

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

1. Chemical: Pyrethrum extract
2. Test Material: Task Force Blend FEK-99, 57.574% ai
3. Study Type: Honey bee acute contact LD50

Species tested: Apis mellifera

4. Study ID: Lynn, S.P., and K. A. Hoxter. 1991. An acute contact toxicity study with pyrethrum extract with the honey bee. Wildlife International Ltd. Project No. 326-104. Submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, D.C. EPA Acc. No. 419688-03.

5. Reviewed By:

Allen W. Vaughan  
Entomologist  
EEB/EFED

Signature: Allen W. Vaughan

Date: 9.3.91

6. Approved By

Norman J. Cook  
Supervisory Biologist  
EEB/EFED

Signature: Norman J. Cook

Date: 9.3.91

7. Conclusions:

This study is scientifically sound, and shows pyrethrum extract to be highly toxic to honey bees. In an acute contact test, the LD50 was determined to be approximately 0.022 micrograms ai 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 reregistration.
10. Discussion of Individual Tests: N/A

11. Materials and Methods:

Seven days prior to initiation of the study, two frames containing honey bee pupae were selected from Wildlife International's hives. The frames were placed in an environmental chamber for no more than seven days to allow adult emergence. All test bees were 1 to 7 days old at test initiation, and were apparently healthy. On the day of study initiation, all bees that had emerged were immobilized with N<sub>2</sub> and at least 25 bees were placed into each test chamber.

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.

The photoperiod was eight hours of light per day. Test temperatures ranged from 23 to 26° C.

Five treatment levels, 0.0000586, 0.000586, 0.00586, 0.0586, and 0.586 micrograms per bee, were tested along with a solvent control and a negative control. All doses were adjusted to 100% ai based on the reported purity of the test substance. 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.

Mortality data were analyzed using the computer program of C.E. Stephan. In this study the binomial probability method was used.

12. Reported Results:

The study authors found that pyrethrum extract was highly toxic to honey bees, with an LD50 of 0.022 ug per bee.

13. Study Authors' Conclusions/ QA Measures

48-hr. LD50 = 0.022 ug per bee (highly toxic).

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: Independent validation by EEB confirms that the analysis is appropriate and supports the conclusions of the study.
- C. Discussion/Results: Pyrethrum extract is highly toxic 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 Pyrethrum extract Honey bee LD50

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CONC.      NUMBER      NUMBER      PERCENT      BINOMIAL
           EXPOSED      DEAD        DEAD        PROB.(PERCENT)
.586       47                46          97.8723     0
.0586      47                36          76.5958     0
.00586     47                4           8.5106      0
.000586    47                1           2.1277
0
.0000586   47                1           2.1277
0
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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 2.522941E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
3	2.715163E-02		.0270594      1.770362E-02

.0422427

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
6	3.313731	24.25144

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 = 1.315627  
 95 PERCENT CONFIDENCE LIMITS = -1.079295 AND 3.71055

LC50 = 2.345104E-02  
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 2.540056E-03  
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

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