

US EPA ARCHIVE DOCUMENT

(12-1290)

DATA EVALUATION RECORD

- 1. Chemical: MSMA (monosodium methanearsenate)
- 2. Test Material: Arsonate liquid blend, 51% MSMA
- 3. Study Type: Honey bee acute contact LD50

Species tested: Apis mellifera

- 4. Study ID: Hoxter, K., and G. Smith. 1990. MSMA: An acute contact toxicity study with the honey bee. Wildlife International Ltd. Project No. 296-101. Submitted by MAA Research Task Force Three, Tel Aviv, Israel. EPA Acc. No. 416100-07.

5. Reviewed By:

Allen W. Vaughan  
Entomologist  
EEB/EFED

Signature: Allen W. Vaughan  
Date: 12.12.90

6. Approved By

Norman J. Cook  
Supervisory Biologist  
EEB/EFED

Signature: Norman J. Cook  
Date: 12.12.90

7. Conclusions:

This study is scientifically sound, and shows MSMA to be practically nontoxic to honey bees. In an acute contact test, the LD50 was determined to be approximately 68 micrograms per bee. This study fulfills the guideline requirement for an acute contact toxicity test on honey bees.

8. Recommendations: N/A

9. Background: This study was submitted in support of registration for MSMA.

10. Discussion of Individual Tests: N/A

11. Materials and Methods:

Apparently healthy worker bees, less than eight days of age, were used as test animals. Test chambers were rolled paper containers. Each container was covered with a plastic petri dish through which a glass vial containing 50% sugar water was inserted. This food source was available to the test bees throughout the study.

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The photoperiod was eight hours of light per day. Ambient temperatures in the test room ranged from 22 to 24° C.

Five treatment levels, 13, 22, 36, 60, and 100 micrograms per bee, were tested along with a solvent control and a negative control. Two replicates were tested at each dosage, with 25 bees per replicate. The solvent control bees received a volume of acetone equal to the largest volume used during the test.

Recently collected bees were immobilized with N<sub>2</sub> to facilitate handling. Each bee was individually dosed with the appropriate test solution. Solvent control bees were dosed with acetone.

Observations on mortality and signs of toxicity were made twice on the day of initiation and once on Day 1 and Day 2 after dosing.

An LD50 was calculated using the computer program of C.E. Stephan. For this study, the binomial test was used.

12. Reported Results:

The study authors found that MSMA was practically nontoxic to honey bees, with an LD50 of 68 ug per bee.

13. Study Authors' Conclusions/ QA Measures

48-hr. LD50 = 68 ug per bee (practically nontoxic).

14. Reviewer's Discussion and Interpretation of the Study

A. Test Procedures: Procedures were in accordance with protocols recommended in the guidelines. There were no problems in this regard.

B. Statistical Analysis: EEB validation showed that the analysis was appropriate and its results reflected the actual outcome of the study.

C. Discussion/Results: MSMA is practically nontoxic to honey bees.

D. Adequacy of Study:

1. Classification: Core

2. Rationale: Guidelines protocol

3. Reparability: N/A

15. Completion of One-Liner for Study: N/A

16. CBI Appendix: N/A

NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY, THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

Vaughan MSMA Honey Bee Acute

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
100	47.5	47.5	100	0
60	47.5	11.5	24.2105	0
36	47.5	.5	1.0526	0
22	50	2	4	0
13	50	1	2	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 68.90002

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	2.165108E-02		65.44696	61.31763
70.12356				

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
7	10.60145	67.71416

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 = 5.303337  
 95 PERCENT CONFIDENCE LIMITS = -11.96426 AND 22.57093

LC50 = 64.47472  
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 37.14647  
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

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