Soil Arthropods

TOXICITY OF RAPESEED MEAL AND METHYL ISOTHIOCYANATE TO LARVAE OF THE BLACK VINE WEEVIL

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Soil amendments of *Brassica* spp. tissues are known to display toxic effects to a number of soil organisms, including insects. However, application rates necessary to obtain effective insect suppression have not been determined. We tested the toxicity of soil treated with rapeseed (*Brassica napus* L.) seed meal and methyl isothiocyanate to larvae of the black vine weevil, *Otiorhynchus sulcatus* (F.). Controls included untreated soil and soil treated with detoxified rapeseed meal. Larvae were exposed to treated soil for 24 h. Larvae remaining motionless 30 min after their extraction from soil were recorded as dead. Mortality data were subjected to probit analysis (Table 1). We estimated LC$_{50}$ as 19.3 g of rapeseed meal or 6 mg of methyl isothiocyanate per kg of soil. Extrapolation of the lethal concentrations of rapeseed meal necessary for effective control in a nursery or field application may be too high for practical use. The toxicity of rapeseed meal is about one third of the predicted rate, based on the glucosinolate content within the meal. *Brassica* spp. tissues containing higher levels of isothiocyanate-generating glucosinolates may have greater insecticidal potential.
Table 1. Toxicity of rapeseed meal (g/kg soil) and methyl isothiocyanate (g/kg soil) to larvae of the black vine weevil.

<table>
<thead>
<tr>
<th>Preparation</th>
<th>N</th>
<th>Slope ±SE</th>
<th>LC\textsubscript{10} (90%CI)</th>
<th>LC\textsubscript{50} (90%CI)</th>
<th>LC\textsubscript{90} (90%CI)</th>
<th>X\textsuperscript{2b}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapeseed meal</td>
<td>160</td>
<td>1.839±0.288</td>
<td>1.829 (0.543-3.587)</td>
<td>19.338 (13.335-26.640)</td>
<td>86.906 (57.599-170.205)</td>
<td>10.61</td>
</tr>
<tr>
<td>Methyl isothiocyanate</td>
<td>180</td>
<td>3.530±0.729</td>
<td>0.0018 (0.0004-.0031)</td>
<td>.0061 (.0037-.0091)</td>
<td>.0133 (.0088-.0302)</td>
<td>12.05</td>
</tr>
</tbody>
</table>

\textsuperscript{a} N = Number of larvae used in bioassay
\textsuperscript{b} Chi-square goodness-of-fit tests (Robertson & Preisler 1991); degrees of freedom = 6 and 7 for rapeseed meal and methyl isothiocyanate, respectively