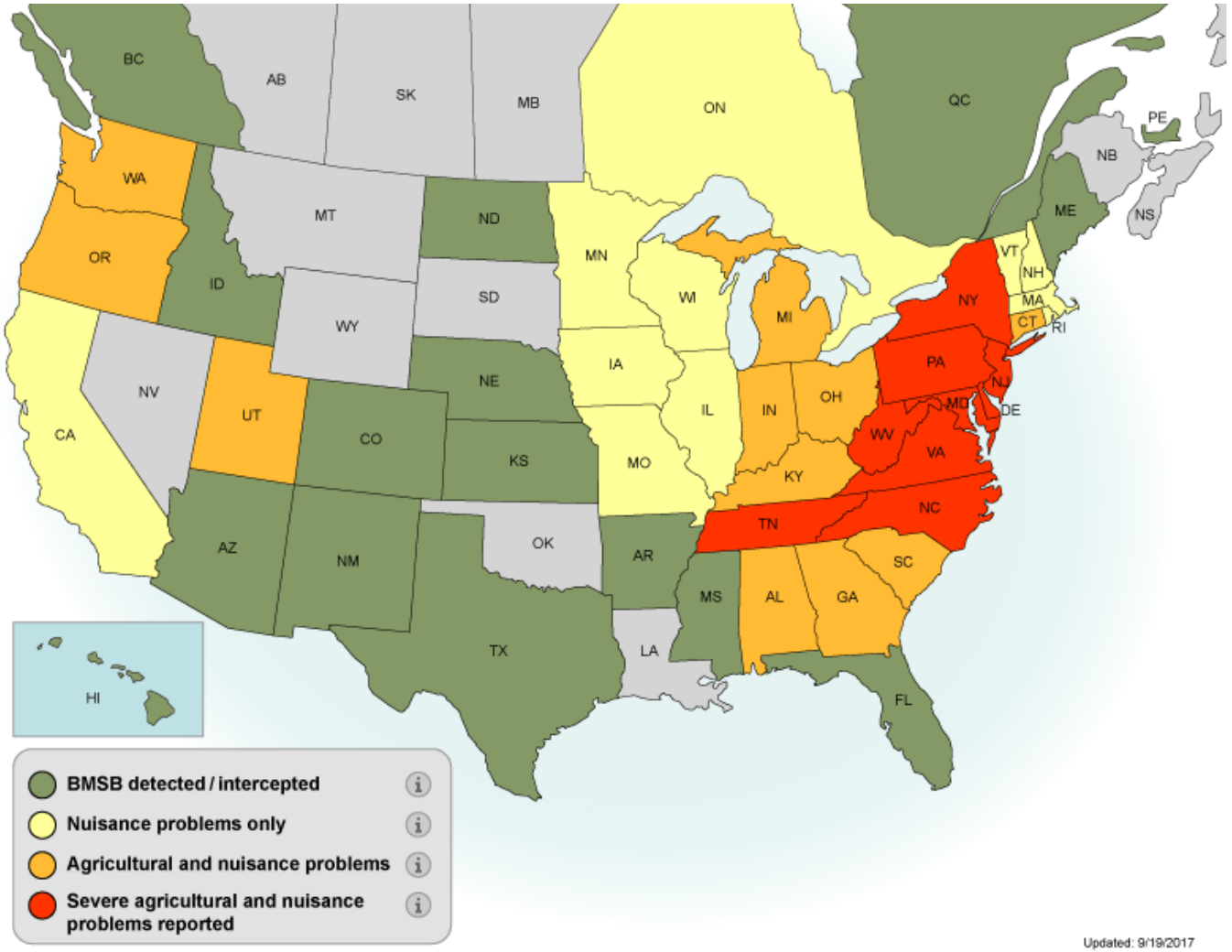
Brown Marmorated Stink Bug:
A new threat to Utah agriculture

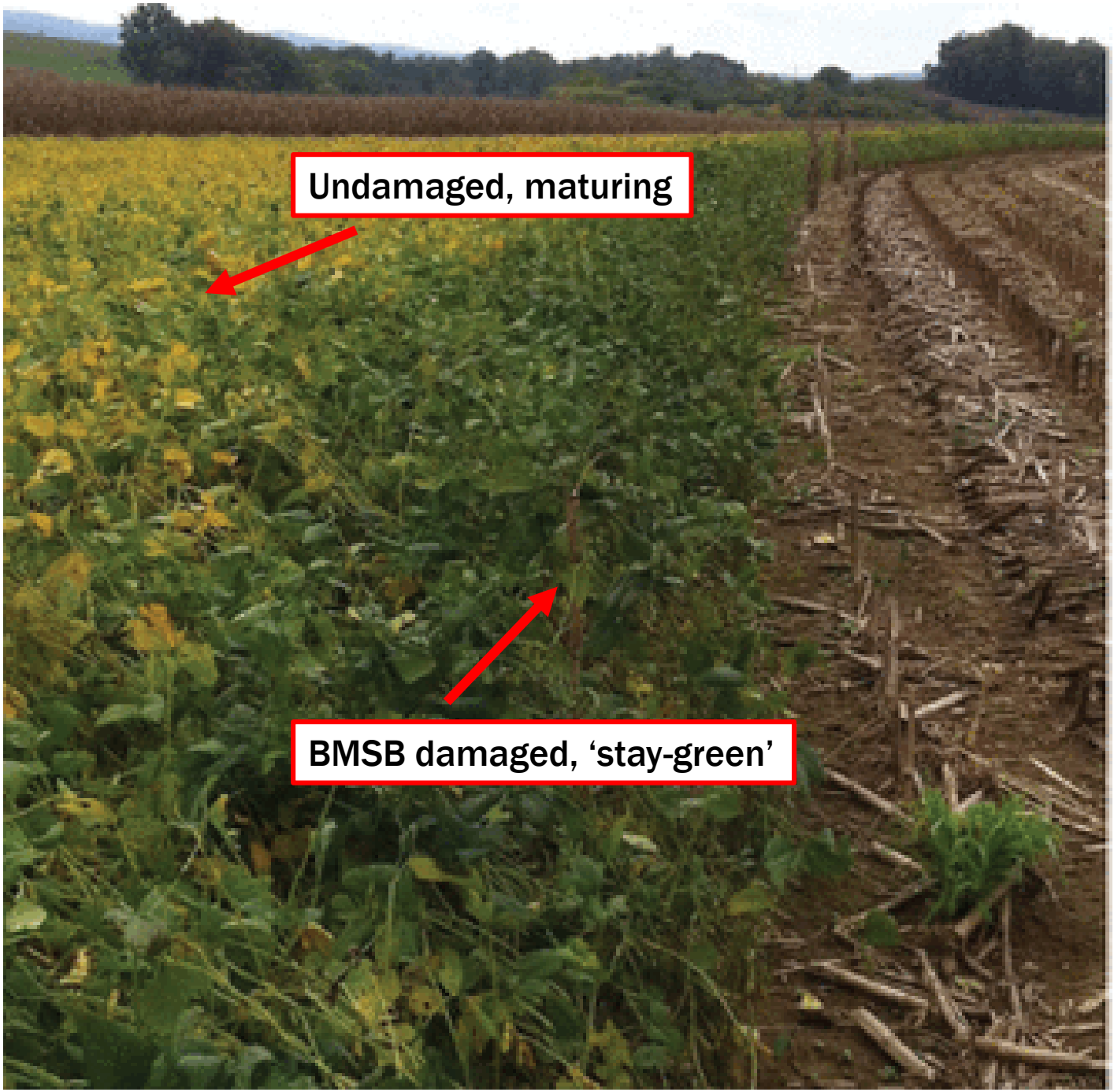
Brown Marmorated Stink Bug

Halyomorpha halys

- A highly invasive pest
  - Native to eastern Asia
  - First detected in PA in 2001
  - Has since spread to 44 states
  - First detected in Utah in 2012
- Nuisance in urban landscapes
- Potential to damage many crops
  - Agricultural damage confirmed in Utah in 2017

Current Distribution

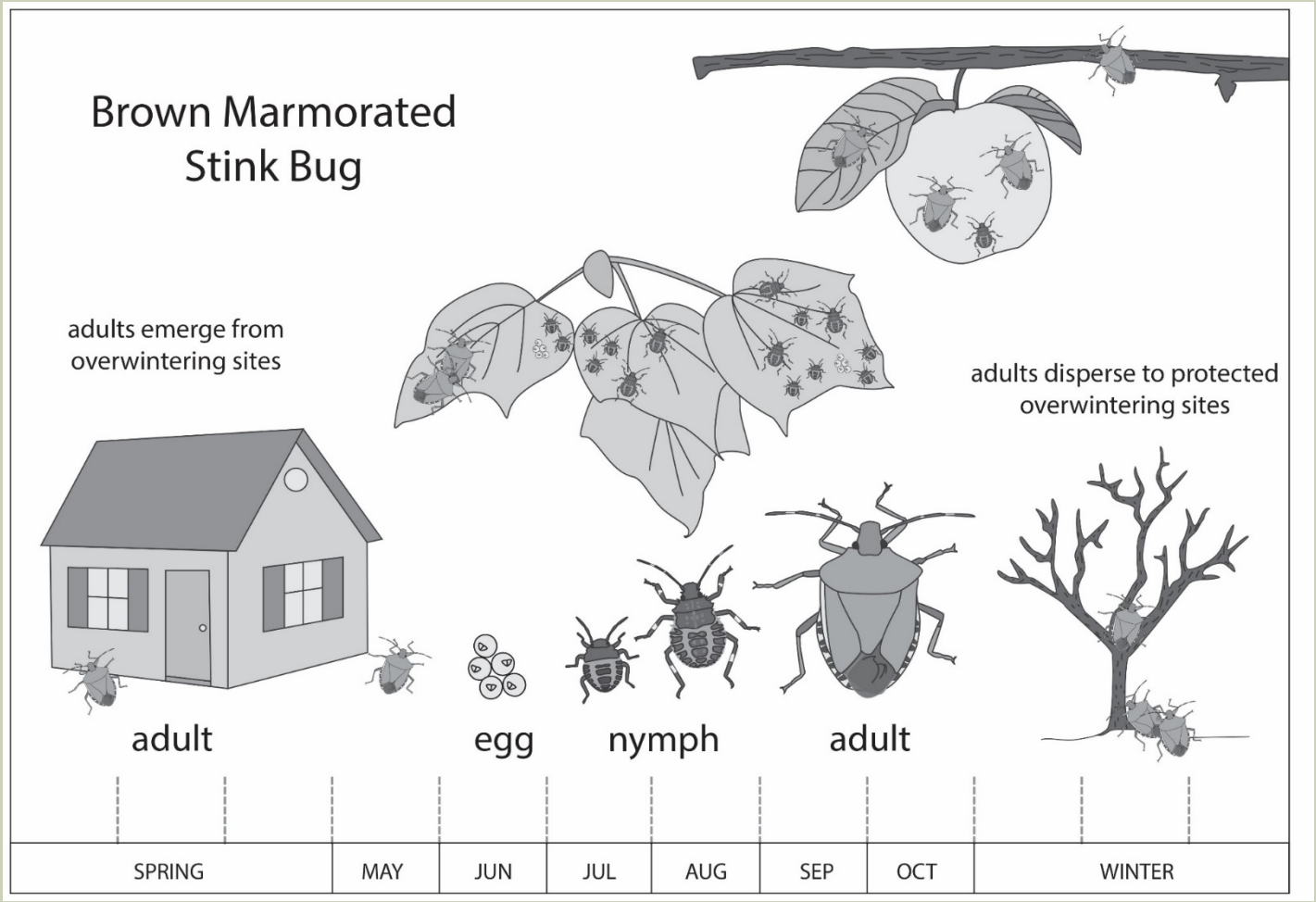



Undamaged, maturing
BMSB damaged, ‘stay-green’

Damage on fruit caused by BMSB feeding can occur throughout the entire growing season

- Early season feeding causes misshapen fruit
- Late season feeding causes depressions on the fruit surface and "corking" just below the fruit surface
- Internal damage can be present even when external damage is not detectable

Spring emergence of adult bugs from overwintering sites is usually very extended



Life History and Biology

- Eggs laid under leaves in clusters
- 1st instars feed on egg mass
- 2nd instars disperse from host plant
- Developmental period from egg to adult lasts ~50 days

28 eggs

“red ring”

1st instars

2nd instars

Life History and Biology

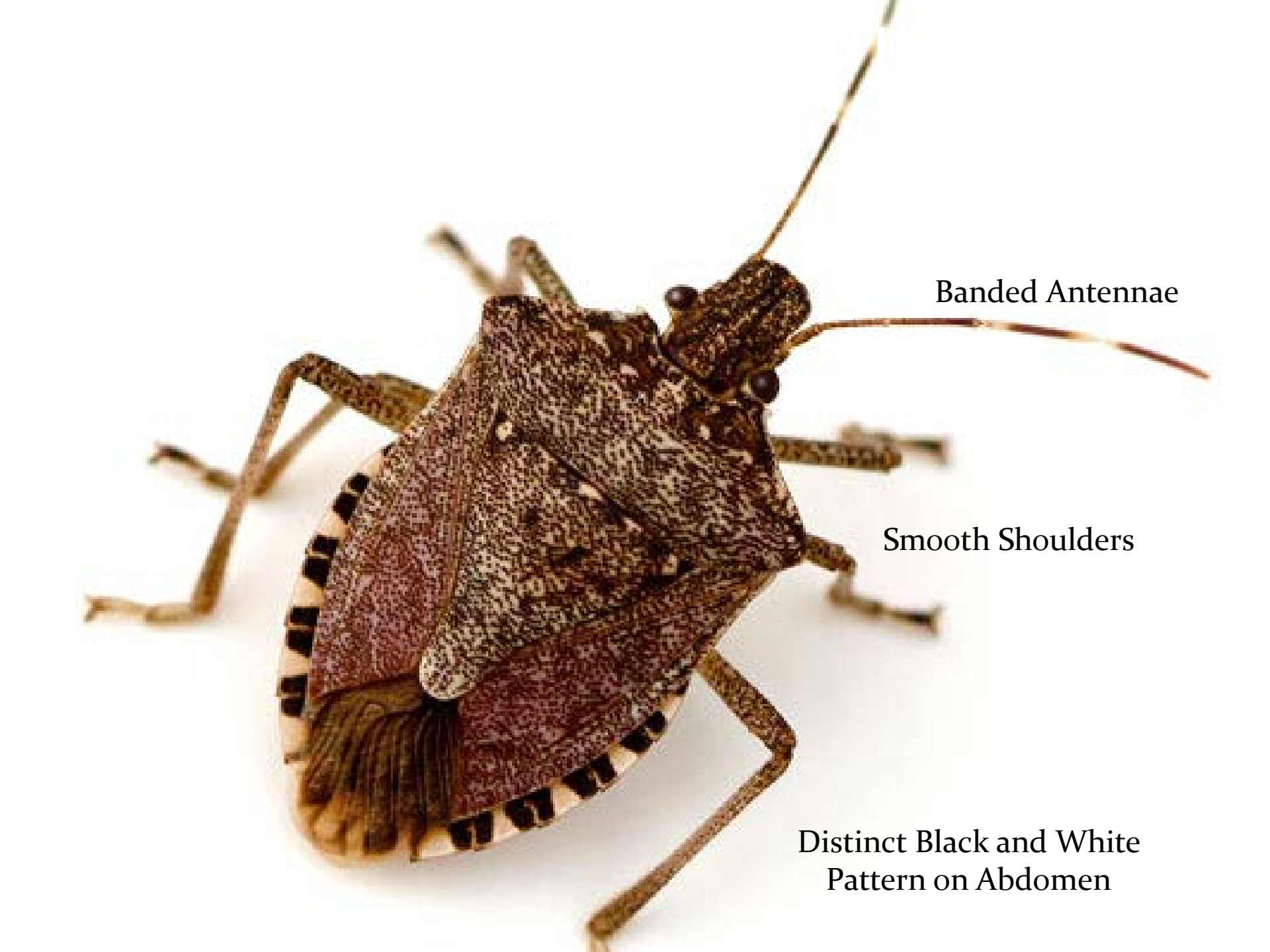
Nymphs (5 stages)

2 3 4 5

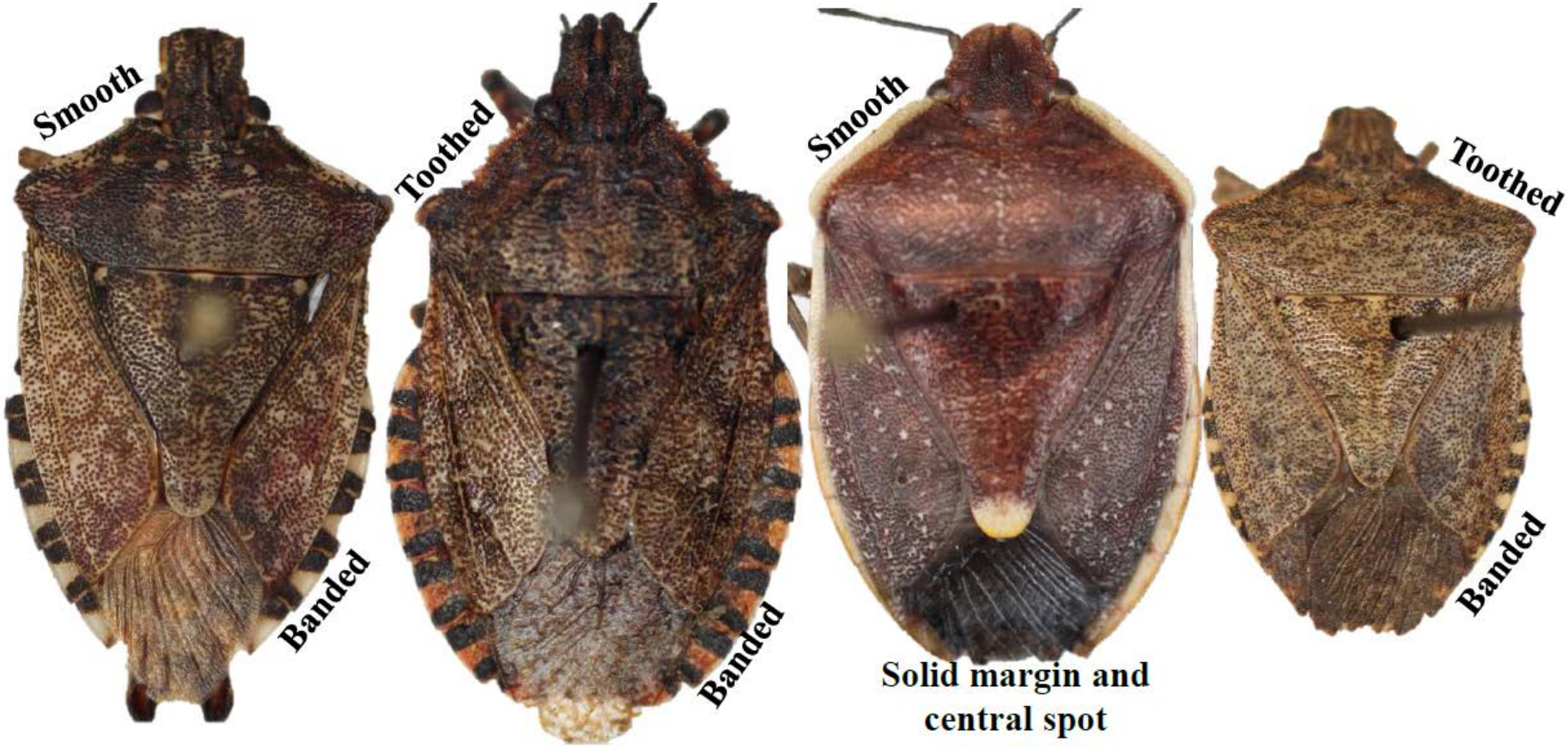
Winged adults

male female

All except stage 1 are damaging


Banded Antennae
Smooth Shoulders
Distinct Black and White
Pattern on Abdomen

To scale



Brown Marmorated ***Brochymena* sp.** ***Chlorochroa* sp.** **Consperse**

https://utahpests.usu.edu/caps/bmsb-host-plants

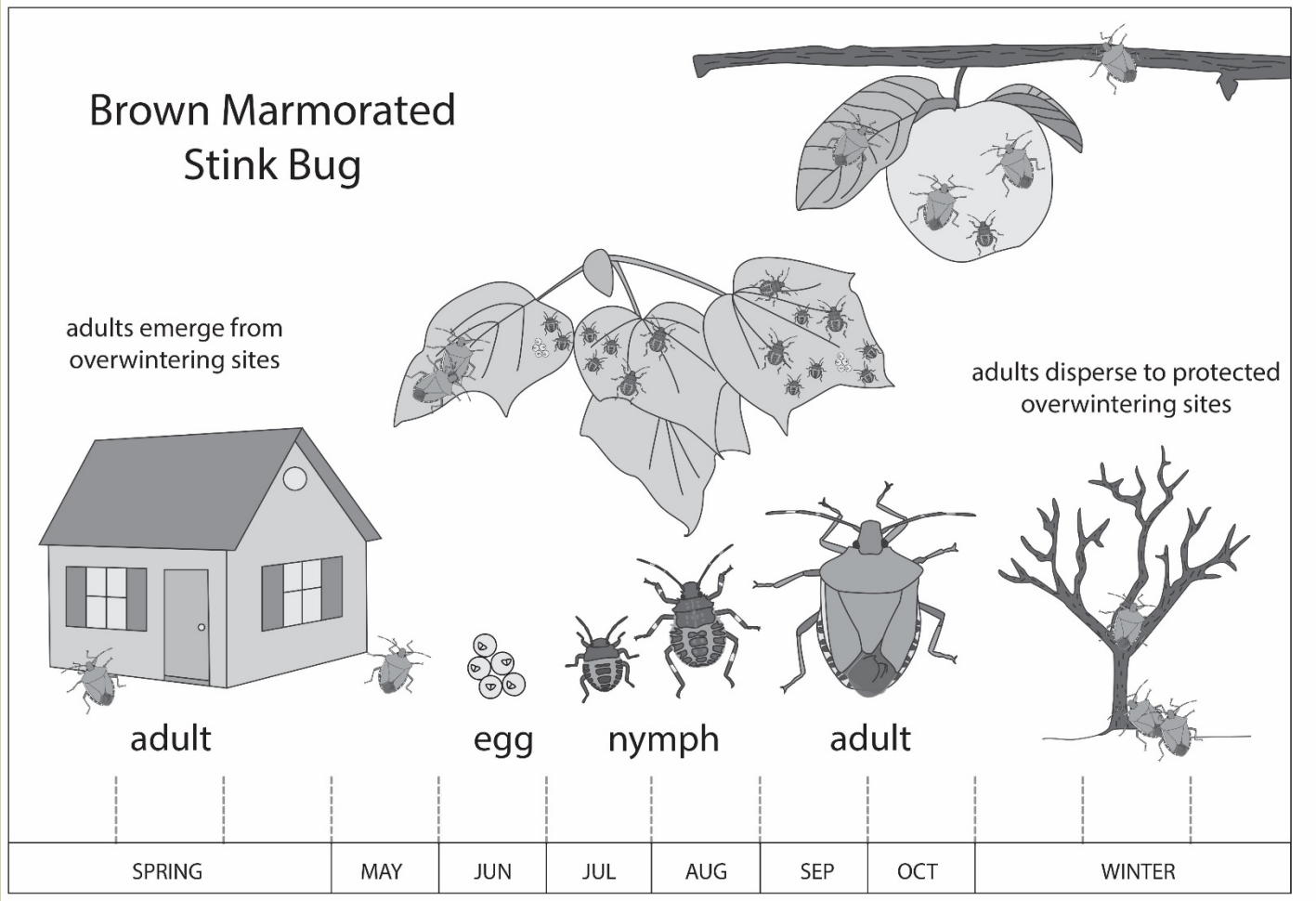
BMSB Plant Hosts of Utah

Current Known Host Plants of Brown Marmorated Stink Bug in Utah

Family Name	Scientific Name	Common Name
Aceraceae	Acer freemanii	Autumn blaze maple
Aceraceae	Acer ginnala	Amur maple
Aceraceae	Acer negundo	boxelder
Aceraceae	Acer nigrum	black maple
Aceraceae	Acer Palmatum	fireglow Japanese maple
Aceraceae	Acer platanoides	Norway maple
Aceraceae	Acer platanoides	Norway maple 'Crimson King'
Apocynaceae	Vinca major	vinca
Araliaceae	Hedera helix	English ivy
Berberidaceae	Mahonia repens	creeping oregon grape
Bignoniaceae	Campsis radicans	trumpet vine
Bignoniaceae	Catalpa speciosa	catalpa
Boraginaceae	Borago officinalis	borage
Buddlejaceae	Buddleia spp.	butterfly bush
Caprifoliaceae	Lonicera maackii	Amur honeysuckle
Cornaceae	Cornus alba	redtwig dogwood variation 'Elegantissima'
Cucurbitaceae	Cucurbita pepo	squash
Fabaceae	Caragana arborescens	Siberian pea shrub
Fabaceae	Cercis canadensis	eastern redbud
Fabaceae	Gleditsia triacanthos	honey locust
Fabaceae	Robinia pseudoacacia	purple robe black locust
Fabaceae	Robinia pseudoacacia	black locust

BMSB is a serious threat to IPM and is very difficult to manage

Effective control of one wave of BMSB does not prevent another wave of stink bugs



Biological Control

- *Trissolcus japonicus*
  - "Samurai wasp"
  - Parasitoid from China
  - > 50% egg parasitism in China
  - Detected in the U.S.
- Fungal pathogens
- Other natural enemies
  - Predators (egg eaters)

ESA NEWS

- In Memoriam: Menachem Jochanan (John) Berlinger
- Call for Editor-in-Chief of American Entomologist
- Ticks That Carry Lyme Disease Found in Eastern National Parks
- Why Odds Are Against a Large Zika Outbreak in the US
- In Memoriam: Melvin "Scott" Thomson

OTHER INSECT BLOGS

- Beetles in the

Native Predators May Be Having a Larger Impact than Expected on Invasive Stink Bug

March 25, 2016 by Entomology Today | Leave a Comment

A jumping spider on the prowl for prey in vegetable crops at Redbud Farm, Inwood, WV. Photo by Dr. Rob Morrison.

By Dr. Rob Morrison

Research recently appearing in the journal *Biological Control* may change how we view native predators of the brown marmorated stink bug (BMSB). BMSB is an invasive species that was accidentally introduced to the United States from Asia in Pennsylvania, and has since been detected in more than 40 U.S. states. It feeds on more than 150 plant species, making it a large threat to many agricultural systems in the country.

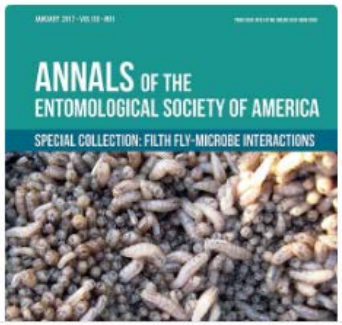
Dr. Tracy Leskey from the USDA-ARS Appalachian Fruit Research Station, Dr. Clarissa Mathews from Shepherd University, and I evaluated 25 native generalist natural

TWEETS FROM ESA

Tweets by @EntsocAmerica

Entomology Society
@EntsocAmerica

If you like maggots, you'll love the cover of the new issue of Annals of the ESA (Jan 2017), published online today. academic.oup.com/aesa/issue/110…



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JOURNAL OF INSECT SCIENCE

Biological Control in Utah

Cody Holthouse and Zach Schumm, USU Grad Students

Parasitoid on BMSB egg mass in catalpa

Sentinel egg mass on corn

Parasitoid on BMSB egg mass in peach

Current Parasitoids found in Utah

Trissolcus euschisti
BMSB egg mass on peach

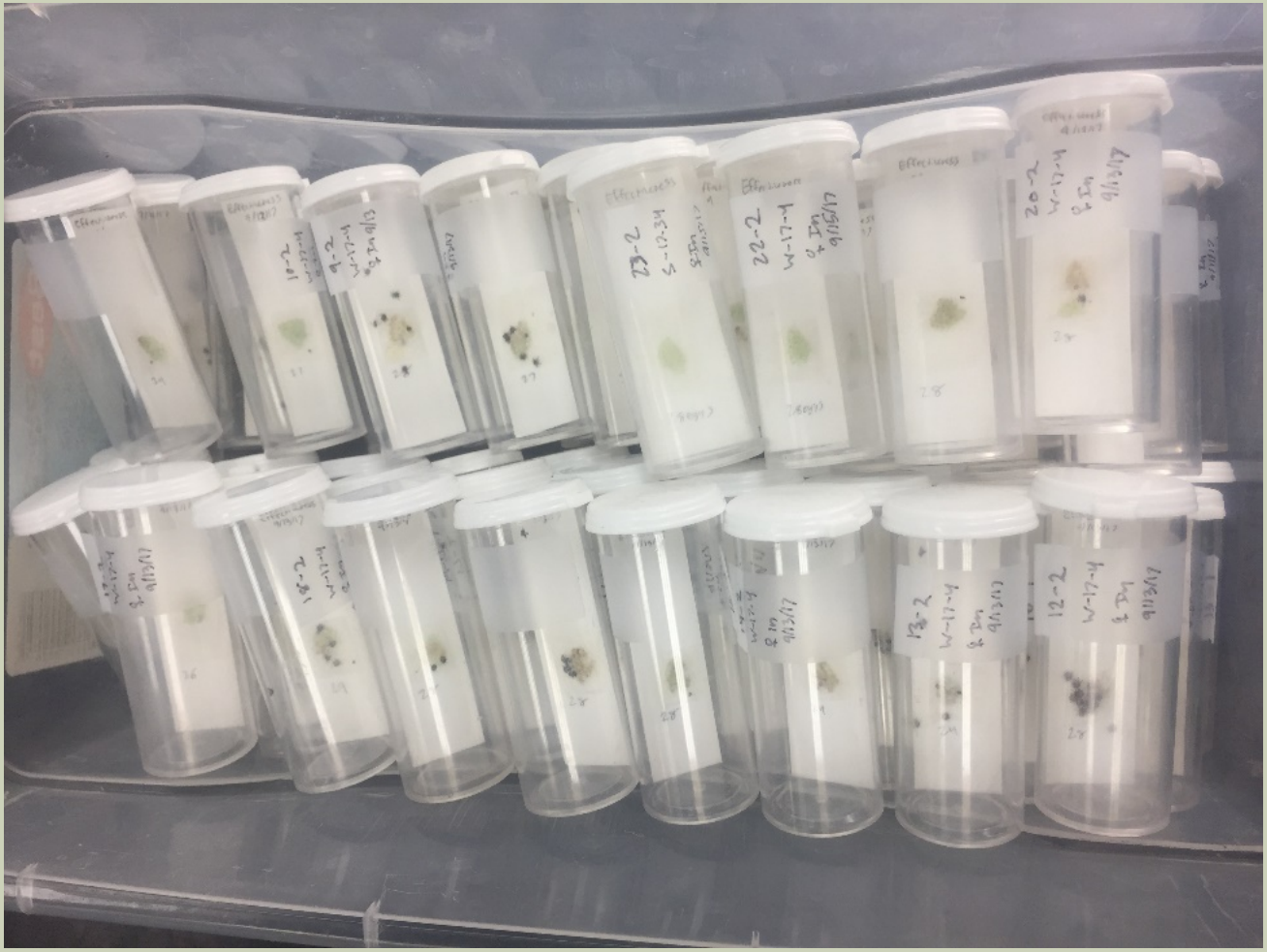
Trissolcus utahensis
BMSB egg mass on corn

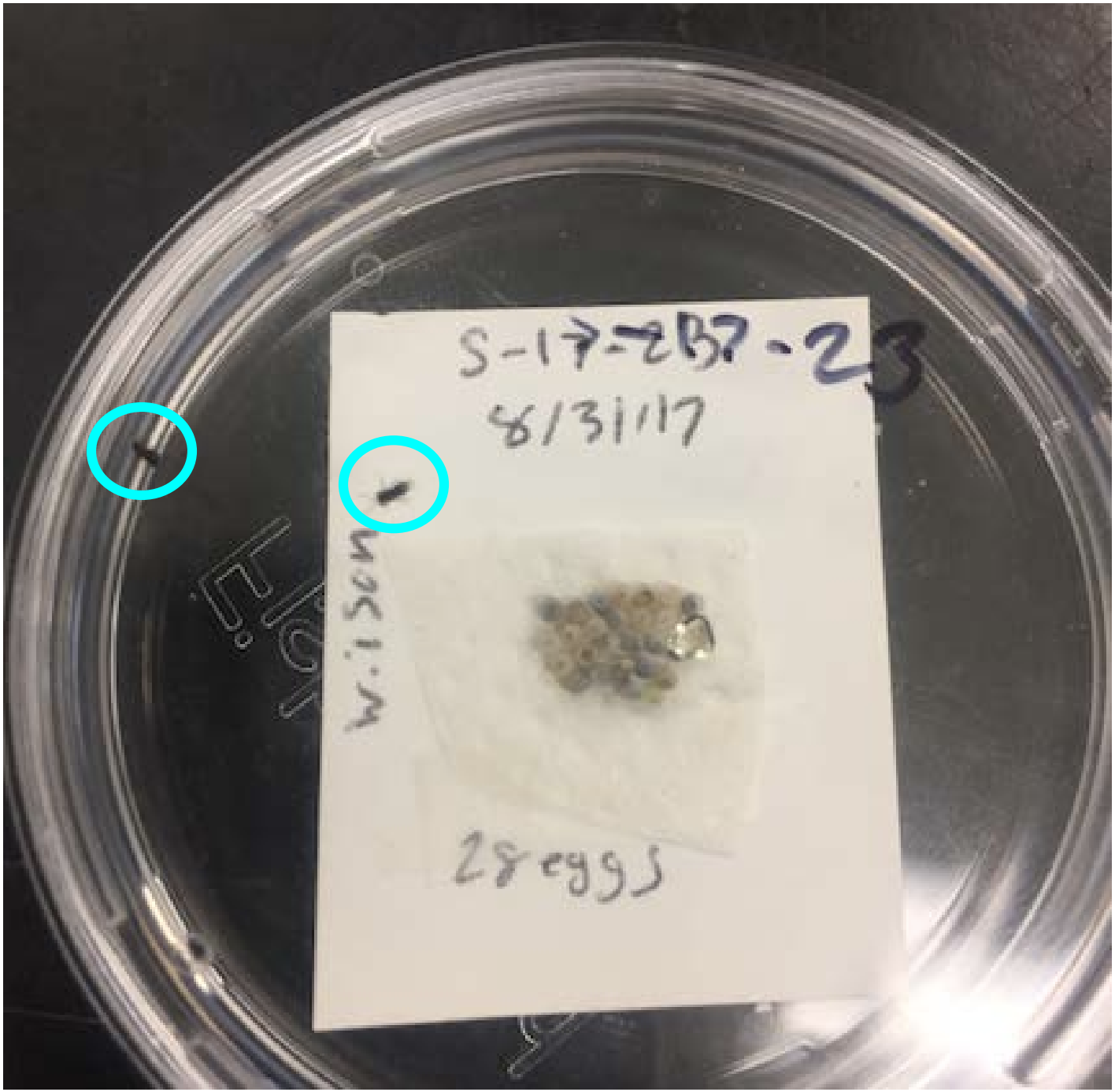
Psix tunetanus
Emerged from native stink bug egg mass


Anastatus sp.
Found on wild BMSB egg mass

Telenomus sp.
Found on wild BMSB egg mass

How effective are these parasitoids at stopping BMSB development?




S-17-287-23
8/31/17
W. Isem
28 eggs

If You Can't Beat 'Em, Eat 'Em!

Stink Bug Tacos

½ lb. stink bugs

2 cloves garlic, minced

1 lemon

Salt

2 ripe avocados, mashed

6 tortillas

Roast stink bugs for 10 minutes in a 350°F oven. Toss with garlic, juice from 1 lemon, and salt to taste. Spread mashed avocado on tortilla. Sprinkle on stink bugs to taste.

Spotted Wing Drosophila

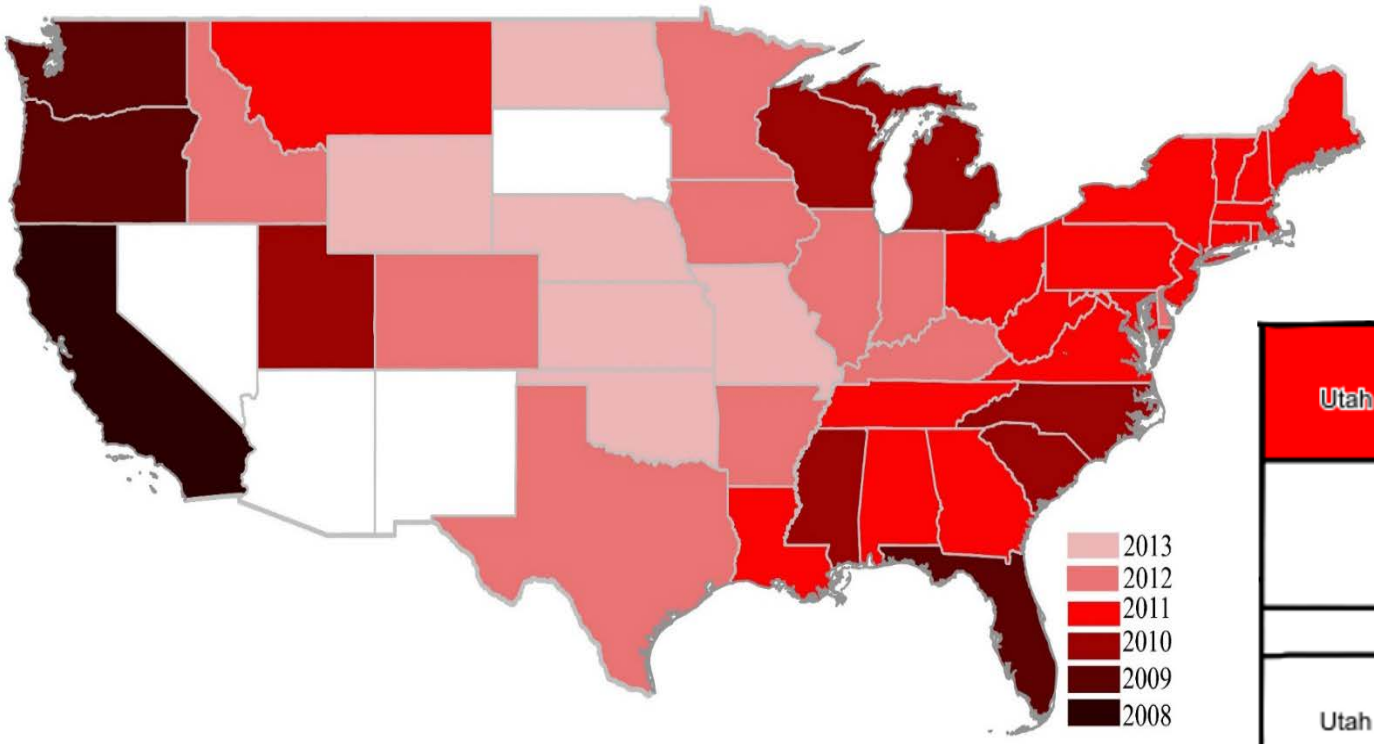
Spotted Wing Drosophila
(Drosophila suzukii)

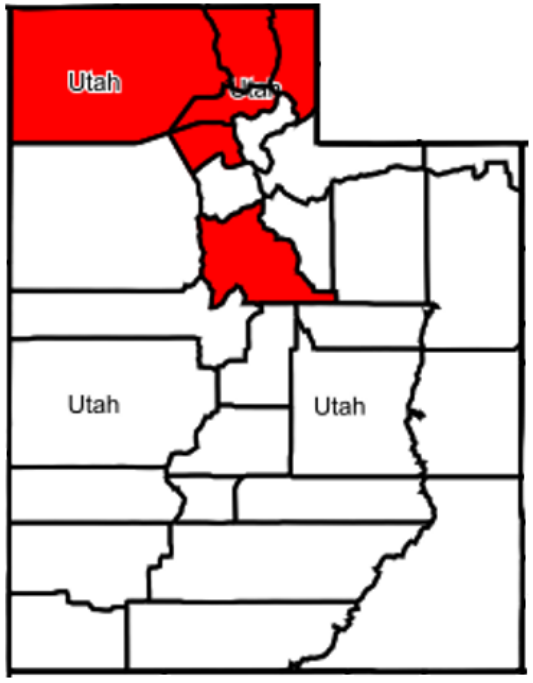
- Native to southeast Asia
  - First detected in CA in 2008
  - Introduced to Utah in 2010
  - No crop damage has been reported in Utah
- Most *Drosophila* spp. attack overripe and rotting fruit
- SWD preferentially infests ripening and ripe fruit

Production of high-quality fruit now requires aggressive management programs

- Increases in pesticide costs of $100 to $300 per acre
- Insecticide applications are typically made on a 5-10 day schedule
- Growers of late season sweet cherry report as many as 11 additional pesticide applications
- Late season berries may require up to 16 additional applications

Current Distribution

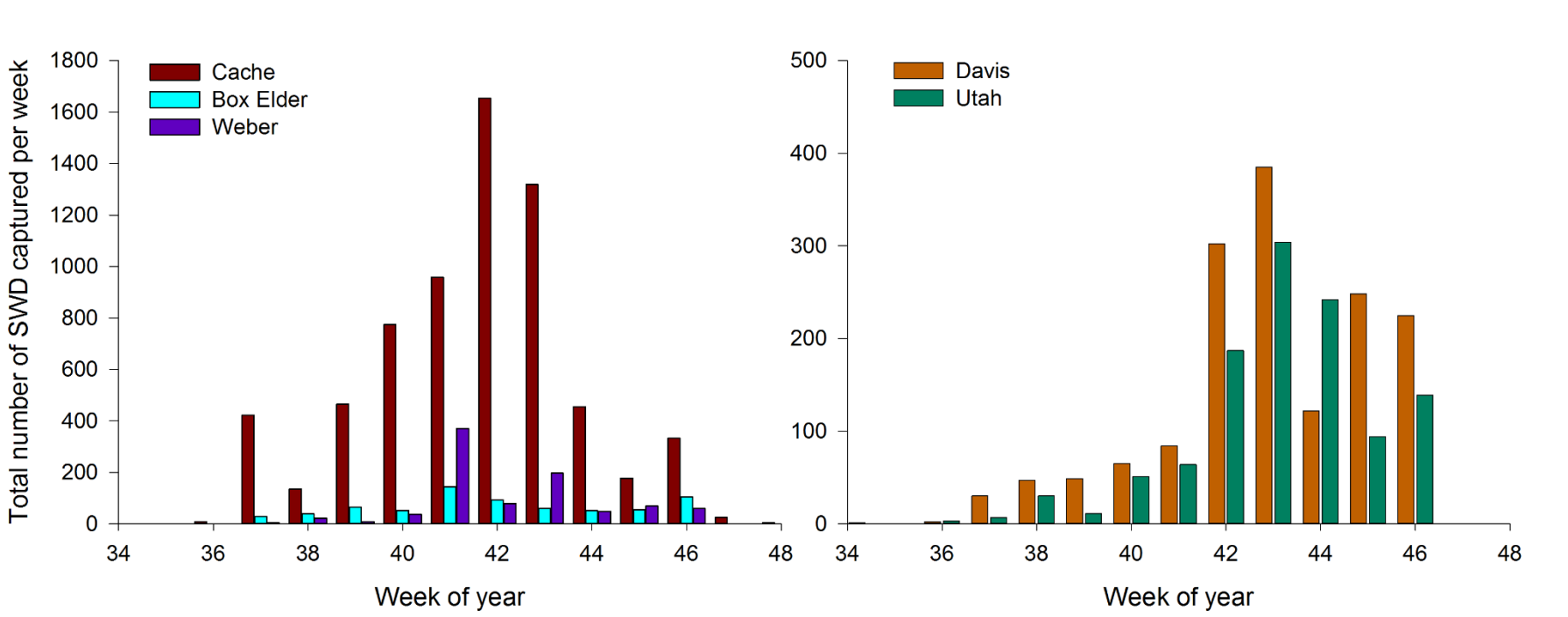




SWD was first detected in Utah in 2010

- Established in Utah, Davis, Weber, Box Elder, Cache & Rich Counties
- Found in commercial orchards, backyard gardens, and wild habitats
- Overwintering, reproducing, and completing full generations in Utah
- No reports of damage

SWD adults are not detected in traps until late summer or early fall. Their activity peaks mid to late October.

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JOURNAL OF APPLIED ENTOMOLOGY
J. Appl. Entomol.

ORIGINAL CONTRIBUTION

Humidity affects populations of *Drosophila suzukii* (Diptera: Drosophilidae) in blueberry

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Keywords
fecundity, longevity, ovarian maturation, relative humidity, spotted wing drosophila

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Abstract

Temperature and humidity affe
reproductive status and behavio
tigating the effects of temperatu
invasive frugivorous pest, *Drosop*
conducted to determine the effe
opment, adult survival, fecundit
as a host substrate. The five con
says were 20, 33, 71, 82 and 94
fecundity and longevity increase
limited impact on mean genera
eclosion times. The highest net
intrinsic rate of population inc
94% RH. The reproductive statu
of mature oocytes per female, w
compared to 71% RH. In additio
lated field trap captures over an
ity (RH) levels in close proximit
humidity levels resulted in dec
dent population model predicte
populations at higher humidity.
cultural practices that minimize
tribute to the management of *D.*
pruning, drip irrigation and field

PHYSIOLOGICAL ECOLOGY

Temperature-Related Development and Population Parameters for *Drosophila suzukii* (Diptera: Drosophilidae) on Cherry and Blueberry

SAMANTHA TOCHEN,[1] DANIEL T. DALTON,[1] NIK WIMAN,[1] CHRISTOPHER HAMM,[2] PETER W. SHEARER,[3] AND VAUGHN M. WALTON[1,4]

Environ. Entomol. 43(2): 501–510 (2014); DOI: http://dx.doi.org/10.1603/EN13200

ABSTRACT Temperature-related studies were conducted on *Drosophila suzukii* Matsumura (Diptera: Drosophilidae: Drosophilini). From 10–28°C, temperature had a significant impact on blueberries, *Vaccinium corymbosum* L. (Ericales: Ericaceae), and cherries, *Prunus avium* (L.) L. 1755 (Rosales: Rosaceae), important commercial hosts of *D. suzukii*. Temperature had a significant influence on *D. suzukii* developmental period, survival, and fecundity, with decreasing developmental periods as temperatures increased to 28°C. At 30°C, the highest temperature tested, development periods increased, indicating that above this temperature the developmental extremes for the species were approached. *D. suzukii* reared on blueberries had lower fecundity than reared on cherries at all temperatures where reproduction occurred. The highest net reproductive rate (R_o) and intrinsic rate of population increase (r_m) were recorded on cherries at 22°C and was 195.1 and 0.22, respectively. Estimations using linear and nonlinear fit for the minimum, optimal, and maximum temperatures where development can take place were respectively, 7.2, 28.1, and 42.1°C. The r_m values were minimal, optimal, and maximal at 13.4, 21.0, and 29.3°C, respectively. Our laboratory cultures of *D. suzukii* displayed high rates of infection for *Wolbachia* spp. (Rickettsiales: Rickettsiaceae), and this infection may have impacted fecundity found in this study. A temperature-dependent matrix population estimation model using fecundity and survival data were run to determine whether these data could predict *D. suzukii* pressure based on environmental conditions. The model was applied to compare the 2011 and 2012 crop seasons in an important cherry production region. Population estimates using the model explained different risk levels during the key cherry harvest period between these seasons.

KEY WORDS fecundity, mortality, longevity, population matrix

Invasive Fruit Pest Guide for Utah

Insect & Disease Identification, Monitoring & Management

2016

EXTENSION

UtahStateUniversity

CHAPTER 3 SPOTTED WING DROSOPHILA

Quick Facts

- Spotted wing drosophila (SWD) is a small vinegar fly that infests ripening, ripe, and overripe fruits.
- SWD is native to Southeast Asia; it was first detected in the U.S. in 2008, and in Utah in 2010.
- Preferred hosts include stone fruits (especially cherry and peach), berries, and soft-skinned vegetables.
- Monitoring SWD and timely harvest of fruit are important IPM practices.
- SWD management tactics include timely applications of insecticides, and protecting pre- to post-ripe fruit stages.

Background

The spotted wing drosophila (SWD), *Drosophila suzukii* (Matsumura) (Diptera: Drosophilidae), is an invasive vinegar fly native to Japan and parts of Thailand, India, China, Korea, Myanmar, and Russia. SWD was first detected in the U.S. in California in 2008. In Utah, it was first discovered in a raspberry and blackberry field in Kaysville (Davis County). It is currently an economic pest of soft fruits and vegetables throughout much of the U.S. SWD is named for a dark spot on each wing of the male fly.

Other species of vinegar flies only attack fruit that is overripe or rotten, but SWD females lay eggs in unripe, ripe, and overripe fruit. Because it will lay eggs in fruit still maturing on the plant, larvae can be present in fruit that is harvested for market. The larva is the main damaging life stage; the female fly punctures fruit when laying eggs which can introduce secondary pathogen infections.

Because SWD is widely distributed throughout the U.S., it is not considered a quarantine pest. Of the countries that receive U.S. fruit exports, Australia and New Zealand are the only ones with quarantine restrictions for SWD.

Identification and Life History

ADULT: REPRODUCTIVE, DISPERSAL, DAMAGING, AND OVERWINTERING STAGE

- About 0.1 in (2-3 mm) long.
- Pale brown body with unbroken bands on the backside of the abdomen.
- Red eyes and featherlike antennae.
- Males have a single black spot on the leading edge of each wing and two dark bands ("sex combs") on each foreleg **(Figs. 3.1-3.2)**.
- "Sex combs" can be important for identification when wing spots are faint or missing.
- Females can be distinguished from similar flies by their large, saw-like ovipositor (egg-laying device) located on the back of their body **(Figs. 3.3-3.5)**.
- Ovipositor may be difficult to see unless extended.
- Magnification with a hand lens or dissecting microscope is helpful for identifying specimens.

EGG

- About 0.02 inches (0.6 mm) long and 0.007 inches (0.18 mm) wide.
- White to creamy translucent; cylindrical in shape.
- Two thin respiratory filaments occur on one end *(Figs. 3.6-3.8)*.
- Filaments may protrude from fruits with eggs *(Figs. 3.9-3.10)*.

LARVA: DAMAGING STAGE

- About 0.003-0.01 in (0.067-3.5 mm) long.
- Cream-colored maggots with black mouthparts *(Figs. 3.11-3.13)*.
- Typically creates a breathing hole through the fruit skin as it matures *(Fig. 3.14)*.
- Mature larvae can be distinguished from other fruit fly larvae (cherry fruit fly) by a smaller body, tapered at both ends, and shallow fruit feeding.

PUPA: POSSIBLE OVERWINTERING STAGE

- About 0.1 in (2-3 mm) long.
- Brown, cylindrical capsules with two extensions on one end *(Figs. 3.15-3.17)*.

Acknowledgments

Participating Growers

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- USU Extension
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- USDA NIFA Specialty Crop Research Initiative
- Utah Specialty Crop Block Grant
- Western IPM Center Grant
- USDA AFRI CAP - iPiPE
- USDA APHIS PPQ Farm Bill – Orchard Commodity Survey
- USDA APHIS PPQ Farm Bill – Invasive Species Outreach