Fruit Insect Update

Fruit Pest Management In-Service Workshop
Sponsored by USU Extension Utah Pests Team
March 2, 2010
Utah State University, Logan, UT
Topics

- Spotted-wing Drosophila
  - Potential for invasion to Utah
- Raspberry Horntail
  - Research update on insect biology and management
- Greater Peachtree Borer
  - Mating disruption as a tool for even small peach orchards
**Spotted-wing Drosophila**

- *Drosophila suzukii* (vinegar fly)
- Exotic, first detected in CA, OR & WA in 2009 and spread rapidly (also in FL & HI)
- Native to SE Asia
- Most *Drosophila* lay eggs in decaying fruit, but *D. suzukii* attacks ripening fruit

*D. suzukii* larva (up to 3.5 mm; ~1/3 the size of a cherry fruit fly larva) in blueberry fruit

*D. suzukii* male (2 mm)
This is not your common household-compost pile-trash bin Drosophila

Female adult (3 mm) – no spot on wing

Saw-like ovipositor penetrates skin of fruit
Host range – very broad

- In CA/OR/WA
  - Cherry
  - Peach/Nectarine
  - Plum
  - Strawberry
  - Caneberries
  - Blueberry
  - Grape
  - Apple
  - Persimmon
  - Tomato

Oviposition scars in sweet cherry
**Risk for introduction & establishment in Utah?**

- **Preferred temperature range for** *D. suzukii*:
  - 68-85°F (males become sterile at higher temperatures)
  - It is not known how well this fly will overwinter in the cooler climates of the PNW (catches in Willamette Valley in Feb 2010) and Intermountain West
- **Concern is based on**
  - Its establishment in CA & rapid spread within CA, and to OR/WA
  - Its wide host range
  - Its rapid propagation (1-2 wk gen. time & up to 10 gen. per yr in CA)
Monitoring for *D. suzukii*

Bucket-style (McPhail) trap with apple cider vinegar

Look for vinegar flies with dark spot near each wing tip (males)
What to do if an infestation is suspected?

- Contact the Utah Department of Agriculture and Food and Utah Plant Pest Diagnostic Lab
- Management:
  - Insecticide sprays
    - *D. suzukii* can be controlled with standard insecticides
      - Malathion, Mustang, GF-120, Success, Entrust
  - Sanitation
    - Dispose of infested fruit
Currently, most severe insect pest of raspberries (summer- and fall-bearers) in northern UT
- Caneboring wasp (*Hartigia cressonii*)
- Hosts: raspberry, other brambles, rose
- One generation per year; egg-laying extends from early spring to early summer (larval sizes overlap)
Raspberry horntail

- Attack first-year canes (primocanes)
- Apply contact insecticides in the early spring (soon after new cane growth emerges from ground) to target adults before eggs are laid
- Frequent pruning of infested cane tips during summer can lower the horntail population in a field
- Several species of parasitic wasps attack horntail larvae within canes and provide biological control (late in the season)

Wilted cane tips with horntail
Economic losses

- University of California Pest Management Guidelines:
  - 3 actively wilting canes per 100 row ft
- In northern UT, commonly observe infestation levels:
  - 1 infested cane per 5-10 row ft
  - > 3 times higher than UC guidelines
  - Crop loss is occurring
Pruning & sanitation

- Prune & destroy infested cane tips when wilting becomes apparent (June – Aug)
- Cane tips with a larva become soft
- Cut canes ~ 6 inches below tip to ensure that larva is removed
- Can pinch cane tip & kill larva
- Prune/pinch infested canes 1-2 times / wk
## Varietal susceptibility - Summer

<table>
<thead>
<tr>
<th>Summer Variety</th>
<th>Mean no. of larvae</th>
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<tbody>
<tr>
<td>Cascade Dawn</td>
<td>1.5</td>
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<tr>
<td>Cascade Delight</td>
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<tr>
<td>Royalty</td>
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<tr>
<td>Moutere</td>
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<td>Cowichan</td>
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<tr>
<td>Georgia</td>
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<tr>
<td>Coho</td>
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<tr>
<td>Titan</td>
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<tr>
<td>Chemainus</td>
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<tr>
<td>Tulameen</td>
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<td>Cascade Bounty</td>
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<tr>
<td>WDNV2</td>
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<tr>
<td>Canby</td>
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<tr>
<td>Reveille</td>
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<td>Lauren</td>
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<td>Willamette</td>
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Mean number of horntail larvae per 12 row ft from late June to mid August, 2009, Kaysville, UT
### Varietal susceptibility - Fall

<table>
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<tr>
<th>Fall Variety</th>
<th>Mean no. of larvae</th>
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<td>Himbo Top™</td>
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<td>Joan J</td>
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<td>Jaclyn</td>
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<td>Caroline</td>
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<td>Ruby</td>
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<tr>
<td>Anne</td>
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<tr>
<td>Summit</td>
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<tr>
<td>Polka</td>
<td>7.5</td>
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<tr>
<td>Heritage</td>
<td>8.3</td>
</tr>
</tbody>
</table>

Mean number of horntail larvae per 12 row ft from late June to mid August, 2009, Kaysville, UT
Insecticides

- **Contact insecticides**
  - Adults emerge from the previous year’s canes in the early spring (late March to April?)
  - Contact insecticides can kill adults & prevent egg-laying in canes
  - New primocanes should be protected as soon as they begin to grow through early summer (heavy infestations)
  - Avoid insecticides harmful to pollinators during bloom

- **Systemic insecticide (imidacloprid, Admire)**
  - Crown & soil drench in late spring to early summer
  - Imidacloprid is upwardly mobile in plant, so may contact & kill horntail eggs and larvae; *efficacy has not been proven*
Insecticide products

- Botanical (21\textsuperscript{1})
  - rotenone + pyrethrin (Bonide, Pyrellin, Pyganic)\textsuperscript{OH}

- Carbamate (1A)
  - carbaryl (Sevin)\textsuperscript{H}

- Insect growth regulator (18B)
  - azadirachtin (Aza-Direct, Neemix)\textsuperscript{OH}

- Neonicotinoid (4A)
  - acetamiprid (Assail)
  - imidacloprid (Admire) – systemic, soil apply
  - thiamethoxam (Actara)

\textsuperscript{1}IRAC mode of action classification, \textsuperscript{0}OMRI approved for organic production, \textsuperscript{H}homeowner products available
Insecticide products (cont.)

- Organophosphate (IB)
  - diazinon (Diazinon)\(^R\)
  - malathion (Malathion)\(^H\)
- Particle barrier / repellent
  - kaolin clay (Surround)\(^{OH}\) – likely a suppressant only
- Pyrethroids (3)
  - bifenthrin (Brigade\(^R\), Capture\(^R\), Ortho\(^H\))
  - esfenvalerate (Asana)\(^R\)
  - fenpropathrin (Danitol)\(^R\)
  - permethrin (Bonide, Hi-Yield)\(^H\)
  - zeta-cypermethrin (Mustang)\(^R\)

\(^I\)IRAC mode of action classification, \(^O\)OMRI approved for organic production, \(^H\)homeowner products available, \(^R\)restricted use products
Natural enemies (biological control)

- At least 2 species of parasitic wasps attacked horntail larvae (June – Sep) in 2009 studies
- Parasitism occurred near cane tip (smaller diameter, softer cane tissue facilitates insertion of the parasite ovipositor)

Ectoparasite – small larvae on horntail larva

Ectoparasite – small pupae with dead horntail larva
Raspberry Horntail Fact Sheet

Published by Utah State University Extension and Utah Pest Diagnostic Laboratory.

Do You Know?
- The raspberry horntail is a parasitic wasp that can cause loss to raspberries in northern Utah.
- Apply insecticides in the spring targeting adults, to prevent egg-laying in the new cones.
- Infested cones often become evident during the summer when tips will turn and drop.
- Frequent pruning of infested cone tips during summer can lower normal populations in a field.
- Several species of parasitic wasps attack horntail larvae within cones and can provide biological controls.

The most injurious insects to raspberries and other members are those that bore within the cones resulting in cone distortion, reduced fruit yield, and even shoot death. The most common of the pests attacking raspberries in northern Utah is the raspberry horntail (Hartigia cressonii). A type of wasp (Hymenoptera: Tenthredinidae), it was first documented in Utah in the 1980s and is known to occur in other western states. Horntails spend the winter as mature larvae in the previous year’s cones; pupate in the early spring, and emerge as adults to mate and lay eggs in primocanes (first-year canes) just before new growth begins. Early-season emergence and protection of the eggs and larvae within cones create challenges for normal management and potential for high infestation levels in raspberry fields. Recent research to evaluate the susceptibility of raspberry varieties and observations of high parasitoid levels of horntail larvae in some fields, provide new insights into raspberry horntail management.

Mature Larva – Overwintering Stage
- Size, shape, and color of a cylindrical, white body about 1 inch (25 mm) long; brown head; short spine on the tail end (Fig. 1).
- When and where: Spends the winter in a bored cavity in the lower cone.

Pupa
- Size and color: tan and about ¼ inch (18 mm) long.
- When and where: Pupation occurs within the cone in the early spring.
Primary hosts in UT
- Peach, nectarine (plum?)

Mating Disruption
- Excellent performance in UT
  - Single application
  - Isomate-P (Pacific Biocontrol Inc.)
  - Hang dispensers in lower half of canopy
- Effective in small orchards (< 1 acre)
- Complete trap shut down