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Cranberry Toad bugs: What are they?

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CRANBERRY TOAD BUGS: WHAT ARE THEY?

Cesar Rodriguez-Saona
Vera Kyryczenko-Roth, Robert Holdcraft, and Dan Schiffhauer

P.E. Marucci Blueberry and Cranberry Research and Extension Center
• *Phylloscelis atra* (Dictyopharidae).
• Feeds only on cranberries.
• Single generation a year.
• Overwinters as eggs.
Objectives

• Establish phenology of toad bugs in cranberries

• Characterize toad bug injury to cranberries

• Evaluate efficacy of various insecticides
Phenology

- 3 commercial bogs and 1 research bog
- Sampled once per week June through October
- 3 sweep sets per bog
- Samples evaluated under dissecting microscope in lab
Toad bug Phenology

Number per sample

- Toadbug Nymph
- Toadbug Female
- Toadbug Male
- Toadbug Eggs

Bloom
Toad-bug Phenology

Biofix = 15 April; Threshold = 10°C
• Establish phenology of toad bugs in cranberries

• Characterize toad bug injury to cranberries

• Evaluate efficacy of various insecticides
Greenhouse Study

• Cages with 30 x 30 cm tray of cranberries per cage

• Treatments: 0 (Control), 10, 25, 50 toad bugs per cage

• Toad bugs collected from research bog at P.E. Marucci Center

• 5 replicates per treatment

• No. damaged uprights and berries, and berry weight after 6 wks
Toad bug Damage: Uprights

% Damaged Uprights

No. Toadbugs

0 10 25 50

B B A A

A A A A

0 2 4 6 8 10 12

RUTGERS
New Jersey Agricultural Experiment Station
Field Study

- Seven uprights enclosed per fabric sleeve on 18 July
- Treatments: 0, 2, 5, and 10 toad bugs per fabric sleeve
- Toad bugs collected at P.E. Marucci Center
- 5 replicates per treatment
- No. damaged uprights and berries, and berry weights recorded after 4 wks
Toad bug Damage: Uprights

% Uprights (Mean ± se)

Healthy
Stressed
Damaged

Treatment
- 0 Toad bugs
- 2 Toad bugs
- 5 Toad bugs
- 10 Toad bugs

A
AB
B

0  2  5  10

0  2  5  10

0  2  5  10
Toad bug Damage

0 TB

2 TB

5 TB

10 TB
Toad bug Damage: Fruit

% Fruit (Mean ± se)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0 TB</th>
<th>2 TB</th>
<th>5 TB</th>
<th>10 TB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound Fruit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotten Fruit</td>
<td></td>
<td></td>
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</tbody>
</table>

N.S.
Toad bug Damage: Fruit

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0 TB</th>
<th>2 TB</th>
<th>5 TB</th>
<th>10 TB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound Fruit</td>
<td>2.0</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Rotten Fruit</td>
<td>1.0</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

(A)  (AB)  (AB)  (B)
Objectives

- Establish phenology of toad bugs in cranberries
- Characterize toad bug injury to cranberries
- Evaluate efficacy of various insecticides
Field Trial: Methods

- 6 m x 4.5 m plots divided by silt fence
- Bog at P.E. Marucci Center
- Sprayer: custom-made 8 foot boom (CO₂)
- 50 gal/ac
## Field Trial: Treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate /Acre</th>
<th>Status</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beleaf 50SG</td>
<td>2.8 oz</td>
<td>Registered</td>
<td>Pyridinecarboxamide</td>
</tr>
<tr>
<td>Exirel</td>
<td>13.5 floz</td>
<td>Unregistered, IR4</td>
<td>Diamide</td>
</tr>
<tr>
<td>Closer SC *</td>
<td>4.25 floz</td>
<td>Reassess *</td>
<td>Sulfoximine</td>
</tr>
<tr>
<td>Assail 30SG</td>
<td>6.9 oz</td>
<td>Registered</td>
<td>Nicotinoid</td>
</tr>
<tr>
<td>Agri-Mek SC</td>
<td>3.5 floz</td>
<td>Registered</td>
<td>Miticide</td>
</tr>
<tr>
<td>Brigade 2EC</td>
<td>6.4 floz</td>
<td>Unregistered, IR4</td>
<td>Pyrethroid</td>
</tr>
<tr>
<td>Lorsban 4E</td>
<td>3 pt</td>
<td>Registered</td>
<td>OP</td>
</tr>
<tr>
<td>Sevin XLR</td>
<td>3 L</td>
<td>Registered</td>
<td>Carbamate</td>
</tr>
<tr>
<td>Diazinon AG500</td>
<td>3 qt</td>
<td>Registered</td>
<td>OP</td>
</tr>
</tbody>
</table>
Field Trial: Methods

- Plots sampled (area = 1 m²) via backpack vacuum
  - Pre-sample 3 August (2 days pre-spray)
  - Application on 5 August
  - Post-sample 12 August (7 days post-spray)
- Samples evaluated in lab under dissecting scope
Field Trial: Results

<table>
<thead>
<tr>
<th>No.</th>
<th>Toad bugs (mean ± se)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTC</td>
<td>A</td>
</tr>
<tr>
<td>Beleaf 50SG</td>
<td>A</td>
</tr>
<tr>
<td>Exirel</td>
<td>A</td>
</tr>
<tr>
<td>Closer SC</td>
<td>AB</td>
</tr>
<tr>
<td>Assail 30SG</td>
<td>A</td>
</tr>
<tr>
<td>Agri-Mek SC</td>
<td>A</td>
</tr>
</tbody>
</table>

Reduced-Risk

Broad-Spectrum

C  BC  C  C
Non-Target Effects: Spiders

<table>
<thead>
<tr>
<th></th>
<th>No. Spiders (mean ± se)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UTC</strong></td>
<td>4.3 ± 0.2</td>
</tr>
<tr>
<td><strong>Beleaf 50SG</strong></td>
<td>4.1 ± 0.3</td>
</tr>
<tr>
<td><strong>Exirel</strong></td>
<td>3.9 ± 0.2</td>
</tr>
<tr>
<td><strong>Closer SC</strong></td>
<td>3.7 ± 0.2</td>
</tr>
<tr>
<td><strong>Assail 30SG</strong></td>
<td>3.5 ± 0.2</td>
</tr>
<tr>
<td><strong>Agri-Mek SC</strong></td>
<td>3.3 ± 0.2</td>
</tr>
</tbody>
</table>

**Reduction-Risk Broad-Spectrum**

- UTC: A
- Beleaf 50SG: A
- Exirel: AB
- Closer SC: A
- Assail 30SG: A
- Agri-Mek SC: A

**Non-Target Effects: Spiders**

- ABC: Reduced-Risk
- AB: Reduced-Risk
- BC: Broad-Spectrum
Conclusions I

Eggs: mid-August (2344 DD)-October

Nymphs: end of June (865 DD)-August

Adults: end of July (1755 DD)-October

Eggs: mid-August (2344 DD)-October

Pre-bloom  Bloom  Post-bloom  Harvest
Conclusions II

- Toad bugs cause injury to cranberry uprights leading to lower fruit quality.
- Lorsban, Sevin, Diazinon, Brigade, Assail, and Agri-Mek worked well against toad bugs.
- Beleaf, Closer, and Exirel were not effective.
- Assail and Agri-Mek had lower toxicity on spiders.
Acknowledgements

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Cranberry Institute

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