



# Raspberry Cane Borer and Spider Mite Management Updates

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Urban & Small Farms Conference  
February 19, 2015  
Viridian Center, West Jordan, UT

# Raspberry Topics

- Cane Borers
  - Raspberry Horntail
  - Raspberry Crown Borer
  - Rose Stem Girdler
- Spider Mites



# Utah Pests Online Resources

The screenshot shows the Utah Pests website homepage. At the top, there is a navigation bar with the text "EXTENSION Utah State University" on the left, "UTAH PESTS" in the center, and a logo on the right. Below this is a secondary navigation bar with links: "UTAH PESTS Home", "Utah Plant Pest Diagnostic Lab", "Integrated Pest Management", "School IPM", and "Cooperative Agricultural Pest Survey".

On the left side, there is a "Google™ Search" box and a vertical menu with the following items: "Home", "Fact Sheets", "Video Fact Sheets", "Image Galleries", "Slideshows", "Utah Pests News", "Quarterly Newsletter", "Bees and Other Pollinators", "In the News", and "Contact Us". A green circle highlights this menu.

The main content area features a large image of a caterpillar on a yellow flower. Below this image are four tiles:

- Utah Plant Pest Diagnostic Lab**: "Just \$7 gets your pest problem diagnosed or insect identified." (Icon: microscope)
- Integrated Pest Management**: "Your source for fruit, vegetable, and landscape pest problems." (Icon: leaf with insect)
- School Integrated Pest Management**: "Teaching responsible pest management for a healthy learning environment." (Icon: apple and book)
- Cooperative Agriculture Pest Survey**: "CAPS protects Utah agriculture through statewide monitoring of invasive pests." (Icon: envelope)

On the right side, there is an "In the News" section with three articles:

- Predators, Parasites, Pests, and the Paradox of Biological Control** (Jan 20, 2015)
- Insect Communication** (Jan 13, 2015)
- A Taxonomic Toolkit Ends a Century of Neglect For a Genus of Parasitic Wasps** (Dec 15, 2014)

Below the news section is a paragraph: "UTAH PESTS' is a group of Extension entomologists and plant pathologists that helps to solve the thousands of plant pest issues that concern Utah citizens every day. The UPPDL identifies, the IPM Program educates, and the CAPS Program investigates. Open one of the websites to get answers!"

At the bottom of the page, there is a footer: "Utah State University is an affirmative action/equal opportunity institution. © 2015 Utah State University Utah Pests"

[www.utahpests.usu.edu](http://www.utahpests.usu.edu)

# Raspberry Horntail

6 years of Utah research

- 1) Biology & Life Cycle
- 2) Predict Adult Emergence/Egg-Laying Period
- 3) Natural Enemies
- 4) Raspberry Cultivar Resistance

# Raspberry Horntail Research Summary Article

Utah Pests News  
Quarterly Newsletter  
[www.utahpests.usu.edu](http://www.utahpests.usu.edu)

Fall 2014  
Vol. 8: 4-5, & 11

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Utah Pests News  
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## ENTOMOLOGY NEWS AND INFORMATION

### 6 Years of Raspberry Horntail Research, berry condensed

Recent research has defined horntail biology, developed a degree-day model, identified wasp parasitoids for biocontrol, evaluated insecticides, and assessed raspberry cultivars for susceptibility.



The raspberry horntail, *Hartigia cressonii*, is a prevalent cane-borer in raspberries of northern Utah. The horntail is a stem sawfly that exclusively attacks first-year primocanes. It was first found in Utah in the 1980s, and is known from the Pacific Northwest, California, and Colorado. Infested canes have lower berry yield, vigor, and winter survival. Through a comprehensive research program covering 6 years, we have defined horntail biology and life history in Utah, developed a degree-day model to predict adult activity, assessed biological control by parasitoid wasps, evaluated insecticide efficacy, and evaluated summer- and fall-fruited raspberry cultivars for susceptibility. This article provides an overview of the findings.

**Horntail Biology** There is only one generation each year; horntails are active from late spring through summer. Adults chew their way out of overwintering chambers within canes beginning in late May. Female sawflies seek attractive raspberry primocanes on which to insert eggs under the soft epidermis or bark. After hatching, the young horntail larva tunnels upwards in the cambium as the new cane grows. At the cane tip, the larva feeds heavily in the center pith causing the tissue to soften and wilt, leading to the characteristic shepherd's crook. Typically only one larva develops per cane; however, two larvae can develop in bifurcated canes. Wilted canes are evident from late June through early September. Larvae consume the succulent tissue in the cane tip, make a U-turn and tunnel downward through the cane pith. The mature larva overwinters within a silk-lined chamber, 1.5 to 2 feet above the base of the cane.

**Predicting Horntail Activity** A degree-day (DD) model was developed to predict timing of adult egg-laying. In early spring, raspberry canes containing horntail larvae were collected from farms in five northern Utah counties across three years. They were placed in a constant 77°F chamber within mesh fabric cages, and checked 2 to 3 times per week for adult emergence. Using a lower developmental threshold of 50°F, and accumulating degree



Horntail larvae hollow out the pith of the tops of raspberry canes.

continued on next page

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## ENTOMOLOGY NEWS AND INFORMATION, continued

### Raspberry Horntail Research, continued from previous page

days from January 1 of each year; the adult emergence period was found to span 500 to 1800 DD. This timing corresponds to approximately late May to mid-August, but varies with location and year. The DD model provides a critical tool to improve the timing of horntail management.

**Natural Enemies** We detected an abundance of biological control by parasitoid wasps; however, parasitism of the horntail larva takes place in the cane tip, after some injury has already occurred. We found three species of native parasitoid wasps attacking horntail larvae. One of the most common is an ichneumonid wasp with a long ovipositor. It is a solitary ectoparasite; an individual parasitoid egg is laid upon the horntail larva within the cane tip, and the parasitoid larva consumes the horntail. Another common parasitoid we found is a gregarious pteromalid wasp whose larvae attack horntail larvae in groups of three to twenty. The least abundant parasitoid in our survey was a tiny eurytomid wasp that is known to parasitize gall midges and gall wasps. In our study, the majority of horntail parasitism occurred from late June to mid-August with peak rates of parasitism from 40-100% in late July and early August.



Several small larvae of an ectoparasitic pteromalid wasp feeding on a single horntail larva inside a raspberry cane.

**Cultivar Resistance** Since 2009, 21 cultivars of floriculture-fruited (summer-bearing) raspberries and 16 cultivars of primocane-fruited (fall-bearing) raspberries have been evaluated at the USU Horticultural Research Farm in Kaysville. Horntail infestation was substantially lower in primocane- than floriculture-fruited plants. The main reasons are likely two-fold: primocane-fruited canes were removed at ground level in the fall or spring, thus removing the overwintering horntail larvae; and horntails avoid thin canes which are more common in primocane-fruited cultivars.

Horntail population pressure was higher in the 2009-2011 cultivar trial than in the 2013-2014 trial, likely because of successive years of removal of infested canes at the site as

Floriculture-fruited (summer-bearing) cultivar susceptibility to raspberry horntail (RHT): mean number of larvae per row-foot of plants, Kaysville, UT.

Cultivar	# RHT	Cultivar	# RHT
2009-2011 Trial			
Royalty	0.25 a	Reveille	2.85 abc
Moutere	0.80 a	Chemainus	2.95 abc
Cascade Dawn	1.25 ab	Canby	3.25 bc
Cowichan	1.55 abc	Georgia	3.65 c
Coho	1.60 abc	Cascade Bounty	3.75 cd
Cascade Delight	1.75 abc	Titan	4.10 cd
Lauren	1.85 abc	Willamette	5.10 cd
Tulameen	2.20 abc	Saanich	5.95 d

2013-2014 Trial			
Octavia	0.01 a	Prelude	0.26 ab
Cascade Gold	0.05 a	Cascade Bounty	0.68 ab
1142-1	0.12 a	Nova	1.07 b
Chemainus	0.18 a		

Primocane-fruited (fall-bearing) cultivar susceptibility to RHT: mean number of larvae per row-foot of plants, Kaysville, UT.

Cultivar	# RHT	Cultivar	# RHT
2009-2011 Trial			
Polana	0.40	Joan J	0.7
Caroline	0.60	Ruby	0.7
Polka	0.60	Himbo Top	0.8
Summit	0.60	Heritage	0.9
Jaelyn	0.60	Anne	1.0

2013-2014 Trial			
Autumn Treasure	0.03	Polana	0.23
Josephine	0.06	Autumn Bliss	0.30
Brice	0.08	Joan J	0.34
Vintage	0.14	Dinkum	0.50
Autumn Britten	0.18		

part of the sampling process. Of the summer-bearing cultivars, 'Royalty', 'Moutere', 'Octavia', and 'Cascade Gold' were the least attractive to horntail while 'Cascade Bounty', 'Nova', 'Titan', 'Willamette' and 'Saanich' had the highest infestations.

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# USU Fact Sheets

UTAH
fact sheet

**Utah State University**  
 COOPERATIVE EXTENSION

Published by Utah State University Extension and Utah Plant Pest Diagnostic Laboratory      ENT-132-09      September 2009

## Raspberry Horntail (*Hartigia cressonii*)

Diane Alston, Entomologist • Brent Black, Fruit Specialist • Marion Murray, IPM Project Leader

**Do You Know?**

- The raspberry horntail is a cane-boring wasp that can cause crop loss to raspberries in northern Utah.
- Apply insecticides in the spring targeting adults, to prevent egg-laying in the new canes.
- Infested canes often become evident during summer when tips wilt and die back.
- Frequent pruning of infested cane tips during summer can lower horntail populations in a field.
- Several species of parasitic wasps attack horntail larvae within canes and can provide biological control.



**Fig. 1.** The raspberry horntail larva bears a spine on the tail end!



**Fig. 2.** Raspberry horntail adult!

**HOST PLANTS**

raspberry, other brambles, rose

**LIFE HISTORY**

There appears to be only one generation per year in northern Utah. Egg-laying extends from early spring to early summer, so larvae of all sizes can be found in canes during the summer.

**Mature Larva – Overwintering Stage**

- Size, shape, and color:** cylindrical, white body about 1 inch (25 mm) long; hardened, brown head; short spine on the tail end (Fig. 1).
- When and where:** spends the winter in a silk-lined cavity in the lower cane.

**Pupa**

- Size and color:** tan and about ¾ inch (18 mm) long.
- When and where:** pupation occurs within the cane in the early spring.

Horticulture

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February 2013      Horticulture/Fruit/2013-01pr

## A Comparison of 10 Fall Bearing Raspberry Cultivars for Northern Utah

Rick Heflebower, Britney Hunter, Shawn Olsen, Brent Black, Diane Alston, and Thor Lindstrom  
Utah State University Extension

**Introduction**

Raspberry plants have a perennial root system with biennial canes. In other words the root system may live for many years, while the individual shoots live for only 2 years. During the first year of growth the canes (primocanes) are typically vegetative, while in the second year, the same canes (now floricanes) flower and bear fruit. Even though the individual canes live for only 2 years, the crown is sending up new canes each year, hence the plant itself is perennial.

Some raspberries have the ability to bear on canes during the first year of growth. These are known as "primocane bearers" or may also be referred to as "fall bearing varieties." The "fall bearing" name is used because by the time the primocane fruiting varieties grow, flower, and set fruit it is usually later into the fall season. This bulletin deals only with fall bearing varieties. If you would like to learn more about general raspberry culture please refer to the fact sheet "Growing Raspberries in Utah."

With fall bearing cultivars, the new canes emerge from the roots in late spring, begin flowering in July and set fruit in August. For this reason, fall bearing cultivars may be better able to withstand extreme cold winters, but are best suited to areas that experience longer growing seasons. Summer bearing varieties set their crop earlier in the summer (usually by July) but require the survival of overwintering canes. Since winter damage is not a major concern with the fall cropping system, the important characteristics to consider in selecting a fall-bearing cultivar are earliness, yield, fruit quality, and resistance to common insects and diseases. In response to increasing local interest in berry production, a

research project to evaluate fall-bearing cultivars was carried out at the USU Kaysville Farm.

**Kaysville Cultivar Trial**

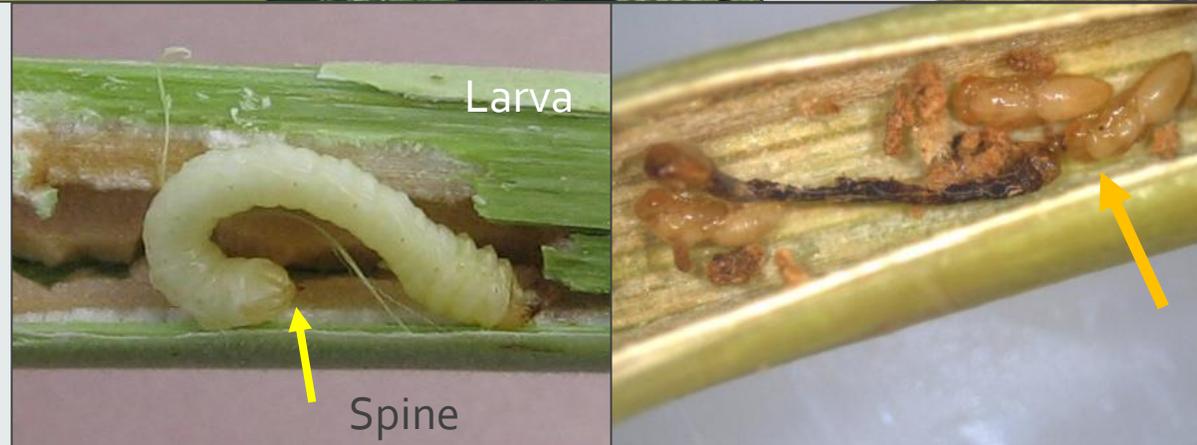
Ten fall-bearing raspberry cultivars were planted in 2006. Each cultivar was grown in a plot measuring 12 feet long with 10 feet between rows, and 8 feet between plots within the row. Each plot was planted with six nursery-produced plants spaced 2 feet apart within the row, and alleyways were planted to grass. Irrigation was provided using both drip and overhead. Plant nutrient needs were supplied by applying 120 lbs of 16-16-16 (NPK) per acre in mid April and again in early June (banded in the row). Only the primocanes were cropped, as all the canes in each plot were pruned to ground level at the end of each season. Canes were supported with a temporary trellis system consisting of a single twine on each side of the row, supported by T-shaped rebar posts (Figure 1).



**Figure 1.** Trellis system for fall raspberries, consisting of baling twine and a T-post made of rebar.

# Raspberry Horntail, *Hartigia cressonii*

- Major cane-boring pest in Utah
- Wasp (Hymenoptera)
  - Stem sawfly (Cephididae)
  - Attacks first-year primocanes
  - Intermountain West & CA
- Infested canes
  - Lower yield
  - Lower vigor
  - Lower winter survival



Natural parasitoid wasps kill RHT

# Raspberry Horntail Biology

- One generation per year (late May – early Sep)
- Overwinter in canes within a silk-lined chamber
  - Mature larva
- Pupate within the chamber in the spring
- Adults chew a hole, emerge
  - Temperature dependent
- Eggs inserted under epidermis of young primocanes
- Young larva (winding) tunnels upwards in cambium just under epidermis
  - At cane tip, consumes pith – tip wilting
  - One larva per cane tip
  - U-turn and tunnels down in pith
- Mature larva forms overwintering chamber 1 – 1.5 ft above cane base



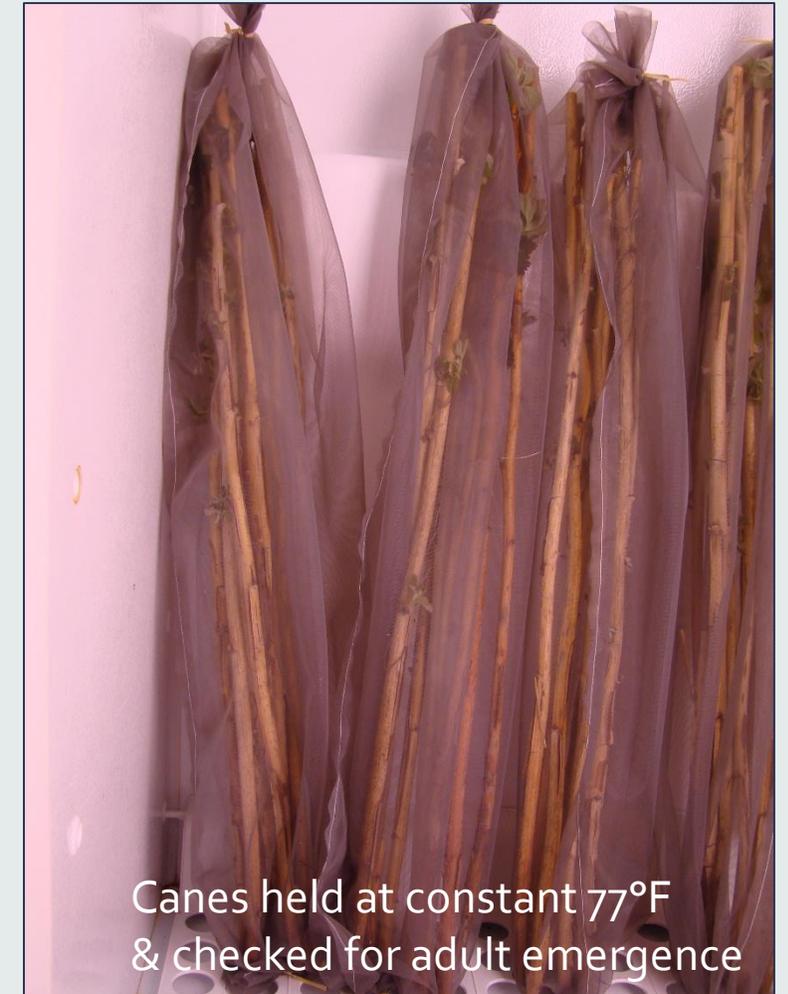
Clockwise from top left: larva in silk-lined chamber, adult emerging from cane, larva & frass at cane tip, male (left) & female

# Adult Emergence



Study sites (3 years):  
Laketown, Richmond, Paradise,  
Wellsville, Kaysville, & Alpine

Emergence:  
Base 50°F since Jan 1  
500 to 1800 DD  
Average dates:  
June 12 to August 3



Degree-Day Model to predict timing of egg-laying

Predict emergence of RHT adults from overwintering chambers in canes

# Natural Enemies (Biological Control)

- 3 species of parasitic wasps attacking horntail larvae
- Parasitism occurred near cane tip (smaller diameter, horntail larva consumes pith, softer cane tissue facilitates insertion of the parasitoid's ovipositor, space for parasitoid to develop)
- Some cane injury already occurs before parasitism



# Parasitism of RHT Larvae



Percentage of horntail larvae parasitized, Kaysville, UT (Davis Co.), 2009 & 2010

Date	Summer Cultivars		Fall Cultivars	
	2009	2010	2009	2010
June 24	0	-	9.1	-
July 1	-	0	-	25.6
Jul 15	35.1	25.8	41.7	20.0
Jul 22	-	73.1	-	47.1
Jul 29	98.4	59.1	100	33.3
Aug 5	61.5	80.0	25.0	0
Aug 13	70.0	-	40.0	-

# Parasitoid I

- Ichneumonidae
- Long ovipositor
- Ectoparasite
- Solitary



# Parasitoid II

- Pteromalidae
- Ectoparasite
- Gregarious
- ~3-20 larvae/horntail



# Parasitoid III

- Less common
- Eurytomidae
- *Tenuipetiolus* sp.
- This genus known to parasitize gall midges & gall wasps



# Summer (Floricanne-Fruiting) Raspberry Cultivar Resistance Trials

USU Research Farm, Kaysville, UT (Davis Co.)

2009-2011

Mean no. RHT per row-ft

Cultivar	RHT	Cultivar	RHT
Royalty	0.25 a	Reveille	2.85 abc
Moutere	0.80 a	Chemainus	2.95 abc
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2013-2014

Mean no. RHT per row-ft

Cultivar	RHT	Cultivar	RHT
Octavia	0.01 a	Prelude	0.26 ab
Cascade Gold	0.05 a	Cascade Bounty	0.68 ab
1142-1	0.12 a	Nova	1.07 b
Chemainus	0.18 a		

Horntail population pressure declined in 2013-2014 as compared to 2009-2011: successive years of cane removal as part of the sampling process. Suggests that frequent pruning is an effective management tactic.

Cultivars with greater winter hardiness, cane vigor, & yields were more resistant to horntail.

# Fall (Primocane-Fruiting) Raspberry Cultivar Resistance Trials

USU Research Farm, Kaysville, UT (Davis Co.)

2009-2011

Mean no. RHT per row-ft

Cultivar	RHT	Cultivar	RHT
Polana	0.4	Joan J	0.7
Caroline	0.6	Ruby	0.7
Polka	0.6	Himbo Top	0.8
Summit	0.6	Heritage	0.9
Jaclyn	0.6	Anne	1.0

2013-2014

Mean no. RHT per row-ft

Cultivar	RHT	Cultivar	RHT
Autumn Treasure	0.03	Polana	0.23
Josephine	0.06	Autumn Bliss	0.30
Brice	0.08	Joan J	0.34
Vintage	0.14	Dinkum	0.50
Autumn Britten	0.18		

For fall-bearing cultivars, horntail infestation  $\leq 1$  larva per row-ft, and there were no statistical differences among cultivars.

Horntail infestation was substantially lower in fall- than summer-bearing cultivars:

- fall-bearing canes were removed at ground level in the spring before overwintered horntail adults emerged
- horntails seem to avoid thin canes which are more common in fall-bearing cultivars

# Raspberry Horntail IPM

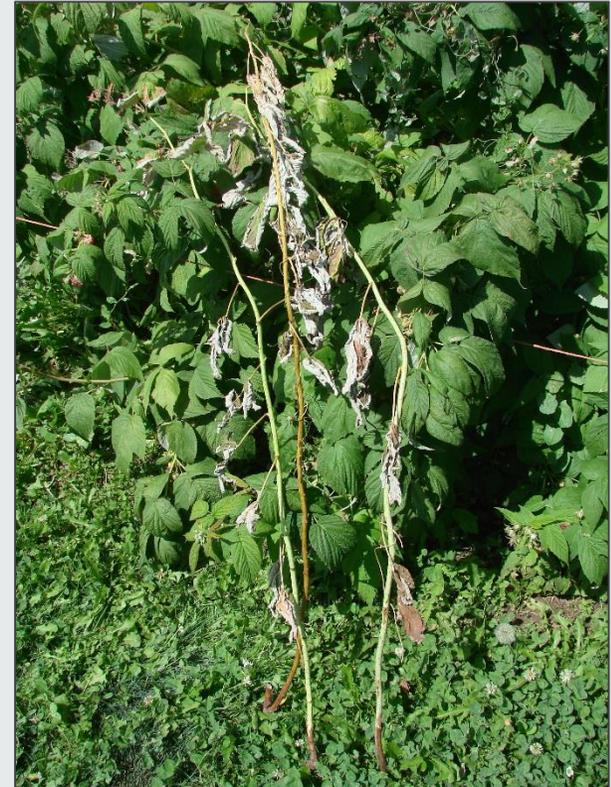
- Select cultivars with more resistance
  - Fall-bearing are less susceptible than summer-bearing cultivars
- Prune out infested canes before adults emerge ( by May)
  - Remove fall-bearing canes at ground level
  - Remove floricanes-fruiting canes with a horntail tunnel in pith
- If warranted, apply insecticide beginning at 500 DD to prevent egg-laying; repeat based on protection interval of product (emergence ends by 1800 DD)
  - Carbamate: carbaryl (Sevin)
  - Pyrethroids: bifenthrin (Brigade, Capture), esfenvalerate (Asana), fenpropathrin (Danitol), zeta-cypermethrin (Mustang Max), pyrethrin
  - Organophosphates: diazinon (Diazinon, RUP), malathion (Malathion)
  - Don't spray when bees are active! Follow all product label protections for pollinators
- Frequent pruning of infested cane tips during summer can lower the horntail population in a field
- Conserve parasitoid wasps by avoiding unnecessary insecticide applications



# Raspberry Crown Borer

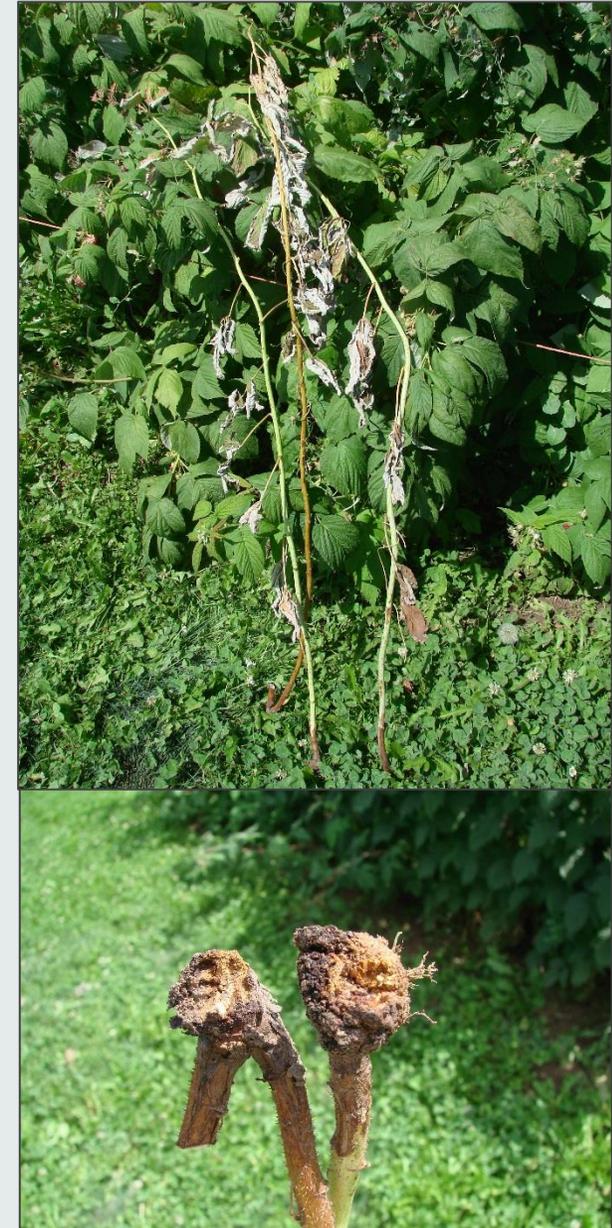
# Raspberry Crown Borer

- Two-year life cycle
- Year 1:
  - In late summer, day-flying clearwing moth (resembles yellow jacket) emerges from cane, lays eggs on lower leaves
  - Larva overwinters by tunneling into base of cane
- Year 2:
  - Larva tunnels into crown/upper root during summer, spends 2<sup>nd</sup> winter in roots
    - Overlapping generations
- Infestation symptoms (2<sup>nd</sup> year):
  - Canes become spindly and wilt during summer
  - Canes break-off easily at the crown
  - Holes in the crown/upper roots with sawdust-like frass



# Raspberry Crown Borer Management

- Only use clean planting stock
- Don't transplant canes between fields
- If infestation is localized in a field, dig and destroy infested crowns/roots
- Monitor by observation of brittle/wilted canes and enlarged crowns
  - Tested sex pheromone lure (British Columbia, Canada) – too volatile, short-lasting
- Insecticides – apply as heavy drench/soak to base/crown/roots for  $\geq 2$  consecutive years
  - Mid-October to target first year larvae
  - In spring before bud break, to target overwintered larvae before they tunnel deeply into the crown/roots
    - Bifenthrin (Brigade 2 EC) (PHI 3 days; only 1 pre-bloom application allowed per year)
    - Pyrethrin (organic option; short residual)
    - Chlorantraniliprole (Altacor) (PHI 3 days)
    - Diazinon 50W (PHI 7 days; restricted use; only 1 application allowed per year)



# Rose Stem Girdler

# Rose Stem Girdler

- Metallic, flatheaded beetle
  - Adults emerge from canes in May-June
- Larva is white, flattened head, two short spines on tail end
- Larva tunnels 2-5 spiral grooves in the cambium (just under the bark)
  - Gall-like swelling
- Cane girdling leads to wilt, breakage, and loss
- First-year canes most susceptible to attack



# Rose Stem Girdler Management

- Remove nearby roses (wild and climbing) – excellent alternate host
- Prune out and destroy infested canes in spring and summer to remove larvae
- Apply insecticides just after bud break to kill adults and prevent egg-laying
  - Control timing may overlap with first horntail emergence
  - Full cover spray to canes
  - Don't spray when bees are active
  - Same insecticide recommendations as for raspberry horntail



# Spider Mites: How Do They Make a Living?



Twospotted Spider Mite, *Tetranychus urticae*

- Prefer undersides of leaves
- Form colonies, webbing: eggs, nymphs & adults
- Very small (0.02 inch length)
- Overwinter as dormant females (orange color) at base of canes & on weeds
- 10-14 day life cycle in summer
- Suck plant sap: fine, gray stippling on leaves

# Spider Mites: Caneberry Symptoms



“Mite Burn”

Hot, dry conditions promote mites

“Mite burn”: yellow, brown bronzing, begins on lower leaves first

Mites move up from (broadleaf) weeds on the ground

Raspberry leaves are sensitive to mite feeding

Fruiting canes: reduces vigor & berry yield

Primocanes: weakens, predisposes to winter injury

# Spider Mite Management: Cultural Control

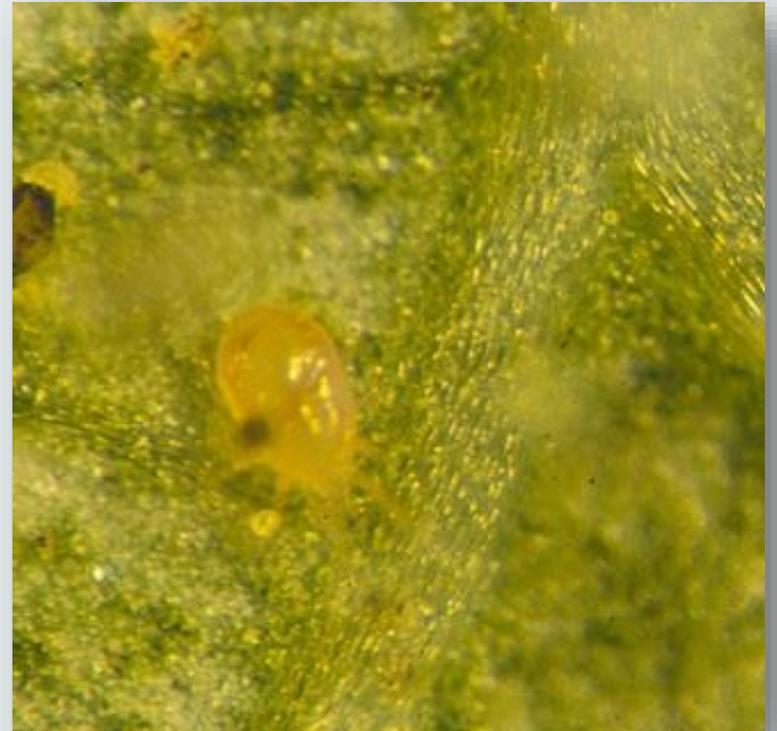
- Plant vegetation in alleyways (grass)
  - Minimize broadleaf weeds
    - field bindweed, common mallow
- Overhead sprinklers (cool & wet)
- Avoid disturbing ground cover (avoid dust)
- Avoid plant stress – water!
- Macro-tunnels:
  - Good venting, temperature mgmt.
  - Avoid hot, dry conditions
- Cultivar resistance:
  - Heavily pubescent leaves reduce mites



Spider mite-induced defoliation

# Spider Mite Management: Biological Control

- Predatory mite
  - *Galendromus (Typhlodromus) occidentalis*
  - western predatory mite
- Other predators:
  - thrips, pirate & big-eyed bugs, ladybeetles, lacewings
- Naturally occurring
  - Supplemental releases – predatory mite
- Avoid insecticides & miticides toxic to beneficial insects & mites



Western predatory mite, note tear-drop-shaped body

# Spider Mite Management: Chemical Control

## Less disruptive & organic miticides

- insecticidal soap (M-Pede, others) – physical
- horticultural oil (JMS Stylet Oil, others) - physical
- azadirachtin/neem oil (Trilogy, others) – Unkn\*
- cottonseed+clove+garlic oil (GC-Mite) – physical
- Sulfur (do not use above 90°F)

## Commercial miticides

- acequinocyl (Kanemite) – 20B\*
  - adults, eggs, nymphs; 1 day PHI
- bifenazate (Acramite 50WS) – Unkn\*
  - adults, eggs, nymphs; 1 day PHI
- etoxazole (Zeal) – 10B\*
  - eggs, early nymphs; 1 day PHI
- hexythiazox (Savey) – 10A\*
  - eggs, nymphs; 3 day PHI
- fenbutatin-oxide (Vendex 50WP) – 12B\*
  - adults, nymphs; 3 day PHI (raspberry only)

\*IRAC MoA groups

# Rotate Chemical Groups to Manage Resistance

- Rotate Modes of Action (MoA)
- Rotate MoA between mite generations ( $\geq 2$  wk)
- Check label for # applications allowed per season



\*IRAC MoA groups

# Berry Spider Mite IPM



Scout leaves on lower canes for mite injury when temperatures rise

Avoid plant stress

Water!

Good plant nutrition

Scout for early signs of mite feeding

Intervene early:

1. irrigate & cooling, prevent mite dispersal & dust
2. apply less disruptive miticide early in mite population increase
3. Apply stronger miticide, if needed

Observe Pre-Harvest Intervals

# Small Fruit & Vegetable IPM Advisory – Free Newsletter

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## Winter Utah Pests Newsletter 2014

This month's issue includes articles about Biochar, Onion Pest Management, Brown Rot, & more



1 2 3

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### Integrated Pest Management (IPM):

"a comprehensive approach to pest control that uses a combined means to reduce the status of pests to tolerable levels while maintaining a quality environment."

### In the News

Adapting to Climate Change

Jan 21, 2014

Welcome to Airblast 101

Jan 06, 2014

Integrated Pest Management for Billbugs in Orchardgrass

Dec 06, 2013

[Insect/Disease Activity continued from previous page](#)

### BERRY CROPS

#### Raspberry crown borer



If you are noticing entire canes wilting in your raspberry field, it is possibly damage from the raspberry crown borer. Larvae are actively feeding in the roots and crowns, and entire canes can be killed in response to the feeding. Often, the canes can be easily pulled out of the ground. You may see some tunneling in the lower part of the cane.

The crown borer is a clearwing moth, and the larvae live and bore into the crown and roots of blackberries, raspberries, loganberries, and wild brambles. The problem with this pest is that low levels of infestation can suddenly develop into a severe problem, so it is important to keep an eye on the health of your plants during the entire season.

The crown borer larvae actually spend two years feeding and developing in the plant, and the damage is most evident during the second year of larval activity. Early in their life cycle, they are feeding on the smaller roots, and as they get larger, they move to the crown. Pupation occurs in the crown in mid to late August.

Early fall is the best time for treatment because larvae will leave the crowns and move to the roots for the winter. At least two years of diligent treatment is necessary in an infested field.

**Treatment:** drench roots with bifenthrin in early fall

**Precautionary Statement:** Utah State University Extension and its employees are not responsible for the use, misuse, or damage caused by application or misapplication of products or information mentioned in this document. All pesticides are labeled with ingredients, instructions, and risks. The pesticide applicator is legally responsible for proper use. USU makes no endorsement of the products listed herein.

#### Raspberry Horntail



Continue to cut off the tops of wilted canes and kill the larva inside. Sometimes, the cane is "hollow" where the larva is inside, and you can squish the cane to kill the larva.

By keeping up with keeping the plants free of horntail larvae, you are reducing the population for future infestations.

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*Insects – Tree Fruit and Small Fruit*

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