Management of apple pests: codling moth, leafrollers, laca

obia, and stink bugs

Jay Brunner, Mike Doerr and Keith Granger
WSU-TFREC, Wenatchee
Development and degree model to predict the phenology of *Lacanobia subjuncta*

Jay Brunner and Mike Doerr
Tree Fruit Research
and
Extension Center
Life Stages of the *Lacanobia* Fruitworm

- Eggs
- Larvae
- Pupa
- Adult

*Leaf roller*
Damage caused by the *Lacanobia* Fruitworm

1st instar

3rd instar

5th instar

Fruit feeding by larger larvae
3rd - 5th instars
Generalized Life History of *Lacanobia* Fruitworm

- Eggs
- Larvae
- Pupae

- April
- May
- June
- July
- August
- September
- October
Comparative activity of codling moth and Lacanobia fruitworm

Moths/trap

- codling moth
- lacanobia
Lacanobia Fruitworm Degree day development

Degree days from biofix

- Eggs
- Larvae
- Pupae

375 DD From 3/1
### Control options for *lacanobia* fruitworm

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Control and target stage</th>
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<tr>
<td>Thiodan</td>
<td>Excellent - all stages</td>
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<tr>
<td>Avaunt</td>
<td>Excellent - all stages</td>
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<tr>
<td>Proclaim</td>
<td>Excellent - young larvae</td>
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<td>Success</td>
<td>Good - young larvae</td>
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<td>Surround</td>
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<td>Ecozin</td>
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<td>Intrepid</td>
<td>Good - young larvae</td>
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<td>Cryolite</td>
<td>Fair - young larvae</td>
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<td>Bts</td>
<td>Poor</td>
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The Biology and Management of Stink Bugs in Orchards
Seasonal phenology in Washington state

- Eggs
- Nymphs (5 instars)
- Reproductive adults
- Feeding adults

Damage occurs in late summer
Stink Bug Species

Consperse Stink Bug

Chlorochroa ligata

Acrosternum hilare
Green soldier bug

Thyanta pallidovirens
Red-shouldered stink bug
This species often observed in orchards but is a predator not a pest
Stink bug vs. bitter pit

**Stink bug**
- stink bug damage usually higher on fruit
- usually conical or rectangular
- ranges very light tan to dark brown in color

**Bitter pit**
- damage distributed on sides and near calyx
- spherical damage
- dark brown to black in color
Fruit injury generally associated with orchard edges bordering native habitats.
Stink bug damage begins in mid-summer by new adults and accumulates throughout the harvest period.

Accumulated % fruit damage

![Graph showing accumulated fruit damage over time from July 15 to Oct 1.](image)
Stink bugs form aggregations within 24 h and these are maintained until the pheromone lure is removed and then aggregations decline over 73 h.
We find that stink bugs form aggregation starting in late afternoon with the peak aggregations being at night. Aggregations remain on the host plant the following day but only about 50% of those at night.
We have found that the aggregation pheromone has a short range of attraction, about 25 meters. Will not draw bugs from long range but will aggregate those in the area to the source.
Attract-and-kill: Methods

- Lures placed on mullein plants at 20’ intervals along orchard borders
- Alternate baited/sprayed blocks with unbaited/unsprayed blocks (400’ sections)
Harvest Damage: Results

% fruit damage

- Baited & sprayed
- Check

Attract & Kill Approach
Monitoring

Yellow pyramid traps baited with pheromone captured adult stink bugs (2003 research)

![Graph showing average bugs/day for pheromone and unbaited traps]

- Shorter trap as good as taller ones.
Significant damage reduction with single spray:

80% reduction in damage

Danitol Check

80% reduction in damage

% fruit damage

Row 1 Row 2 Row 4 Row 6 OVERALL
Stink bug Management

Summary

• Most information is for Consperse stink bug
• Other species might have different behavior and not respond to aggregation pheromone

• Most injury along orchard borders adjacent to native habitats
• Monitor with aggregation pheromone and cone traps
• Attract and Kill reduces border populations and reduces fruit injury
• No “soft” insecticides as controls - need to use contact insecticides --> pyrethroids
• Border treatments can reduce negative impacts on biological control agents.
Questions on Lacanobia
Fruitworm or Stink Bugs