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*


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 N₂ 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 N₂ 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 SUBJECT TO ABBOTT'S CORRECTION.

Vaughan Pyrethrum extract Honey bee LD50

<table>
<thead>
<tr>
<th>CONC.</th>
<th>NUMBER EXPOSED</th>
<th>NUMBER DEAD</th>
<th>PERCENT DEATH</th>
<th>BINOMIAL PROB. (PERCENT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.586</td>
<td>47</td>
<td>46</td>
<td>97.8723</td>
<td>0</td>
</tr>
<tr>
<td>.0586</td>
<td>47</td>
<td>36</td>
<td>76.5958</td>
<td>0</td>
</tr>
<tr>
<td>.00586</td>
<td>47</td>
<td>4</td>
<td>8.5106</td>
<td>0</td>
</tr>
<tr>
<td>.000586</td>
<td>47</td>
<td>1</td>
<td>1</td>
<td>2.1277</td>
</tr>
</tbody>
</table>

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 2.52294E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

<table>
<thead>
<tr>
<th>SPAN</th>
<th>G</th>
<th>LC50</th>
<th>95 PERCENT CONFIDENCE LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td>2.715163E-02</td>
<td>.0270594</td>
</tr>
<tr>
<td>.0422427</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RESULTS CALCULATED USING THE PROBIT METHOD

<table>
<thead>
<tr>
<th>ITERATIONS</th>
<th>G</th>
<th>H</th>
<th>GOODNESS OF FIT PROBABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>3.313731</td>
</tr>
</tbody>
</table>

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