Areawide Organic IPM in Pear

The Peshastin Creek Project: A three-year success story

John E. Dunley and Tara Madsen
Washington State University
Tree Fruit Research and Extension Center
Wenatchee, WA
An Areawide Soft Approach to IPM

- Areawide pest management in tree fruit
  - Codling Moth Areawide Mating Disruption Project
  - Pear psylla

- Primary focus is soft IPM
- Organic tactics used first
  - Soft blocks
    - Growers choose not to use organic nutrition, weed, rodent control programs
- Capitalize on areawide concept
The Peshastin Ck. Areawide Project

• The Peshastin Creek Growers Association
  - Association of local growers and fieldmen
  - Mission: Increase the use of environmentally-friendly pest management techniques to enhance water and soil quality, improve worker safety and reduce pesticide inputs
The Peshastin Ck. Areawide Project

• The Peshastin Creek Growers Association
  ▪ Association of local growers and fieldmen

• Pest Management Program
  ▪ Based on Organic insect management practices
    • Areawide techniques to control Pear psylla and Codling moth
    • Reduce non-selective pesticide use
    • Increase potential migration of beneficial insects
Programs

• **Comparison of 3 management types**
  - **Organic**—91 acres
    - Organic management techniques
    - Surround, Oil, Sulfur, Azadirachtin, Bt, Spinosad, CM granulosis virus and mating disruption
  - **Soft**—82 acres
    - Prefer organic methods, use IGRs and selective pesticides
    - Surround, Oil, Sulfur, Avaunt, IGRs, and MD
    - Endosulfan, Carzol used prebloom for PRM
  - **Conventional**—56 acres
    - Standard pest management techniques
    - Surround, Oil, IGRs, Carzol, Chloronicotinyls, Abamectin, Organophosphates and MD
Location

• Area
  ▪ Peshastin Creek Valley, WA
    • Center of state
    • Blewett Pass Hwy 97
  ▪ 230 ac. sampled
    • ~300 ac. of pears in the valley
  ▪ 41 plots
    • 1.5 to 10 ac. in size
    • Plots defined as orchard blocks
      ▪ Grower management units
Monitoring

• **Standard sampling methods**
  ▪ Weekly
  ▪ Randomly distributed through blocks

• **Arthropods Monitored**
  ▪ Pear psylla
  ▪ Mites
  ▪ Codling moth
  ▪ Grape mealybug, other

• **Predators**

Dunley - WOPDMC 2005
Results - Pear psylla adults

- **Organic slightly higher**
- **Entire areawide project kept low**
**Organic slightly higher**

**Entire areawide project kept low**

**Densities much lower than 2002**

<table>
<thead>
<tr>
<th>Date</th>
<th>Mean number of adult pear psylla per tray</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/20/03</td>
<td></td>
</tr>
<tr>
<td>5/9/03</td>
<td></td>
</tr>
<tr>
<td>6/28/03</td>
<td></td>
</tr>
<tr>
<td>8/17/03</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Mean number of adult pear psylla per tray</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/20/04</td>
<td></td>
</tr>
<tr>
<td>5/9/04</td>
<td></td>
</tr>
<tr>
<td>6/28/04</td>
<td></td>
</tr>
<tr>
<td>8/17/04</td>
<td></td>
</tr>
</tbody>
</table>
Pear psylla nymphs

- Again, no differences overall
- Differences do occur during season
- Insecticides remove differences
• Again, no differences overall
• Differences do occur during season
• Insecticides remove differences
• Much lower than 2002
Codling moth

- Population was greatly reduced in 2004
  - Following scare of spring 2003

![Graph showing Codling moth flight](image-url)
Codling moth in 2003

- High first generation catch
  - Organic tactics worked
    - Virus, oil, spinosad, mating disruption
  - 2 blocks had damage
    - Poor spray
    - Sprayable pheromone

Codling moth damage

- $0.0\%$, $0.5\%$, $1.0\%$, $1.5\%$, $2.0\%$, $2.5\%$, $3.0\%$
- $0$, $50$, $100$, $150$, $200$, $250$, $300$, $350$
- $0.0\%$, $0.5\%$, $1.0\%$, $1.5\%$, $2.0\%$, $2.5\%$, $3.0\%$

Cumulative moth catch per generation

- Conv 1st
- Conv 2nd
- Soft 1st
- Soft 2nd
- Org 1st
- Org 2nd

8.7%
Codling moth damage at harvest

- Damage kept very low
  - 2 locations in 2003 raised the means

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conv</td>
<td>0.54%</td>
<td>0.01%</td>
</tr>
<tr>
<td>Org</td>
<td>0.73%</td>
<td>0.10%</td>
</tr>
<tr>
<td>Soft</td>
<td>0.01%</td>
<td>0.03%</td>
</tr>
</tbody>
</table>
Predator Densities

- Remained low through most of the season
  - Late season increases in ORG and SOFT, following psylla

- Pest densities may be too low to sustain effective NE densities
  - Except late season
  - Don’t see a significant carry-over

Dunley - WOPDMC 2005
Areawide Organic – Program Costs

- No differences in costs
  - Between programs
  - 2002 was a less expensive year
- Organic is generally less expensive
Programs

- Increases between 03-04 in ORG and SOFT tactics in CONV programs
- Azadirachtin
- Esteem
- Oil
- Sulfur

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conv</td>
<td>Soft</td>
<td>Org</td>
<td>Conv</td>
<td>Soft</td>
<td>Org</td>
</tr>
<tr>
<td>Acramite</td>
<td>0.72</td>
<td>0.12</td>
<td></td>
<td>0.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actara</td>
<td>0.30</td>
<td>0.13</td>
<td>0.66</td>
<td>0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agri-Mek</td>
<td>1.50</td>
<td>0.19</td>
<td>1.08</td>
<td>0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assail</td>
<td>0.96</td>
<td>0.38</td>
<td>0.85</td>
<td>0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avaunt</td>
<td>0.36</td>
<td>0.52</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aza-Direct</td>
<td>0.35</td>
<td>3.54</td>
<td>1.67</td>
<td>1.11</td>
<td>4.81</td>
<td>3.20</td>
</tr>
<tr>
<td>Carzol</td>
<td>0.28</td>
<td>0.69</td>
<td>0.57</td>
<td>0.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyd-X</td>
<td></td>
<td>1.46</td>
<td></td>
<td>0.43</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td></td>
<td>0.78</td>
<td></td>
<td>0.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiodan</td>
<td>0.61</td>
<td>0.51</td>
<td>0.57</td>
<td>0.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrust</td>
<td>0.04</td>
<td>1.74</td>
<td></td>
<td>2.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esteem</td>
<td>0.50</td>
<td>1.62</td>
<td>1.15</td>
<td>2.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fujimite</td>
<td></td>
<td></td>
<td>0.34</td>
<td>0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guthion</td>
<td>0.47</td>
<td></td>
<td>1.31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imidan</td>
<td>0.39</td>
<td></td>
<td>0.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrepid</td>
<td>0.42</td>
<td>1.83</td>
<td>1.03</td>
<td>1.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lorsban</td>
<td>0.52</td>
<td></td>
<td>0.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>6.87</td>
<td>7.31</td>
<td>8.09</td>
<td>9.01</td>
<td>8.12</td>
<td>7.52</td>
</tr>
<tr>
<td>Provado</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur</td>
<td>0.13</td>
<td>0.31</td>
<td>2.48</td>
<td>0.57</td>
<td>1.42</td>
<td>3.3</td>
</tr>
<tr>
<td>Surround</td>
<td>2.78</td>
<td>1.71</td>
<td>1.90</td>
<td>3.43</td>
<td>1.98</td>
<td>1.72</td>
</tr>
</tbody>
</table>
Areawide Organic Programs

- No differences in numbers of insecticide applications
- No differences in numbers of trips through the orchard

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total apps per acre</td>
<td>18.05</td>
<td>19.30</td>
<td>18.94</td>
<td>22.55</td>
<td>22.45</td>
<td>20.07</td>
</tr>
<tr>
<td>Avg. trips per acre</td>
<td>8.16</td>
<td>8.73</td>
<td>8.79</td>
<td>9.07</td>
<td>8.24</td>
<td>9.21</td>
</tr>
</tbody>
</table>
Areawide Organic Project

• After 3 years
  ▪ Psylla are down
  ▪ Codling moth are down
  ▪ Spider mites aren’t a problem
  ▪ Costs are no more than conventional

• The program works
Peshastin Creek Areawide Organic Project

• Organic and near-organic Soft pest management strategies
  ▪ Equal to Conventional over 3 year period
    • Pest control
    • Control Costs

• Benefits
  ▪ Increased biological control?
  ▪ Increased returns?
Where to go from here?

• Areawide pest management
  ▪ Always successful

• Organic IPM
  ▪ Tactics available
  ▪ Non-organic using them
  ▪ Not more costly

• Implementation
  ▪ Opportunities for value-added
  ▪ More information-intensive

• Biocontrol is a good goal
  ▪ But tough to rely on

• Optimally-integrated program
Thanks to:

The Peshastin Creek Growers Association
  • Growers
  • Cooperating ag consultants
• And for funding from
  ▪ USDA IFAFS/RAMP
  ▪ Washington State Tree Fruit Research Commission