

US EPA ARCHIVE DOCUMENT

MRID No. 420197-40

## DATA EVALUATION RECORD

1. **CHEMICAL:** Mon 13900, Shaughnessey Number: ~~999999~~ 911596
2. **TEST MATERIAL:** Mon 13900, 96.4% active ingredient, brown granules.
3. **STUDY TYPE:** A 96-hour static acute toxicity test with the Bluegill sunfish (*Lepomis Macrochirus*)
4. **CITATION:** Bowman, Jane, and John Bucksath. 1991. Acute toxicity of Mon 13900 to Bluegill sunfish (*Lepomis Macrochirus*) Guideline 72-1(c) Project ID ABC 39003 Submitted by Monsanto Agricultural Co. Performed by ABC Laboratories Inc., MRID No. 420197-40.
5. **REVIEWED BY:**  
 Renee Lamb  
 Biologist  
 Ecological Effects Branch (H7507C)  
 Environmental Fate & Effects Division  
 Signature:   
 Date: 6/17/93
6. **APPROVED BY:**  
 Ann Stavola  
 Head Section 5  
 Ecological Effects Branch (H7507C)  
 Environmental Fate & Effects Division  
 Signature:   
 Date: 6/30/93
7. **CONCLUSIONS:** This study appears to be scientifically sound and fulfills the data requirements for an acute toxicity test for freshwater fish. The 96 hour LC<sub>50</sub> value for Bluegill sunfish (*Lepomis Macrochirus*) exposed to Mon 13900 was 4.6 mg/L with 95% confidence limits of 2.9 and 12 mg/L. The NOEC was 2.9 mg/L. Therefore, Mon 13900 is classified as moderately toxic to warmwater fish.
8. **RECOMMENDATIONS:**
9. **BACKGROUND:** N/A
10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A
11. **MATERIALS AND METHODS:**  
 A. **TEST ANIMALS:** The fish, Bluegill sunfish (*Lepomis Macrochirus*) were obtained from Osage Catfisheries in Osage Beach, MO. They were from the same source and year. The fish were held in well water in a 16 hour light photoperiod with a 30-minute transition period and observed for 13 weeks prior to testing.



The fish were acclimated to test temperature and hard blended dilution water for 7 days prior to testing. The fish were not fed during the acclimation and test periods. The bluegill had a mean wet weight of  $.24 \pm .04$  g and a mean standard length of  $22 \pm 1$  mm. The biomass loading rate for the control fish was  $.16$  g/L. Measurements were made on the control group at termination of the test.

- B. **TEST SYSTEM:** The test chambers were five gallon glass vessels containing 15 liters of hard blended water which was equivalent to a depth of  $\approx 29.9$  cm.
- C. **DOSAGE:** The fish were exposed to 5 test concentrations and a control. The test concentrations (nominal) used were 1.9, 3.8, 7.5, 15, and 30 mg of active ingredient per liter. These concentrations were chosen by range finding toxicity tests. Mean measured concentrations were 1.4, 2.9, 5.6, 12, and 20 mg a.i./L. A primary stock solution of Mon 13900 technical at a concentration of 9.96 mg/mL in acetone was used for subsequent dilutions.
- D. **DESIGN:** Ten fish were randomly allocated to each test vessel after the vessels reached the test temperature. All vessels were monitored for mortality and sub lethal effects after 4 hours and once every 24 hours.
- E. **STATISTICS:** The 96 hour  $LC_{50}$  value was determined by the statistical method of Stephan et al.
12. **REPORTED RESULTS:** Preliminary testing in hard blended water showed that Mon 13900 is not completely soluble, due to this, the recovery of Mon 13900 was expected to be low. However, the test material appeared to be stable in the system based on information supplied by the sponsor and the consistent measurements at 0 and 96 hours. The mean measured concentrations were  $74 \pm 5\%$  of the nominal concentration.

Abnormal effects were noted in the 5.6, 12, and 20 mg/L test concentrations. There was 100% mortality in the 12 and 20 mg/L concentrations after 72 hours. There was partial mortality after 96 hours in the 5.6 mg/L concentration. Table 5 presents the mortality and abnormal effects observed during the study.

A brown precipitate was on the bottom of all test chambers except the control chamber throughout the study. The amount of precipitate increased as the concentration of Mon 13900 increased.

Water quality data are presented on Table 6. DO ranged from 5.2 to 8.2 mg/L, 62 and 98% saturation at  $22^{\circ}\text{C}$ ,

respectively. The pH ranged from 8.0 to 8.5. The temperature was 22°C when measured during daily water chemistry with a mercury thermometer. The maximum temperature in the continuous temperature recorder was 21.6°C, a minimum of 21.4°C and an average of 21.4°C.

**13. STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:**

The 96 hour LC<sub>50</sub> value for Bluegill sunfish (*Lepomis Macrochirus*) exposed to Mon 139 was 4.6 mg/L with 95% confidence limits of 2.9 and 12 mg/L. The NOEC was 2.9 mg/L.

The study has a quality assurance statement signed by a quality assurance officer.

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

- A. TEST PROCEDURE:** This test is in accordance with EPA's SEP protocol, except there was no solvent control.

There was a brown precipitate in the test chambers, however, as the concentrations were measured, any effects from the presence of the precipitate are likely accounted for.

- B. STATISTICAL ANALYSIS:** The data was analyzed with EEB's Toxanal program using mean measured concentrations.

- C. DISCUSSION/RESULTS:** This study appears to be sound and fulfills the data requirements for an acute toxicity test for freshwater fish. The 96 hour LC<sub>50</sub> value for Bluegill sunfish (*Lepomis Macrochirus*) exposed to Mon 13900 was 4.6 mg/L with 95% confidence limits of 2.9 and 12 mg/L. The NOEC was 2.9 mg/L.

- D. ADEQUACY OF STUDY:**

(1) **CLASSIFICATION:** Core

(2) **RATIONALE:** Although there was no solvent control, the pattern of mortality plus the relatively moderate toxicity of the chemical, indicate that no new information would be gained with a new study.

(3) **REPARABILITY:**

lamb mon 13900 blue

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
20	10	10	100	9.765625E-02
12	10	10	100	9.765625E-02
5.6	10	8	80	5.46875
2.9	10	0	0	9.765625E-02
1.4	10	0	0	9.765625E-02

THE BINOMIAL TEST SHOWS THAT 2.9 AND 12 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 4.552352

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

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TABLE 2

Measured Concentrations from the Acute Toxicity Test  
of MON 13900 to Bluegill (*Lepomis macrochirus*)

<u>Sample</u>	<u>Nominal Conc. (mg/L)</u>	<u>Measured Concentrations (mg/L)</u>			<u>Percent Nominal</u>
		<u>0-Hour</u>	<u>96-Hour</u>	<u>Mean</u>	
Reagent Blank	---	<0.40	<0.40	<0.40	---
Control	---	<0.40	<0.40	<0.40	---
Level 1	1.9	1.3	1.5	1.4	74
Level 2	3.8	2.9	2.9	2.9	76
Level 3	7.5	5.1	6.0	5.6	75
Level 4	15	11	12	12	80
Level 5	30	16	23	20	67

Mean ± S.D. = 74 ±5%

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TABLE 4

Acute Toxicity of MON 13900  
to Bluegill (*Lepomis macrochirus*)

Compound	LC <sub>50</sub> in milligrams/liter (ppm)				
	4-Hour	24-Hour	48-Hour	72-Hour	96-Hour
MON 13900 <sup>a</sup>	>20 <sup>b</sup>	16 <sup>(1)</sup> (12 and 25) <sup>c</sup>	15 <sup>(1)</sup> (12 and 18) <sup>d</sup>	8.2 <sup>(2)</sup> (5.6 and 12) <sup>d</sup>	4.6 <sup>(2)</sup> (2.9 and 12) <sup>d</sup>

N = 10 fish per concentration.

<sup>a</sup> Bioassay as conducted at 22°C (±1°C), mean fish wet weight and standard length, 0.24 (±0.04)g and 22 (±1)mm.

<sup>b</sup> Since no mortality occurred an LC<sub>50</sub> could not be calculated.

<sup>c</sup> Confidence limits extended beyond the concentration range.

<sup>d</sup> 95% confidence limits

The 96-hour no-observed effect concentration could be estimated at 2.9 mg/L, based on the lack of mortality and abnormal effects at this concentration.

LC<sub>50</sub> calculated using:

- (1) Probit Method
- (2) Binomial Method

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TABLE 5

Mortality and Behavioral Observations During the Acute Toxicity Test of  
MON 13900 to Bluegill (*Lepomis macrochirus*)

Mean Measured Conc. mg/L (ppm)	No. Placed in Test	4 Hours		24 Hours		48 Hours		72 Hours		96 Hours	
		Mort.	Observations	Cum. Mort.	Observations	Cum. Mort.	Observations	Cum. Mort.	Observations	Cum. Mort.	Observations
Control	10	0	10 N	0	10 N	0	10 N	0	10 N	0	10 N
1.4	10	0	10 N	0	10 N	0	10 N	0	10 N	0	10 N
2.9	10	0	10 N	0	10 N	0	10 N	0	10 N	0	10 N
5.6	10	0	10 N	0	10 N	0	10 N	0	2 OB/Q; 7 OB; 1 SUR	8	2 OB/LOE/LR
12	10	0	10 N	2	2 OB/Q; 6 OB/DK/Q	2	1 LR; 5 OB/DK/LOE/LR; 2 DK/SUR/LR/LOE	10	---	10	---
20	10	0	10 N	7	3 OB/DK/Q	9	1 OB/LOE/LR	10	---	10	---

Key to Observations: N = Normal; LOE = Loss of Equilibrium; Q = Quiescent; SUR = Surfacing; GB = On Bottom of Test Vessel; DK = Dark Discoloration; LR = Labored Respiration

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TABLE 6

Water Quality Measurements During the Acute Toxicity Test of  
MON 13900 to Bluegill (*Lepomis macrochirus*)

Mean Measured Conc. (mg/L)	Water Quality														
	0-Hour			24-Hour			48-Hour			72-Hour			96-Hour		
	Temp. <sup>a</sup> °C	D.O. <sup>b</sup> mg/L	pH <sup>c</sup>	Temp. °C	D.O. mg/L	pH									
Control	22	8.0	8.5	22	6.7	8.3	22	6.3	8.1	22	6.2	8.2	22	5.2	8.0
1.4	22	8.0	8.4	22	6.7	8.3	22	6.3	8.2	22	6.2	8.3	22	5.3	8.1
2.9	22	8.1	8.4	22	6.8	8.3	22	6.2	8.2	22	6.1	8.2	22	5.5	8.0
5.6	22	8.1	8.3	22	6.8	8.2	22	6.4	8.1	22	6.1	8.2	22	5.7	8.0
12	22	8.2	8.4	22	6.8	8.3	22	6.5	8.2	--	---	---	--	---	---
20	22	8.2	8.3	22	6.9	8.3	22	6.7	8.2	--	---	---	--	---	---

<sup>a</sup> Temperature measured using a mercury thermometer

<sup>b</sup> Dissolved oxygen concentrations - Dissolved Oxygen Probe (YSI Model 54).

<sup>c</sup> pH -pH Probe (Corning Model 476182) used with a Corning Model 125 pH and mV meter.

NOTE: Dissolved oxygen saturation corrected for altitude at the test temperature of 22°C is 8.4 mg/L.