Controlling Codling Moth in Organic Pear Orchards

Organic and 'Super-soft' IPM Programs in Pear

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Outline

• Soft program for pear
  ▪ Not organic, but very soft
    • IGR-based IPM Areawide organic project

• Organic program for pear
  ▪ and organic-ish
  ▪ Organic insect pest management
Background

• Areawide Codling Moth
  ▪ Areawide concept shown important for successful mating disruption

• Areawide II Project
  ▪ Areawide concept applied to biocontrol
  ▪ Tends to be pesticide-oriented
    • Reduction in insecticide load
Pear Areawide II

• No OP, no Agri-Mek
  ▪ 2001
  ▪ +OP+Agm, +OP-Agm, -OP+Agm, -OP-Agm
  ▪ No differences in programs
    • Chloronicotinyls replaced the Agri-Mek

• ‘All IGR All-the-Time Program’
  ▪ 2002
  ▪ Standard program vs IGR
    • IGR – No chloronicotinyls, no Agri-Mek, no OPs
Stepwise improvement in IPM

- Biological control is the ultimate goal

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IPM Philosophy

Organic
Super-Soft
All -IGR
Soft
No OP, No Agri-Mek
No-OP
Mating Disruption
Conventional

Removing Tactics

Increasing Options
All-IGRs All-the-Time

Areawide II Program

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Consultants
Fieldmen
Growers
Design

• Six locations
  ▪ 3 in Wenatchee Valley area
  ▪ 3 in Yakima Valley

• Orchard size: 16+ acres
  ▪ Half the orchard in conventional program
    • Standard IPM for the area
  ▪ Half the orchard using only IGRs
    • 8+ acre per side
Standard

General program

**Pear Psylla**
- Agri-Mek
- Provado
- Actara
- Assail
- Surround
- Esteem
- Dimilin
- Neemix

**Codling moth**
- Guthion
- Imidan
- Mating disruption
- Intrepid
- Esteem
- Dimilin

- Both used Acramite for spider mites

**All-IGR**

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Codling moth

- Codling moth generally the same
  - One spike in Conv. in Wenatchee (still low)
Pear psylla adults

- Generally the same
- Conv. slightly higher in 2 (not signif.)

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Pear psylla nymphs

- Low psylla nymphs in both
- Good control of damaging stage
Grape mealybug

- Only in Wenatchee
- Densities the same
Spider mites

- Spider mites generally the same
- Same control tactic used in each
  - Acramite
Biocontrol

- No consistent trend
- No 'burst' of biocontrol in soft

Der. – 1 Soft higher
Camp. – Conv. slightly higher
Lacewing – no pattern
Trech. – expect Soft higher, more Conv. higher
Spider – Soft slightly higher
Overall – no clear pattern

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Mean fruit damage by pest at harvest

- Differences in
  - GMB
  - PRM
- No good IGR controls

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Summary: All-IGRs All-the-Time

• IGR program generally worked
  ▪ Very soft alternative to organic

• Rust mites, GMB problems
  ▪ Predicted it before season
  ▪ Buprofezin (Applaud) will handle GMB
  ▪ Rust mites???

• More info should come from year 2
Areawide Organic Pear Pest Management

Peshastin Creek Growers Project
Background

- **Areawide Organic – Organic-ish**
  - Areawide organic insect pest management
  - The furthest stretch for IPM
    - Arbitrarily limited to a few selective options
  - Transition between programs easy
    - Step down rather than step up
    - Transitional to Organic
    - Transitional to Super-soft

Terms
- Organic = Certified Organic
- Organic-ish = organic IPM, not certified
- Super-soft = organic IPM + IGRs
- Soft = Super-soft, IGRs

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Areawide Organic in pear

- Pest biology makes sense for areawide
  - Codling moth mating disruption
    - Areawide has been highly successful
  - Pear psylla
    - Previous areawide efforts
      - OPs in the early ’80s
      - Pyrethroids in the mid ’80s
      - Surround – current
    - Dispersal of psylla
      - Evens out the regional density
Psylla control

• Surround
  ▪ Areawide use has dramatically decreased pear psylla
  ▪ ‘psylla equivalent of mating disruption for codling moth’
    • Opens up opportunities

• Azadirachtin
  ▪ Aza-Direct
  ▪ Neemix
  ▪ Ecozin
  ▪ All work well
    • Soft
    • Frequent applications
  ▪ After Surround has reduced psylla
Area-wide Organic in pear

- Biological control
  - Generalist natural enemies
  - Move from surrounding habitat
  - Disrupted by broad-spectrum insecticides

- Area-wide = creating opportunities
  - Increase the size of borders for immigration of biocontrol
  - Create “corridors” to interior
    * Organic surrounded by conventional has little chance of biocontrol
Areawide Organic Insect Pest Management Program

• 12 growers
  ▪ 10 families

• 310 acres
  ▪ Plus conventional

• Three comparisons
  ▪ 180 ac certified Organic
    ▪ Includes 60 ac certified in Sept.
  ▪ 130 ac Super-soft
  ▪ 22 ac conventional

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## Insecticide Programs

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Soft (mating disruption)</th>
<th>Organic (mating disruption)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delayed/Dormant</strong></td>
<td></td>
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</tr>
<tr>
<td>1) Thiodan</td>
<td>1) Thiodan</td>
<td>1) Surround</td>
</tr>
<tr>
<td>2) Surround</td>
<td>2) Surround</td>
<td>2) Oil</td>
</tr>
<tr>
<td>3) Lorsban</td>
<td>3) Oil</td>
<td>3) Sulfur</td>
</tr>
<tr>
<td>4) Oil</td>
<td>4) Sulfur</td>
<td></td>
</tr>
<tr>
<td><strong>Clusterbud</strong></td>
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</tr>
<tr>
<td>1) Sulfur</td>
<td>1) Surround</td>
<td>1) Surround</td>
</tr>
<tr>
<td>2) Oil</td>
<td>2) Azadirachtin</td>
<td>2) Oil</td>
</tr>
<tr>
<td>3) Surround</td>
<td>3) Oil</td>
<td>3) Azadirachtin</td>
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<tr>
<td>4) Esteem</td>
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<tr>
<td><strong>Petalfall</strong></td>
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</tr>
<tr>
<td>1) Actara</td>
<td>1) Azadirachtin</td>
<td>1) Oil</td>
</tr>
<tr>
<td>2) Oil</td>
<td>2) Oil</td>
<td>2) Bt</td>
</tr>
<tr>
<td><strong>Summer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Guthion</td>
<td>1) Oil</td>
<td>1) Oil</td>
</tr>
<tr>
<td>2) Vendex</td>
<td>2) Acramite</td>
<td>2) Azadirachtin</td>
</tr>
<tr>
<td>3) Agri-Mek</td>
<td>3) Azadirachtin</td>
<td></td>
</tr>
</tbody>
</table>
Psylla nymphs

![Graph showing Psylla nymph counts over time across different treatments: Conventional, Soft, and Organic.](image)

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Psylla adults

Pear Psylla Adults

- Conventional
- Soft
- Organic

Date

Adults/tray

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Psylla eggs

![Graph showing the number of Psylla eggs per leaf over time]

**Conventional**

**Soft**

**Organic**

Date:

- 5/10
- 5/17
- 5/24
- 5/31
- 6/7
- 6/14
- 6/21
- 6/28
- 7/5
- 7/12
- 7/19
- 7/26
- 8/2
- 8/9
- 8/16
- 8/23
- 8/30
- 9/6

Eggs/leaf

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5

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Spider mites

Two-spotted spider mite motiles

Two-spotted Spider Mite Eggs

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Biological Control

• Was there any biocontrol?
  ▪ Psylla was controlled
  ▪ Aza isn’t THAT strong

• Numbers certainly weren’t very high
  ▪ Anthocorids
  ▪ Campylomma
  ▪ Deraeocoris

• Maybe next year?
Program costs

Mean Costs

Mean Program Cost

$0 $100 $200 $300 $400 $500 $600

Organic Soft Conv.

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Program costs

Cost Distribution

Mean Program Costs

Higher

Already Soft 3 years

Lower

Organic Soft Conv.

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HOWEVER, if considering organic .......

- Insecticide costs are a small fraction of overall production costs
  - Other costs may increase
- Monitoring time increases
  - As does RISK
- More applications of materials
  - Increase time on sprayer
- Don’t know yield effects yet
Pest problems

- **Pear sawfly**
  - Shows up in supersoft and organic pear
  - Relatively easy to manage

- **Lesser appleworm**
  - Showing up in the upper Wenatchee Valley
  - Manage with Bt
  - More info needed on phenology

- **Pear rust mite**
  - Widespread
  - Nothing to help after petal fall
  - Deal-breaker
    - Soft programs may use Vendex next year
Tree to Table IPM

- Developing markets
  - Blue Bird Inc.
  - The Food Alliance in new markets
  - Self-marketing

- 'Green Label' marketing
  - The Food Alliance
    - 8 growers joined
  - 'near organic' criteria

- Grow the program
  - 1 or 2 more sites next year
    - In the vicinity
    - Eventually the whole Wenatchee Valley?

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Conclusion

• Soft pest management works
  ▪ All-IGRs
  ▪ Organic
  ▪ Organic-ish

• New opportunities
  ▪ New insecticides
  ▪ Increased biological control
  ▪ Choices