	33(2)	7.2-7.5
4.6	8.8(0.4)	25(1)	-	7.1-7.5
2.1	9.0(0.2)	25(1)	-	7.1-7.6
1.1	8.9(0.3)	25(1)	-	7.2-7.5
0.59	8.9(0.3)	25(1)	34(2)	7.2-7.5
control	8.9(0.2)	24(1)	34(1)	7.2-7.5

[a] Mean and standard deviation.

Table 4. Nominal and measured concentrations of CGA-48988 in water during continuous exposure of fathead minnow (Pimephales promelas) eggs and fry.

Nominal concentration (mg/ℓ)	Measured concentration (mg/ℓ) Mean and (standard deviation)	Range
10	9.1(2.2)	8.3-12
5.0	4.6(0.4)	4.1-5.3
2.5	2.1(0.2)	1.7-2.4
1.2	1.1(0.2)	0.55-1.3
0.62	0.59(0.48)	0.24-1.7
control	<0.04	-

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Table 5. Percentage hatch of eggs, percentage survival, mean and (standard deviation) total length, and average wet weight of fathead minnow (Pimephales promelas) continuously exposed to CGA-48988 for 30 days post-hatch.

Mean measured concentration (mg/ℓ)		Hatch (%)	30 Days Survival (%)	30 Days Total length (mm)	30 Days Weight (mg)
9.1	A	95	100	24(1)	110
	B	90	100	23(1)	90
4.6	A	93	92	24(2)	110
	B	93	100	23(2)	100
2.1	A	95	95	24(1)	110
	B	93	100	23(1)	90
1.1	A	97	98	24(1)	110
	B	93	100	23(2)	90
0.59	A	98	95	23(2)	100
	B	93	100	23(2)	100
control	A	93	100	23(1)	100
	B	93	100	23(1)	90