Cucumber green mottle mosaic virus (CGMMV) and honey bee pollinators

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Honey bees

Apis mellifera (Hymenoptera: Apidae)
CGMMV

Tobamovirus

Cause serious diseases in the vegetable & fruit cucurbits as well as several gourd species

A major global threat to cucurbit industries


www.nt.gov.au
CGMMV in Australia

February 2016 Quarantine lifted in the NT


www.nt.gov.au
CGMMV transmission

Spread by direct mechanical contact

- Soil
- Propagation equipment – farm tools
- Seeds
Why honey bees?

Many crops are dependent on honey bee pollination
- squash 10%
- watermelon 70%
- cucumber 100%

Hives are used on multiple properties

Is it possible to move the virus??

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www.nt.gov.au
Is CGMMV present in bee hives?
Is CGMMV present in bee hives?

<table>
<thead>
<tr>
<th>Bee product</th>
<th>Present</th>
<th>Capable of infecting?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollen</td>
<td>79%</td>
<td>20%</td>
</tr>
<tr>
<td>Honey</td>
<td>67%</td>
<td>39%</td>
</tr>
<tr>
<td>Wax</td>
<td>67%</td>
<td>0%</td>
</tr>
<tr>
<td>Adult bees</td>
<td>53%</td>
<td>16%</td>
</tr>
<tr>
<td>Brood</td>
<td>23%</td>
<td>na</td>
</tr>
</tbody>
</table>
Protocol to detect CGMMV in bee hives

What is the best way to confirm the presence or absence of CGMMV in bee hives?
• number of samples?
• type of samples?
Protocol to detect CGMMV in bee hives

Tested for CGMMV presence/absence
• adult bees
• pollen
• honey

Sampled four apiaries. 11 hives in each apiary.

INTENSIVE SAMPLING - 10 samples of each product from a single hive

EXTENSIVE SAMPLING - 1 sample of each product from multiple hives
Protocol to detect CGMMV in bee hives

<table>
<thead>
<tr>
<th>Hive product</th>
<th>Proportion of samples with CGMMV (s.d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intensive</td>
</tr>
<tr>
<td>Adults</td>
<td>0.2 (0.1)</td>
</tr>
<tr>
<td>Pollen</td>
<td>0</td>
</tr>
<tr>
<td>Honey</td>
<td>Na</td>
</tr>
</tbody>
</table>

Recommendation: extensive sampling
Thank you

Acknowledgements
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- NT Quarantine

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