Blueberry Insect IPM Update

School of Biology and Cooperative Extension
University of Maine

Photo: Charlie Armstrong
Winter moth (Operophtera brumata) development and survival on seven different host plants

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University of Maine
winter moth in Maine
winter moth in North America

Maine Forest Service
experiments in 2013 & 2014

1. Determine larval density on 7 host plants in the field
2. Estimate survival on 7 host plants in lab and field setting

- White Oak
- Red Maple
- White Birch
- Wild Blueberry
- Apple
- Pin Cherry
- Highbush Blueberry
Larval densities on different host plants

**Graph:**
- **Host Plants:** Oak, Maple, Apple, Birch, Cherry, Lowbush blueberry, Highbush blueberry
- **2013:**
  - Oak: A
  - Maple: B
  - Apple: B
  - Birch: C
  - Cherry: C
  - Lowbush blueberry: C
- **2014:**
  - Oak: A
  - Maple: B
  - Apple: B
  - Birch: C
  - Cherry: C
  - Highbush blueberry: C
  - Lowbush blueberry: C

**Statistical Analysis:**
- **Plant p<0.0001**
- **Year p=0.0010**
- **No interaction**
proportion of pupated individuals on 7 host plants

<table>
<thead>
<tr>
<th>Host Plant</th>
<th>2013</th>
<th>2014</th>
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</thead>
<tbody>
<tr>
<td>Oak</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Maple</td>
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<td>BC</td>
</tr>
<tr>
<td>Apple</td>
<td>AB</td>
<td>AB</td>
</tr>
<tr>
<td>Cherry</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Highbush blueberry</td>
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<td>C</td>
</tr>
<tr>
<td>Lowbush blueberry</td>
<td>BC</td>
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</tbody>
</table>

Host plant effect: $p<0.0001$

Set date effect: $p=0.0042$

Interaction not significant

Host plant effect: $p<0.0001$

Set date not significant
conclusions

1. Field densities highest on oak compared to 6 other plant hosts
2. Survival is also highest on oak
3. Wild blueberry does not appear to be a good host plant, but will be attacked
brown marmorated stink bug

UNWANTED!

Be on the lookout for the **Brown Marmorated Stink Bug**. While not known to be established in Illinois, it is a potential pest of several shade & fruit trees, vegetables, and legumes - including apple, peach, pear, and soybean.

Look for these key features that help distinguish this fugitive from other insects.

- **White stripes on the antennae**
- **Speckled body with red eyes**
- **Black and white banding**

Don’t be fooled by other stink bugs or look-alikes!

- **Assassin Bug**
- **Brown Stink Bug**
- **Squash Bug**

If you think you have this in your field PLEASE SEND TO UMAINE FOR CONFIRMATION
what is this?
life stages of the BEAST
hypothesized life cycle of blueberry tip midge

• pupae overwinter in duff layer
• adult flies emerge mid-May – July (live 4-6 days)
• flies lay eggs singly on top leaves
• eggs hatch in a few days (temperature dependent)
• larvae go through three instars (7-10 days)
• pupae stay in soil a week before adults emerge
• several generations / yr ... in cranberry, but blueberry?
an example of complex life cycle (Cecidomyiidae)
hypothesized life cycle of *Dasineura oxyococcana* blueberry tip midge

- pupae overwinter in duff layer
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- flies lay eggs singly on top leaves
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- larvae go through three instars (7-10 days)
- pupae stay in soil a week before adults emerge
- several generations / yr ... in cranberry, but one generation in blueberry (?)
damage
(3 in 4 trials...50% decrease in flowers)
effect of management system

year: $F_{(2,6)} = 9.051, \ P = 0.015$

system: $F_{(3,6)} = 0.890, \ P = 0.498$

<table>
<thead>
<tr>
<th>system</th>
<th>organic</th>
<th>low</th>
<th>medium</th>
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<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
<td>2</td>
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<tr>
<td>2014</td>
<td>1</td>
<td>1</td>
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</table>

Tip midge galls / m²
temporal dynamics

Tip midge density
2003 - 2006 (n = 20 fields/yr)
2010 - 2013 (n = 12 fields/yr)
2014 (n = 16 fields/yr)

Exploding?
economic thresholds

IF 46.5% damage is typical

$0.60 / lb
$50/acre for control

$1.00 / lb
$50/acre for control

% infestation

economic crop loss (dollars / acre)

0 5 10 15 20 25 30

0 200 400 600 800 1000

% infestation

0 5 10 15 20 25 30

0 200 400 600 800 1000
control tactics

- **Target prune cycle** – BEFORE damage occurs
  - As leaves begin to emerge
  - When adult tip midges are caught in traps

- **Apply**
  - 2012: Assail & Imidan
  - 2013: Assail & Imidan
  - 2014: Assial, Entrust, Success, Rimon, Mustang Max

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**Density of Blueberry Gall Midge in Prune vs Crop Fields**

(N=10 fields / TMT)

- **Prune status**: 4 galls/m²
- **Crop status**: 0 galls/m²

\(P = 0.033\)
results of controls studies

Mean number of curls / m

Sample date

Assail 30 SG
Imidan 70 WP
Non-treated check
conclusions

• Assail or imidacloprid at time of gall formation 2012, 2013 not effective
• All insecticides did provide some control in 2014 when monitored adults, but NOT great!
• Monitored adults in spring and then treat with Rimon with first trap capture – 2014
  • Currently evaluating

Rimon – novaluron, an insect growth regulator
why? – maybe under natural control