

# Invasive Insect Update

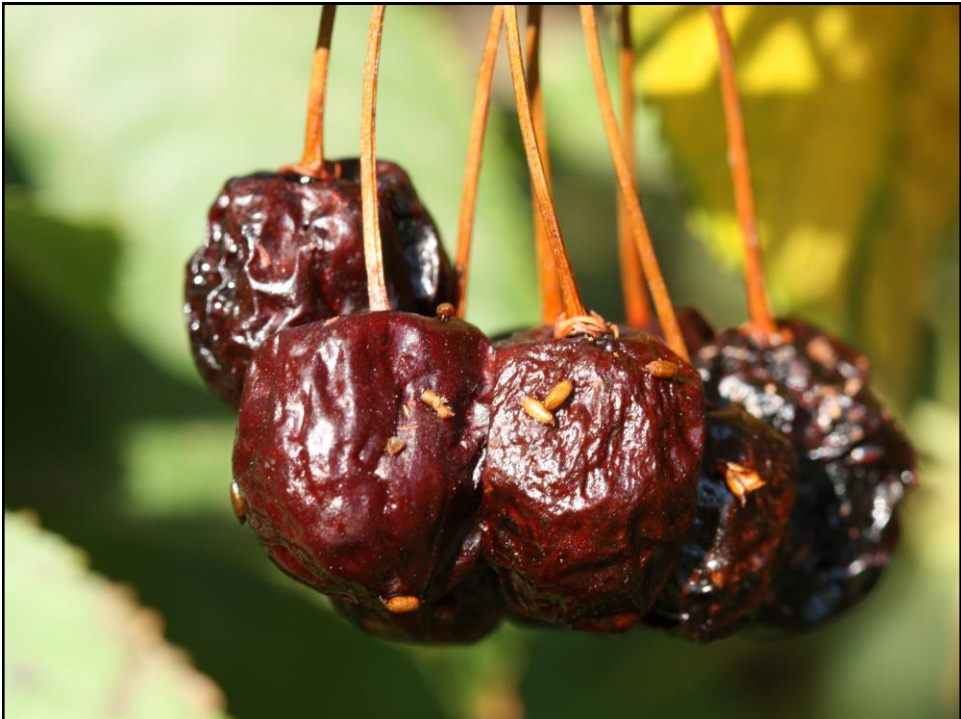


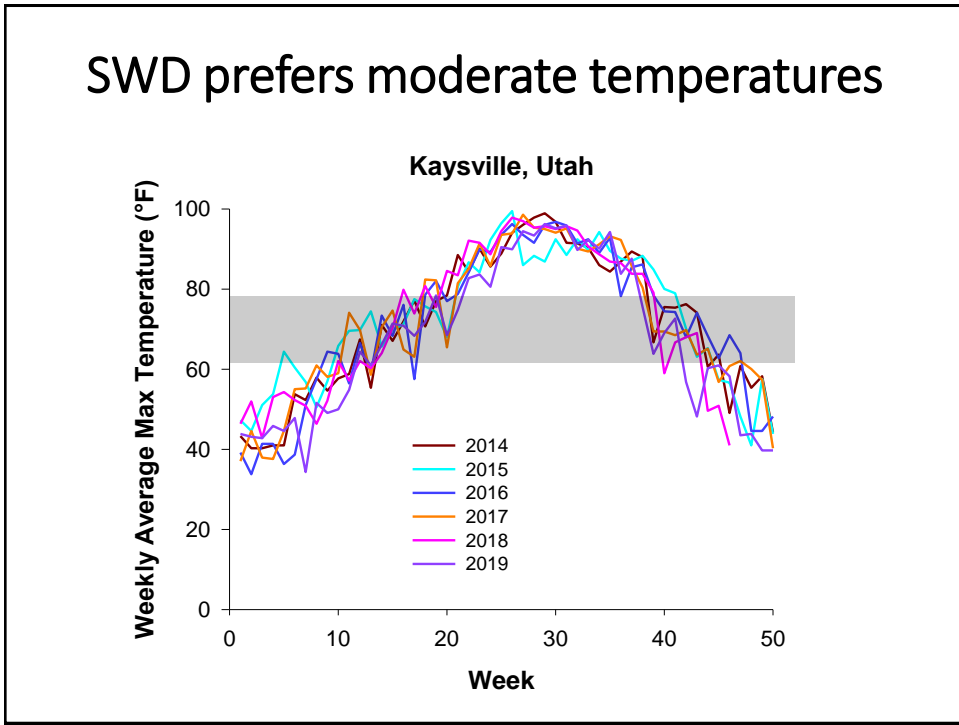
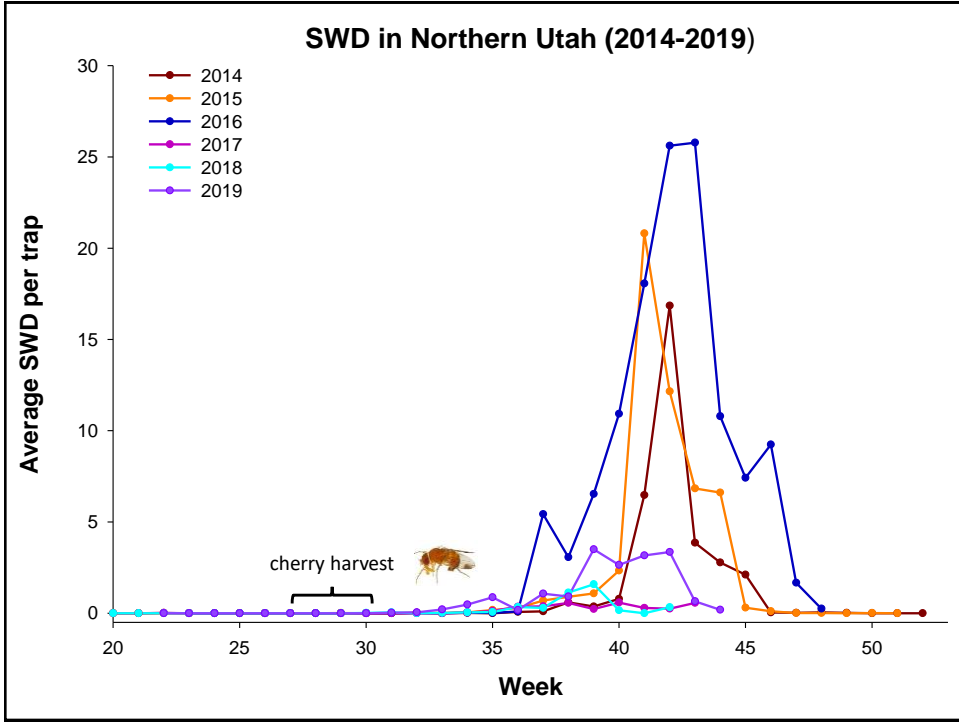
Lori Spears  
Utah State University  
Utah State Horticultural Association  
January 23, 2020

## Spotted Wing Drosophila

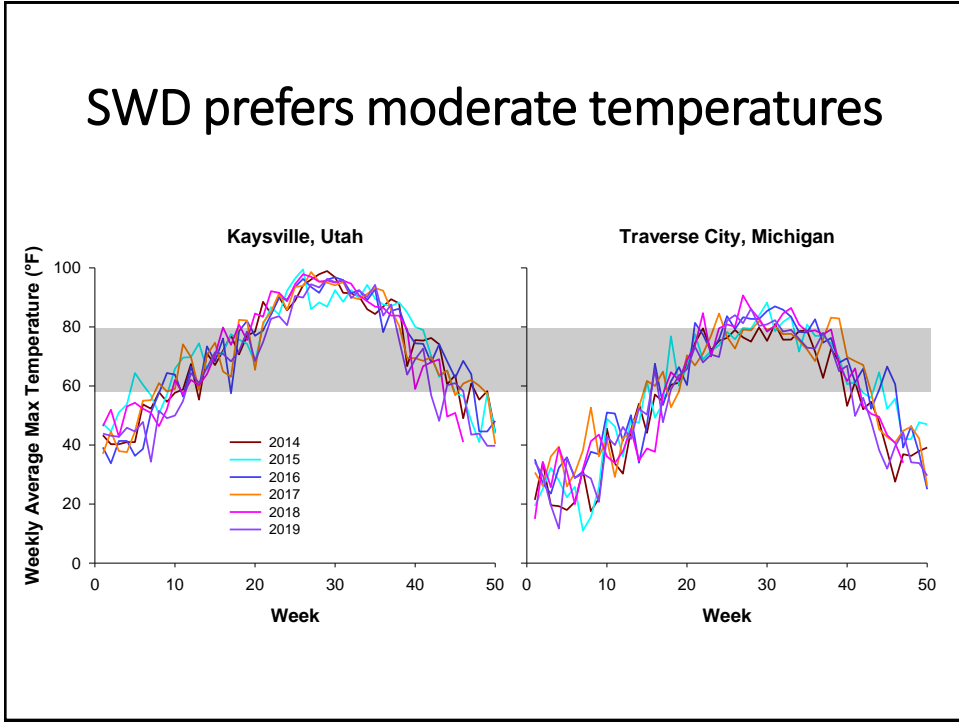
- Native to southeast Asia
- Infests ripening and ripe fruit
- Detected in the U.S. in 2008
- First detected in Utah in 2010
- Abundant in wild habitats and backyard gardens
- No damage reports



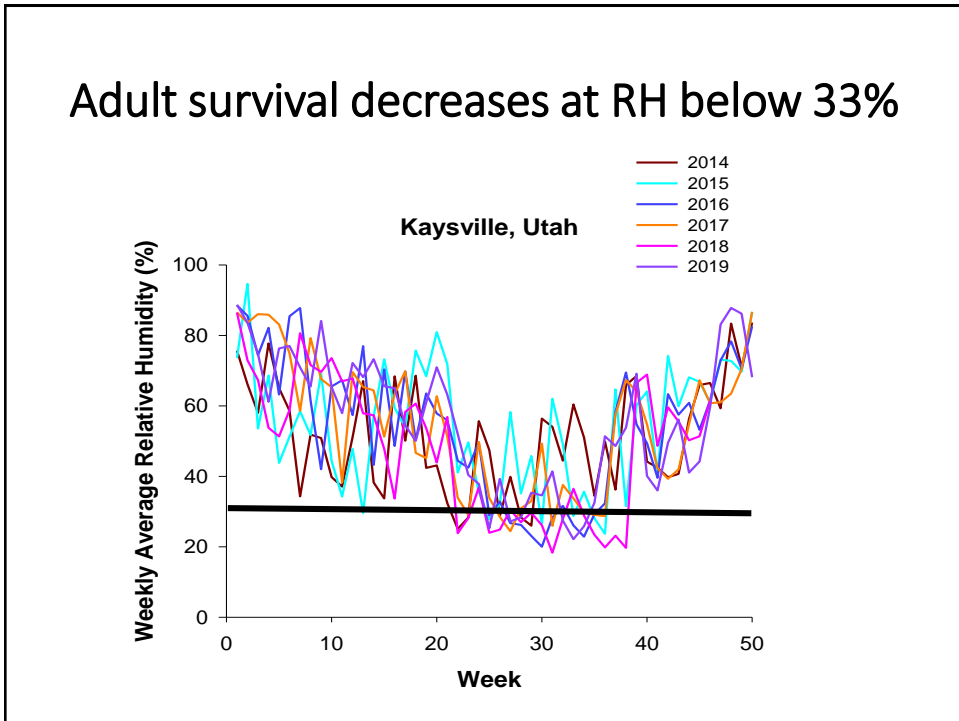




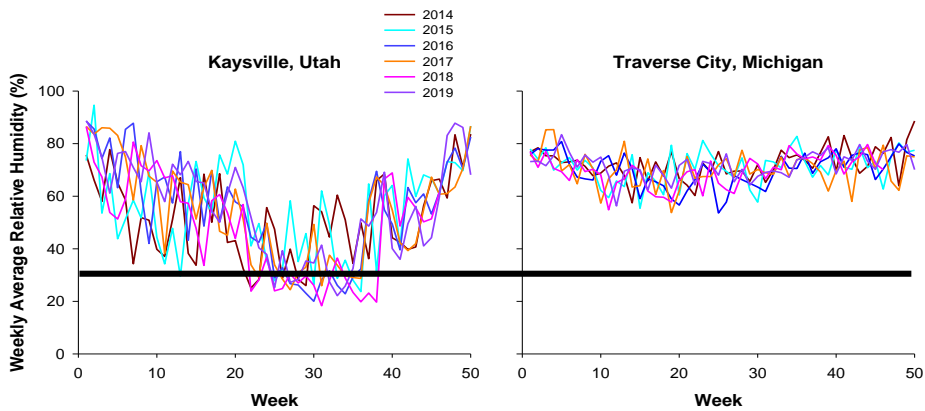
# SWD prefers moderate temperatures



# Adult survival decreases at RH below 33%



## Adult survival decreases at RH below 33%



## Monitoring for SWD

- Scentry lure; water + a few drops of unscented dish soap
- Begin monitoring as fruit ripens
- Place trap in cool, shaded area
- Service trap weekly



Low trap #s may not accurately indicate first fly activity





## Cultural Control of SWD

- Minimize overhead irrigation; repair leaking drip lines
- Early or timely harvest
- Chill fruit (34-38°F) (12-72 hrs.)
- Destroy unharvested fruit



Piles of fruit placed in the orchard row and then driven over by a golf cart. Photo: MSU Extension

## With a prune here and a mow there...

- Pruning trees and mowing row centers resulted in 80% reduction of SWD larvae in fruit



# Chemical Control of SWD

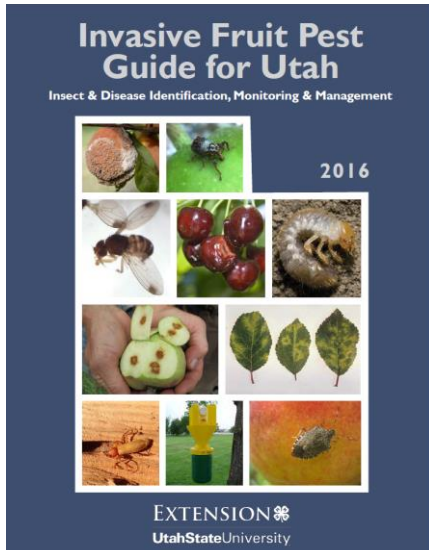


Table 3.1. Insecticides recommended for control of SPOTTED-WING DROSOPHILA IN COMMERCIAL FRUIT production in Utah

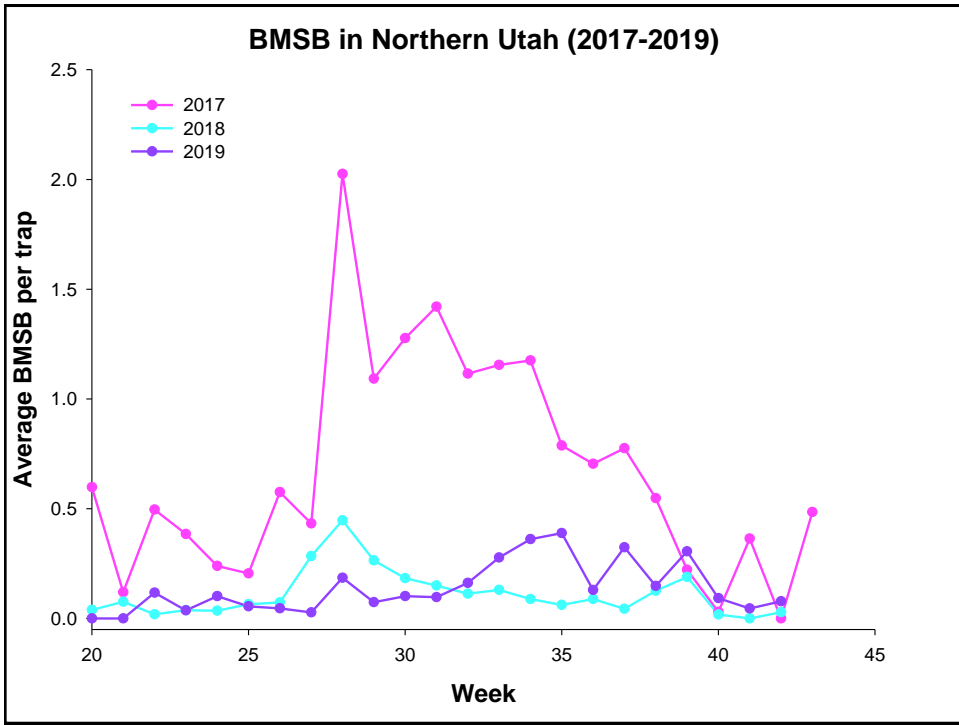
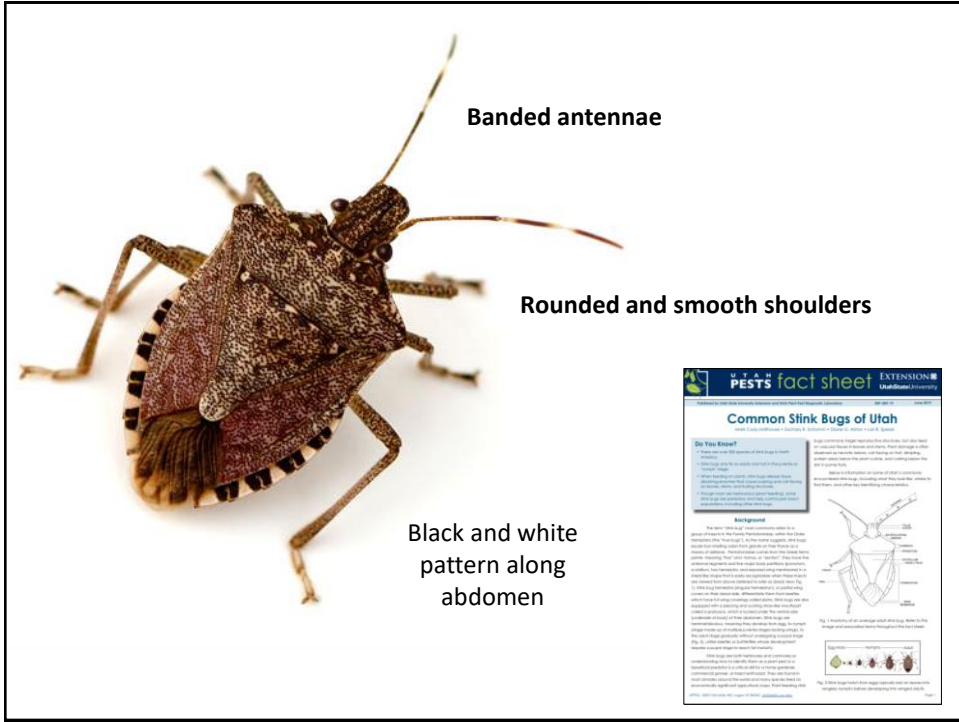
Chemical Name	Example Brands	Timing of Application	FRU (or Days)	Preharvest Interval (PHI) (Days)	Comments
<b>Insecticide Class</b>					
<b>Organophosphates (OP)</b>					
malathion	Folway 500 AG, Malathion 8.5 Original		1-2 a, 3-4 a	7 d	Test to assess organophosphate resistance and bees
imidacloprid	Disson 8 Emulsion*	Make first application as soon as flies appear	For grape only: 2-3 a, 3-4 a	7 d	For grape only: 7 d
phosmet	Insect 70 W Insecticide		2-3 a, 3-4 a	NL	Phosmet: Apply by airblast only
<b>Pyrethroids, Pyrethrins (PT)</b>					
knoxthion	Knock 1.4 EC, Spray*	Apply immediately when first activity is the usual, minor or residual and according to specified practices related to mite control	3-4 a (candy 3 a), 4-5 a (strawberry 2 a)	10 d (candy 7 d), 14 d (strawberry 7 d)	Test to fish assess organophosphate, miticide, and bees
permethrin	Proper EC 1.4 8F, Torus*		3-4 a	3 d	
<b>Neonicotinoids (NT)</b>					
imidacloprid	Imvo 200 EC	Apply when adults appear	3-4 a (candy 3 a)	7 d	Test to freshwater and monitor bee and other pollinators
<b>NETS Acaricides and Insecticides (NAI)</b>					
collembol and collembol	Beauver	Apply when pest populations are beginning to build	1-2 a	NL	Test to fish assess insecticides, bees and other pollinators
<b>Insecticides (IS)</b>					
cypermethrin	Excel	Apply in the specified manner when ready (dependent on crop threshold)	3-4 a	7 d	Test to assess insecticides, organophosphate, and bees
<b>Other: Pyrethroids, Pyrethrins (PT)</b>					
lambda-cyhalothrin	Evergreen EC 60.4	Apply only as specified on the label	3-4 a	7 d	Test to assess organophosphate, miticide, and bees
<b>Stilbenes (ST)</b>					
methoxyfenozid	Mak 3	Apply when pests first appear	3-4 a	7-10 d	Test to fish assess insecticides

\*Insecticide Resistance Action Committee (IRAC) mode of action classification codes. To minimize resistance development in insect populations, rotate among classes.  
Effectiveness of products will vary based on their dosage and timing of application. To maximize insect resistance, rotate applications among insecticide classes. All brand names are registered trademarks. Examples of brands may not be all inclusive. An all-in-one product may be available depending on the crop. The availability of insecticides and control applications in brands can change. Always read the product labels to ensure that target insect is listed. ALWAYS READ THE LABEL. PEST RESISTANCE: USE APPLICATION AND SAFETY INFORMATION, RESISTANCE, PREVENTION, AND THE MOST RECENT EDITION.  
EC = for tree fruit. \*NT = Pre-harvest interval (required) with tree fruit applications and harvest of crop in days.

## Brown Marmorated Stink Bug

- Native to eastern Asia
- Detected in the U.S. in 1990s
- Detected in Utah in 2012; first crop damage reported in 2017
- Broad host range; poses significant risk to specialty crops
- Invades structures for overwintering
- Strong dispersal capacity





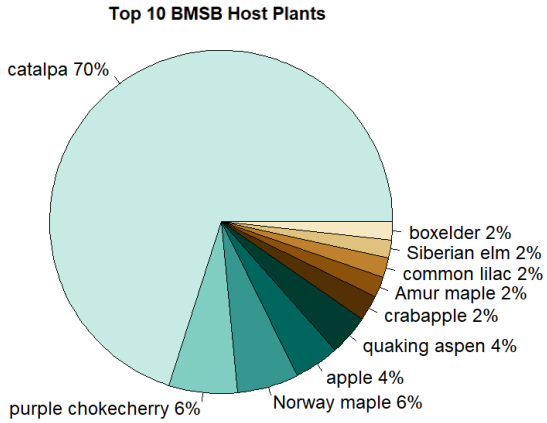




## BMSB has been recorded on 63 plant species from 21 plant families



**Cody Holthouse**  
Graduate Student



## BMSB feeding on tart cherry quality and yield



**Zach Schumm**  
Graduate Student





## 2018 Results

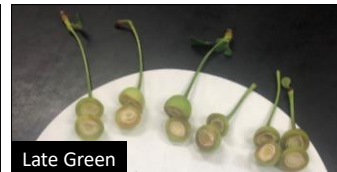
- BMSB will feed on all stages of tart cherry
- Feeding at the early fruit stage caused fruit abscission
- Complete timeline needs clarification



Early Green



Mid Green



Late Green



First Blush



Pit Hardening



Half Red



Full Red

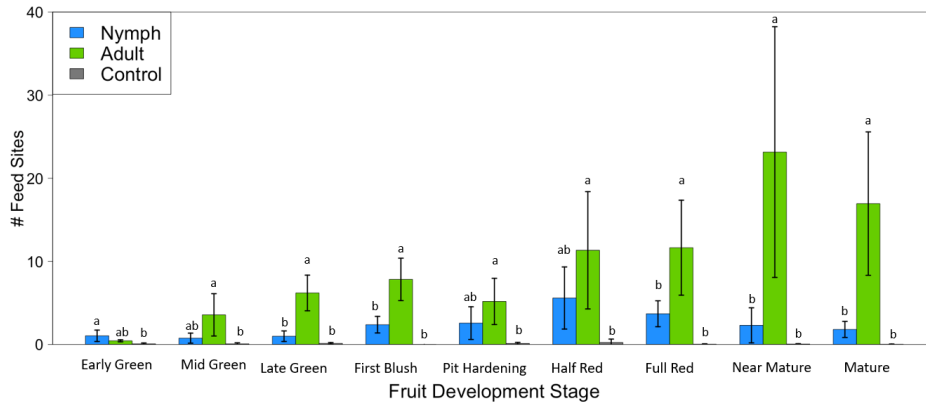


Near Mature



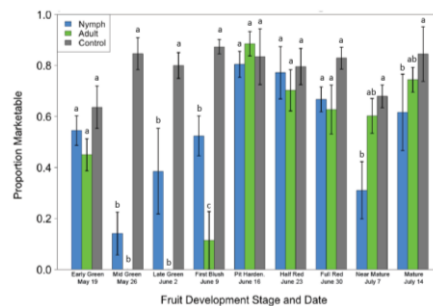
Mature

## BMSB will feed on all stages of tart cherry



## BMSB management on tart cherries should focus on the early fruit stages

- Feeding can cause fruit abscission from the mid green to first blush stages
- Nymph feeding resulted in less marketable fruit at the near mature & mature stages
- Fruits with minor visible damage are still marketable



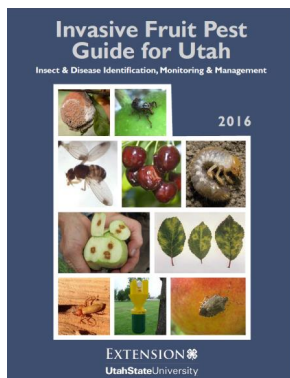


# Successful BMSB management depends on a reliable pest detection and monitoring strategy



Acebes-Doria et al. 2018

# BMSB can be a difficult pest to manage



utahpests.usu.edu  
stopbmsb.org





# Integrated Pest Management Crop Perimeter Restructuring

**IPM-CPR**  
Integrated Pest Management Crop Perimeter Restructuring  
Anne L. Nielsen, Brent R. Hanson and Dean Papp

The invasive brown marmorated stink bug (BMSB) has disrupted long-standing tree fruit IPM programs resulting in changing management practices to control the threat posed by this invasive pest. Current management tools for BMSB rely on weekly, extensive long applications of broad-spectrum insecticides that are costly, risk pest resistance, and may cause secondary pest outbreaks. The goal of IPM-CPR is to re-introduce common IPM practices (planting based, rather than insecticide edge, mating disruption, and biological control) back into tree fruit management. The implementation of IPM-CPR as the management of tree fruit pests may be less costly, more sustainable, enhance biological control, and be just as effective as current standard management methods. IPM-CPR is composed of the following tactics:

IPM-CPR	Phenological Model	Insecticide Use	Mating Disruption	Biological Control
	BMSB dispersal rate peaks at 100-200 (Miles), BMSB population peak at 1000-2000 (Days)	Weekly insecticide treatment on orchard borders only	Sexual management + common population pressure over time	Natural enemy conservation on orchard borders

IPM-CPR management is aimed at controlling populations of tree orchard pests through the use of common IPM tactics. This strategy reduces the amount of insecticide used while having insecticide class usage up to the grower's discretion. IPM-CPR is aimed at controlling the following:

Pest	Management
Transplanted plant tags and other collecting insects	How the orchard floor with Chemicals 40-60% during the first week of May at the rate of 4 oz/A to control broad leaf weevils (if used)
Overhead fruit moth and codling moth	Deploy mating disruption dispensers (ORM IT or Triscor or ORM-CR IT) at 200000 to 400000 in early May
Stems marmorated stink bug	Insecticide treatment on the outside edge and the first full row of the orchard border (see diagram below)

**Standard** vs **IPM-CPR**

Comparison of the standard standard one weekly insecticide application with the IPM-CPR orchard border with ground based herbicide, mating disruption, and border insecticide application. Border based insecticide application can reduce insecticide use by 90-95%.

- Comparable in price
- Reduces insecticide use
- Manages BMSB at levels equal to current grower standard practices
- Reduces cat-facing injury
- Increases biological control of BMSB eggs



**Nymphal Natural Enemies**

- Tachinid Fly
- Spined Soldier Bug
- Praying Mantis
- Lacewing Larva
- Spider
- Assassin Bug
- Astata bicolor

**Adult Natural Enemies**

- Tachinid Fly
- Praying Mantis
- Web-Building Spider
- Assassin Bug

**Egg Natural Enemies**

- Spined Soldier Bug
- Bigeyed Bug
- Asian Lady Beetle
- Jumping Spider
- Earwig
- Ground Beetle
- Lacewing Larva
- Pirate Bug

**Asian Biocontrol Agents**

- Trissolcus japonicus
- Trissolcus cultratus
- Trissolcus basalil
- Trissolcus edessae
- Anastatus reduvii

**Size Comparison**

The infographic shows a large central image of a BMSB nymph and a cluster of its eggs. To the left, a vertical stack of images shows various natural enemies, with a coin placed below them for scale. To the right, another vertical stack shows more natural enemies, also with a coin for scale. The Asian Biocontrol Agents are shown in a separate box at the bottom.



## USU can work with *Trissolcus japonicus* only after it has been detected in the state



- Native to Asia
- >75% egg parasitism

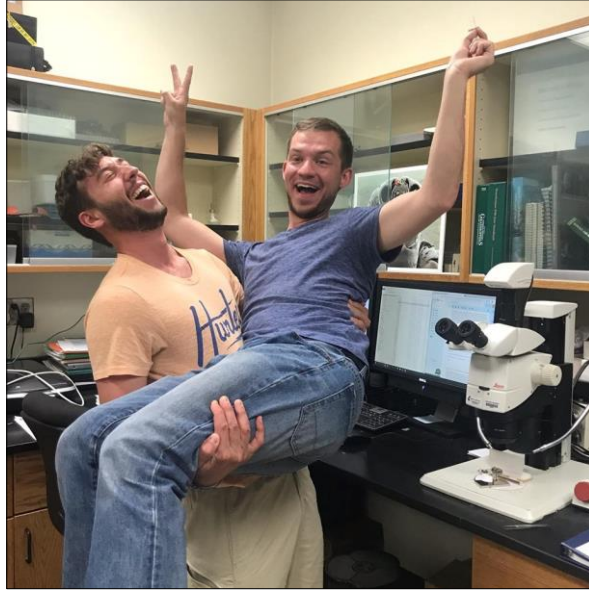


## Monitoring Parasitoid Activity

- Ornamental and specialty crop hosts
- Methods
  - Yellow sticky cards
  - Wild laid egg masses
  - Lab-reared egg masses



# The samurai wasp was detected in Utah!

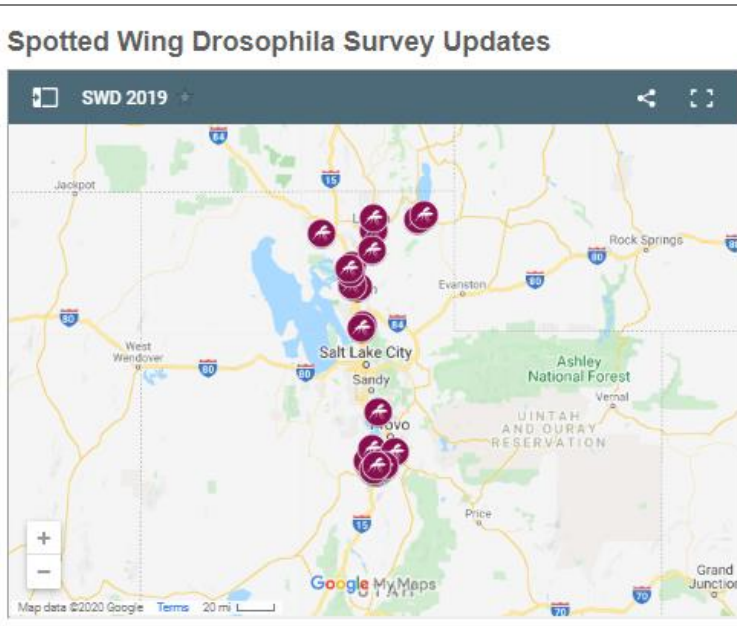


<https://utahpests.usu.edu/caps/survey>

A screenshot of the Utah CAPS Survey website. The page features a header with a green beetle and the text "COOPERATIVE AGRICULTURAL PEST SURVEY". Below the header, there are sections for "Survey Updates for Utah", "Brown Marmorated Stink Bug Survey Updates", and "Spotted Wing Drosophila Survey Updates". A navigation menu on the right includes "Survey Updates" and "Cooperative Agricultural Pest Survey". Two maps show survey locations: one for the BMSB 2019 survey and another for the Spotted Wing Drosophila survey. The second map includes a data table for site U46.

Site	U46
Latitude	40.0292205
Longitude	-111.8379343
Host	Peach
Male	4
Female	32
Total	36

## Spotted Wing Drosophila Survey Updates



Download weekly BMSB and SWD trap captures here.

2019-Survey-Data - Excel

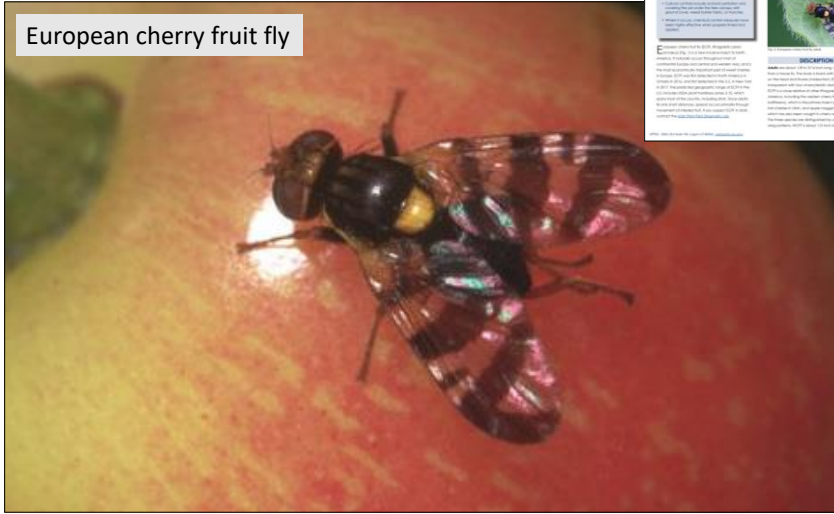
BROWN MARMORATED STINK BUG											SPOTTED WING DROSOPHILA		
Date	Site ID	Rep	Male	Female	Nymph 1-3	Nymph 4-5	Total	Male	Female	Total	Male	Female	Total
6/4/2019	U20	2	0	1	0	0	1	0	0	0	0	0	0
6/4/2019	U28	2	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U24	2	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U44	2	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U26	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U26	2	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U44	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U20	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U24	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U45	2	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U45	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U21	2	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U21	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U16	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U28	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U15	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U48	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U48	2	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U49	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U49	2	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U90	1	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U50	2	0	0	0	0	0	0	0	0	0	0	0
6/4/2019	U15	2	0	0	0	0	0	0	0	0	0	0	0
6/5/2019	U25	2	0	0	0	0	0	0	0	0	0	0	0
6/5/2019	U30	1	0	0	0	0	0	0	0	0	0	0	0
6/5/2019	U29	2	0	0	0	0	0	0	0	0	0	0	0
6/5/2019	U29	1	0	0	0	0	0	0	0	0	0	0	0
6/5/2019	U90	2	0	0	0	0	0	0	0	0	0	0	0
6/5/2019	U25	1	0	0	0	0	0	0	0	0	0	0	0
6/10/2019	U40	1	0	0	0	0	0	0	0	0	0	0	0
6/10/2019	U43	2	0	0	0	0	0	0	0	0	0	0	0
6/10/2019	U47	2	0	0	0	0	0	0	0	0	0	0	0
6/10/2019	U10	2	0	0	0	0	0	0	0	0	0	0	0
6/10/2019	U10	1	0	0	0	0	0	0	0	0	0	0	0
6/10/2019	U31	2	0	0	0	0	0	0	0	0	0	0	0

Field Data Sheet



# Waiting in the wings...

European cherry fruit fly



**PESTS fact sheet** EXTENSION **University of Florida**

**European Cherry Fruit Fly**  
*Rhagoletis cerasi* (Linnaeus)

Leah Soper, UF/IFAS Citrus and Steve O. Harris, Extension Entomologist

**Quick Facts**

- Native to Europe, the European cherry fruit fly is a pest of cherry and other stone fruits.
- It is a common pest of cherry in Florida and other warm regions.
- The fly is a pest of cherry and other stone fruits.
- It is a common pest of cherry in Florida and other warm regions.

**DESCRIPTION**

The European cherry fruit fly is a small, dark fly with a yellowish-brown thorax and dark wings with a distinct pattern of dark bands and spots. The fly is a pest of cherry and other stone fruits.

# Waiting in the wings...

Spotted lanternfly



**PESTS fact sheet** EXTENSION **University of Florida**

**Spotted Lanternfly**  
*Lycorma delicatula* (White)

Leah Soper, UF/IFAS Citrus and Steve O. Harris, Extension Entomologist

**Quick Facts**

- The spotted lanternfly is a pest of grapevines and other plants.
- It is a common pest of grapevines in Florida and other warm regions.
- The fly is a pest of grapevines and other plants.
- It is a common pest of grapevines in Florida and other warm regions.

**DESCRIPTION**

The spotted lanternfly is a small, dark fly with a yellowish-brown thorax and dark wings with a distinct pattern of dark bands and spots. The fly is a pest of grapevines and other plants.

# Acknowledgments

## Participating Growers

### Payson Fruit Growers

## USU Faculty, Staff, and Students

- Dr. Diane Alston
- Anna Fabiszak
- Cody Holthouse
- Zach Schumm
- Carson Wise

## Funding

- USHA Research Committee
- USDA NIFA SCRI, USDA APHIS PPQ
- Western IPM Center Grant
- USU Extension
- WSARE / Utah IPM
- Utah Specialty Crop Block Grants
- Utah Department of Agriculture and Food
- Utah Agricultural Experiment Station



Table 1. Estimated dates for BMSB life stage activity during the past 5 years (2014-2018) using a biofix of 13.5 hour photoperiod (i.e., degree days begin to accumulate once day length reaches 13.5 hours) (Nielsen et al. 2014; Wilson et al. 2018). Day length was taken from the [Astronomical Applications Department of the U.S. Naval Observatory](#) website, and temperature data used for calculating degree days was taken from the [Utah Climate Center/Utah Traps](#) website. Degree days are calculated at base 57.2°F.

Event --->	1st overwintered adults expected	Egg laying begins	New (summer) generation adults expected
Environmental cue --->	13.5-hr day (biofix)	170 DD	1134 DD
River Heights (Cache County)	18-19 April	7-13 June	11-29 August
Kaysville (Davis County)	19-20 April	29 May - 7 June	25 July - 2 August
Payson (Utah County)	20-21 April	2-7 June	29 July - 4 August
Leeds (Washington County)	24-25 April	9-24 May	30 June - 6 July



**Table 2. The following is a list of insecticides that have demonstrated efficacy against BMSB (Wilson et al. 2018). Note that this list is not exhaustive for every labeled product or active ingredient. Always follow the specific label restrictions for the target crop, including the pre-harvest interval (PHI) and re-entry interval (REI). Always read, understand, and follow label directions before using any pesticide.**

Product Name(s)	Active ingredient(s)	Mode of Action*	Relative efficacy against BMSB
Lannate <sup>®</sup> , Nudrin <sup>®</sup>	methomyl	1A - Carbamate	Excellent
Danitol 2,4 EC <sup>®</sup>	fenpropathrin	3A - Pyrethroid	Excellent
Pounce 25 WP <sup>®</sup>	permethrin	3A - Pyrethroid	Excellent
Warrior II <sup>®</sup> , Lambda-Cy <sup>®</sup> , Silencer <sup>®</sup>	lamda-cyhalothrin	3A - Pyrethroid	Excellent
Actara	thiamethoxam	4A - Neonicotinoid	Excellent
Admire Pro, Alias, Wrangler	imidacloprid	4A - Neonicotinoid	Good
Assail	acetamiprid	4A - Neonicotinoid	Good
Scorpion 35 SL, Venom	dinotefuran	4A - Neonicotinoid	Excellent
Belay	clothianidin	4A - Neonicotinoid	Good
Endigo ZC <sup>®</sup>	lamda-cyhalothrin & thiamethoxam	3A - Pyrethroid, 4A - Neonicotinoid	Excellent
Leverage 360 <sup>®</sup>	beta-cyfluthrin & imidacloprid	3A - Pyrethroid, 4A - Neonicotinoid	Excellent
Voliam Xpress <sup>®</sup>	lamda-cyhalothrin & chlorantraniliprole	3A - Pyrethroid, 8 - Diamide	Good
Aza-Direct <sup>®</sup> and others	botanical	Not classified	Good

\*To minimize resistance development, insecticides should be rotated among different modes of action.

<sup>®</sup>OMRI (organic-certified) registered product.

<sup>®</sup>Restricted use products require an applicator's license to purchase.