Management and Control of Lacanobia Fruitworm

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Wenatchee, WA
Developing an IPM Program

• Biology of the pest
  ▪ Description, life cycle, damage, hosts

• Measuring pest density
  ▪ Sampling techniques
  ▪ What is a treatable population (most difficult for IPM)

• When to spray
  ▪ Implementing a degree-day model

• What to spray
  ▪ Bioassays and field trials to select products
Lacanobia Biology- Description
Lacanobia Biology- Description

Bertha armyworm

Spotted cutworm

Herringbone pattern

Note difference in pattern on last segments
Immature Lacanobia and BAW

Lacanobia Fruitworm

Bertha Armyworm
Immature Lacanobia and BAW

Lacanobia Fruitworm

1st Instar

2nd Instar

Bertha Armyworm
Immature Lacanobia and BAW

Lacanobia Fruitworm

Bertha Armyworm

3rd Instar

4th Instar
Immature Lacanobia and BAW

Lacanobia Fruitworm

Bertha Armyworm

5th Instar

6th Instar
Lacanobia Biology- Life History

Significant numbers of larvae remain in tree until maturity
Lacanobia Biology- Injury
Lacanobia Biology - 
Foliage damaged by many pests
Lacanobia Biology-
Progression of a problem
Lacanobia Biology-
*Progression of a problem*
Lacanobia Biology - *Hosts*

- Apple is 1° tree fruit host, rarely seen on pear
- Broad host range, most plants except grasses
- Doesn’t require a weed host to complete life cycle
- Able to complete entire generation on apple
Bertha Armyworm - *Biology*

- Similar life cycle to *Lacanobia*
- Associated with damage in pear
- Pest where weeds grow into trees (pear only 2° host)
- Have habit of moving in mass
Spotted Cutworm- Biology

• Overwinter as larva
• Feed during periods of warmer temp
• In ground cover (1° host) during day and feed at night
• Associated with bud injury early in spring
Lacanobia- **Sampling**

- **Bucket trap**
  - Pheromone lure and kill strip
  - Highly attractive
  - Important if running DD model
  - Catch of 100-150/week is a good warning
Lacanobia- Sampling

- Beating trays
  - Essential for species ID
  - Larvae difficult to sample
  - Density of 1/10 samples is warning sign
Lacanobia- Sampling

- Visual sampling
  - No substitute for visual sampling
  - Look for egg deposition
  - Detect hatch
  - Larvae difficult to find, damage easy to see
  - Feeding on 30% of shoots or trees is high population
Lacanobia Sampling - Varietal susceptibility

• Red vs. Golden may be associated with skin, wax

• Harvest date important
  ▪ Gala harvested before larvae reach damaging stages
  ▪ Red harvested when larvae first reach maturity
  ▪ Fuji exposed for entire larval generation

• Thresholds most accurate for 1st generation
Lacanobia sampling-
*Limitations to thresholds*

- Males are extremely strong fliers
  - Correlation between trap catch and larval presence is weak
- Injury is easy to detect, larvae are difficult to find
- Eggs are hard to find when population sporadic
- Fruit injury affected by a tree’s horticulture
Lacanobia- When to spray

- Soft chemicals most effective against younger larvae
- Predictive model to optimize timing
  - Majority of eggs have hatched
  - Larvae still in susceptible stages
- Model parameters
  - Thresholds 44°F and 88°F
  - Horizontal cutoff method
Lacanobia Model -
Stage specific activity of Success

Ratio ($LC_{50}$:field rate)

Field Rate Equivalent

Larval Instar

- Success 2 SC
- Thiodan 50 WP
Lacanobia Model- *When to spray*

- Preoviposition: 280
- First larvae: 415

Graph showing cumulative percentage over degree days from biofix (44.88°F).
Lacanobia Model - *When to spray*

**% of Instars**

**Best time to spray**

**DD after biofix**
Lacanobia Control—*What to spray*

- Bioassays predict best alternatives
- Field trials optimize rates and timings
- Potential to double products with LR or CM control
Lacanobia Control -
Possible cause of outbreak

- Field rate of Guthion 50 WP = 300 ppm
- LC 50 of resistant CM or LR populations = 50-100 ppm
- LC50 from field collected populations
  - Azwells: 1112.2 ppm
  - Royal slope: 893.1 ppm
  - Quincy: 725.2 ppm
  - Chelan: 725.8 ppm
  - Chelan: 408.3 ppm

Possible cause of outbreak
Lacanobia Control - Ranking of potential chemicals

- High
  - Avaunt
  - Intrepid
  - Success
  - Malathion
  - Thiodan
  - Asana
  - Lannate
  - Proclaim+
  - Novaluron+

- Moderate
  - Surround
  - Ecozin
  - Pyrellin
  - Diotech

- Low
  - Guthion
  - Imidan
  - Sevin
  - Bt
  - Actara
  - Assail
  - Calypso
  - Provado
  - Penncap

+ not registered
## Lacanobia Control - “Old chems”

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Rate/a</th>
<th>Application</th>
<th>% reduction in feeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malathion/ methoxychlor</td>
<td>4 qts</td>
<td>1 app. at 800 DD (1st brown lv)</td>
<td>66</td>
</tr>
<tr>
<td>Thiodan</td>
<td>3 lbs</td>
<td>1 app. at 800 DD (1st brown lv)</td>
<td>75</td>
</tr>
<tr>
<td>Lannate</td>
<td>3 qts</td>
<td>1 app. at 800 DD (1st brown lv)</td>
<td>100</td>
</tr>
</tbody>
</table>
## Lacanobia Control - "New chems"

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<th>Rate/a</th>
<th>Application</th>
<th>% reduction in feeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avaunt</td>
<td>6 oz</td>
<td>1 app. at 400 DD (hatch)</td>
<td>99, 95</td>
</tr>
<tr>
<td>Avaunt</td>
<td>6 oz</td>
<td>1 app. at 800 DD (1st brown lv)</td>
<td>99, 97, 95, 88</td>
</tr>
<tr>
<td>Intrepid</td>
<td>16 oz</td>
<td>1 app. at 800 DD (1st brown lv)</td>
<td>93, 90</td>
</tr>
<tr>
<td>Success</td>
<td>6 oz</td>
<td>1 app. at 400 DD (hatch)</td>
<td>37</td>
</tr>
<tr>
<td>Success</td>
<td>6 oz</td>
<td>1 app. at 800 DD (1st brown lv)</td>
<td>85, 74, 82, 83</td>
</tr>
</tbody>
</table>
## Lacanobia Control - Organic

<table>
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<th>Chemical</th>
<th>Rate/a</th>
<th>Application</th>
<th>% reduction in feeding</th>
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</thead>
<tbody>
<tr>
<td>Neem products</td>
<td></td>
<td>3 apps (hatch)</td>
<td>88, 63, 78</td>
</tr>
<tr>
<td>Natural pyrethrums</td>
<td></td>
<td>3 apps (hatch)</td>
<td>68, 77</td>
</tr>
<tr>
<td>Surround</td>
<td>25 lbs</td>
<td>3 apps (hatch)</td>
<td>77</td>
</tr>
<tr>
<td>Surround</td>
<td>50 lbs</td>
<td>3 apps (hatch)</td>
<td>88</td>
</tr>
</tbody>
</table>
Lacanobia- Biological control

- 3 species of tachinid flies
- Several wasp species
- Generalist predators???
- Varies in effect from yr to yr (0-25%)