Toxicity of agricultural pesticides to honey bees is an ongoing concern and can lead to death of the bees. The annual value of honey bee pollination in the U.S. has been estimated at $14.6 billion dollars.

Unfortunately, bees may die as a result of pesticide exposure present in dust or air, contaminated flowers or pollen that the bees are feeding on, or from products drifted directly onto the bees. As they fly through or consume residues, they may receive sub-lethal doses that may reduce the colony population or cause the bees to succumb to diseases.

TetraCURB Organic is a safe contact miticide-insecticide and does not have acute toxicity to honey bees.
ACUTE TOXICITY EVALUATION ON HONEY BEES

GOAL - TetraCURB Organic was evaluated for acute toxicity on honey bees (Apis mellifera) over a range of rates to determine the lethal concentration to kill 50% of the population of bees (LC50).

MATERIALS AND METHODS - RATES: TetraCURB Organic: 5% dilution in acetone going up to 30% in 5% intervals. Negative control: Pure acetone. Positive control: Lambda-cyhalothrin (0.02%). PROTOCOL: 25 bees were treated with 5 µl of the test substance placed on the dorsal side of the thorax. The treated bees were maintained in wire mesh test arenas with a food source and incubated at 25°C with 80% relative humidity.

DATA COLLECTION: 1) The number of alive and dead bees were assessed 24 and 48 hours after treatment (% of mortality for honey bees exposed to test substances); 2) Probit Analysis of the acute toxicity of TetraCurb Organic and acetone to honey bees 48 hours after exposure and 3) The LC50 (%) calculated using the average percentage of mortality observed for each dilution of TetraCURB Organic.

<table>
<thead>
<tr>
<th>Test Substance / Mix Rate</th>
<th>Pre-trt</th>
<th>24hr</th>
<th>48hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control-Acetone Only</td>
<td>0%</td>
<td>0%</td>
<td>16%</td>
</tr>
<tr>
<td>5% TetraCURB Organic</td>
<td>0%</td>
<td>16%</td>
<td>16%</td>
</tr>
<tr>
<td>10% TetraCURB Organic</td>
<td>0%</td>
<td>16%</td>
<td>16%</td>
</tr>
<tr>
<td>15% TetraCURB Organic</td>
<td>0%</td>
<td>40%</td>
<td>56%</td>
</tr>
<tr>
<td>20% TetraCURB Organic</td>
<td>0%</td>
<td>92%</td>
<td>92%</td>
</tr>
<tr>
<td>25% TetraCURB Organic</td>
<td>0%</td>
<td>76%</td>
<td>76%</td>
</tr>
<tr>
<td>30% TetraCURB Organic</td>
<td>0%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>0.02% Lambda-Cyhalothrin</td>
<td>0%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1. Percentage of mortality figures for honey bees exposed to test substances

TETRA CURB ORGANIC DILUTED AT 5% WAS EQUIVALENT TO THE NEGATIVE CONTROL FOR MORTALITY AT 48 HOURS POST EXPOSURE.

<table>
<thead>
<tr>
<th>LC50 %</th>
<th>95% Fiducial CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.228</td>
<td>Lower 13.707</td>
</tr>
<tr>
<td></td>
<td>Upper 19.212</td>
</tr>
</tbody>
</table>

Table 2. LC50 Values for TetraCURB Organic

- TETRA CURB ORGANIC ACUTE TOXICITY LC50 WAS DETERMINED TO BE 16.2% DILUTION WITH A 95% FIDUCIAL CONFIDENCE INTERVAL.
- TETRA CURB ORGANIC IS LABELLED FOR USE AT 0.5 - 2% DILUTION RATE, WELL BELOW THE LC50. THEREFORE WILL NOT HARM HONEY BEES!

PROTECT HONEY BEES FROM HARMFUL PESTICIDES!

ABOUT TETRA CURB ORGANIC
- OMRI-LISTED
- Miticide-insecticide
- Horticultural oil-based
- Rich in active ingredients
- Environmentally-friendly product

ACTIVE INGREDIENTS
- Rosemary oil………………50.00%
- Clove oil……………………3.00%
- Peppermint oil……………..1.95%
- Rosemary oil………………50.00%
- Clove oil……………………3.00%
- Peppermint oil……………..1.95%

MODES OF ACTION
- Kills on contact
- Suffocation, desiccation, paralysis
- Repellent

KEY TARGET PEST CONTROLLED
- Mites and small soft-bodied insects such as thrips, aphids, whiteflies, lygus…
- Egg, nymph and adult stages

BEST RECOMMENDED USE
Shake well before use
Must be diluted in water before application
Adjuvant required.

- Recommended rates: 0.5% (dilution of 64 fl.oz/100 gal per acre)
- Timing: Before economic threshold; temperature < 90°F
- Method: Spray application with standard sprayer and minimal PPE
- Frequency of application: For best results, spray minimum of 2-3 applications over a 2 week period.

Always read and follow label directions!

Sources: Third party test by Snell Sciences, LLC; Kemin TD-40-2072; shutterstock_404710777; https://extension.entm.purdue.edu/publications/E-53/E-53.html

Intended for commercial use. Do not apply on stressed plants or when the temperature is 90º F or above. TetraCURB Organic is not registered or authorized for sale in all states. Consult your Kemin Sales representative for approval of this use in your state, specific applications and labeling. (FIFRA 25(b) Exempt pesticide: This product has not been registered by the United States Environmental Protection Agency. Kemin Industries, Inc. represents that this product qualifies for exemption from registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). For non-emergency Kemin product inquiries, please call Customer Service at 1-800-752-2864 between the hours of 7 a.m. - 4:30 p.m. Central Standard Time. Monday - Friday.

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