

Insects of Berry Crops

Va. Berry Production & Marketing Conference

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Dept. of Entomology

Virginia Tech

March 13, 2014



Virginia Berry Scholar Site

Timely in-season pest updates

- Email communications
- Publication access
 - Pest Management Guides
 - Mid-Atlantic Berry Guide
- Web Sites
- File exchange

<http://scholar.vt.edu>

Virginia Berry Scholar Site

**To join this site, please put
your email on the sheet being
passed around, or contact**

Doug Pfeiffer at: dgpfeiff@vt.edu

Or

Meredith Shrader at: mcassell@vt.edu

Links to Recommendations

Virginia Small Fruits Page

<http://www.virginiafruit.ento.vt.edu/VirginiaSmallFruitSite.html>



 **VirginiaTech**
Invent the Future **The Virginia Fruit Web Site:**

Virginia Small Fruits

Updated 10 March 2014

[What's Hot in Caneberries?](#)
[What's Hot in Strawberries?](#)
• [What's Hot in Blueberries](#)

- [Horticultural Topics](#)
- [Small Fruit Pest Management](#)
- [Honey Bees and Pollination](#)
- [Weather Information](#)
- [Mid-Atlantic University and USDA Small Fruit Faculty](#)
- [Research Units](#)
- [Other Sources of Information](#)
- [Regional Producer Websites](#)
- [Small Fruit AdVisor](#) page

In a 1992 survey, there were approximately 1,200 acres of strawberry and 330 acres of brambles grown in the state. There are under 1000 acres of blueberry. See the [Strawberry Crop Profile](#) and [Brambles Crop Profile](#) by Tukey et al. (2000).

[Fruit Loop](#) [NARBA IPM Site](#)
[Homepage](#)

Maintained by: [Douglas G. Pfeiffer](#)
[Department of Entomology](#)
[Virginia Tech](#)
[Blacksburg, Virginia](#)

Links to Recommendations

**Virginia Pest
Management Guide
(Free Online)**

<http://pubs.ext.vt.edu/456/456-017/456-017.html>



Hard copies of The Pest Management Guide are also available for \$12.00 plus shipping.
Visit <https://pubs.ext.vt.edu/pmgstore.html>

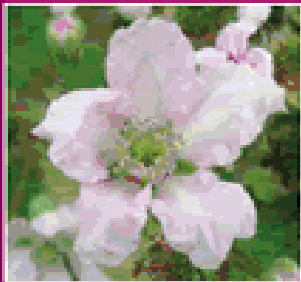
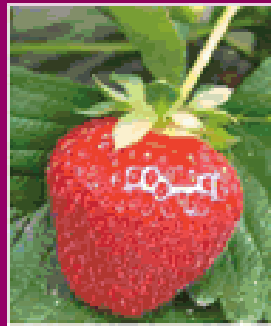
Links to Recommendations

Mid-Atlantic Berry Guide

<http://pubs.cas.psu.edu/freepubs/MAberryGuide.htm>



The Mid-Atlantic Berry Guide



for
Commercial
Growers
2013–2014

Produced by Penn State, Rutgers Univ.,
Univ. Delaware, West Virginia Univ., Univ.
Maryland and Virginia Tech

Links to Recommendations

Southeast Regional Integrated Management Guides

Caneberries

http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2014/2014BrambleSprayGuide10_24_2013.pdf

Blueberries

<http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2014/BlueberrySprayGuide11252013.pdf>



Spotted wing Drosophila (SWD)

“Tin
Fruit



E. Beers

Drosophila suzukii

suzukii means 'sword'

Most *Drosophila* species attack rotting fruit

BUT

Spotted wing drosophila differs in
attacking ripe and ripening fruit

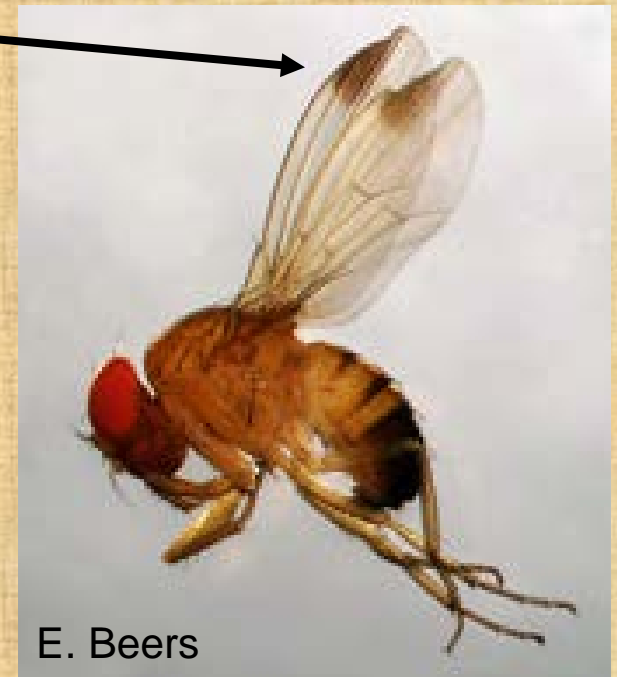


E. Beers

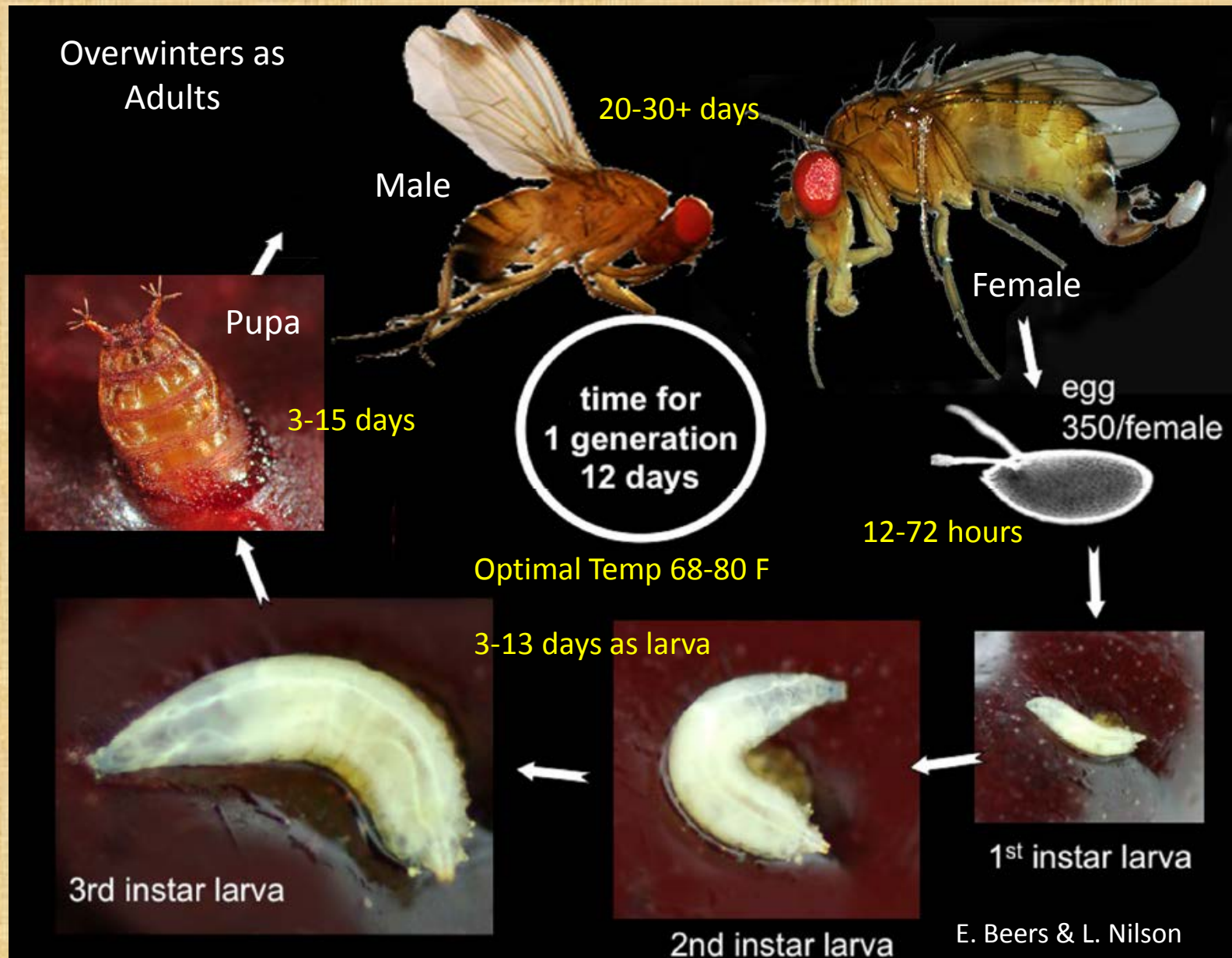
SWD Identification: Male



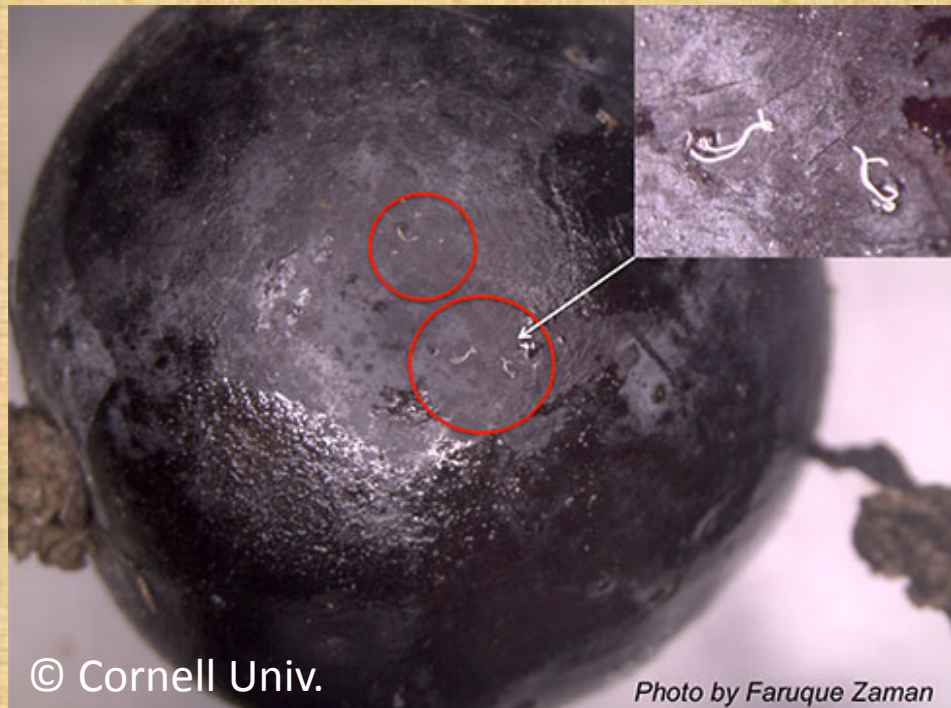
Dark spot
on leading edge of
wing



SWD Life Cycle



SWD Life Cycle: Eggs



SWD Host List

Ranked by more or less at risk

Raspberries, blackberries, blueberries

Strawberries(?)

Cherries, grapes

Nectarines, peaches, plums

Apples, pears



SWD Host List – Non-crop hosts

- Wild blackberries
- Pokeweed
- Dogwood
- Persimmon
- Rose hips
- Porcelain berry

SWD Larvae in Fruit



NCSU

**Damage is difficult to see until larvae
are almost mature....**



SWD Larvae in Fruit



Blackberry



Raspberry

Blueberry



Trapping for SWD adults

50/50 Apple cider vinegar/ Merlot

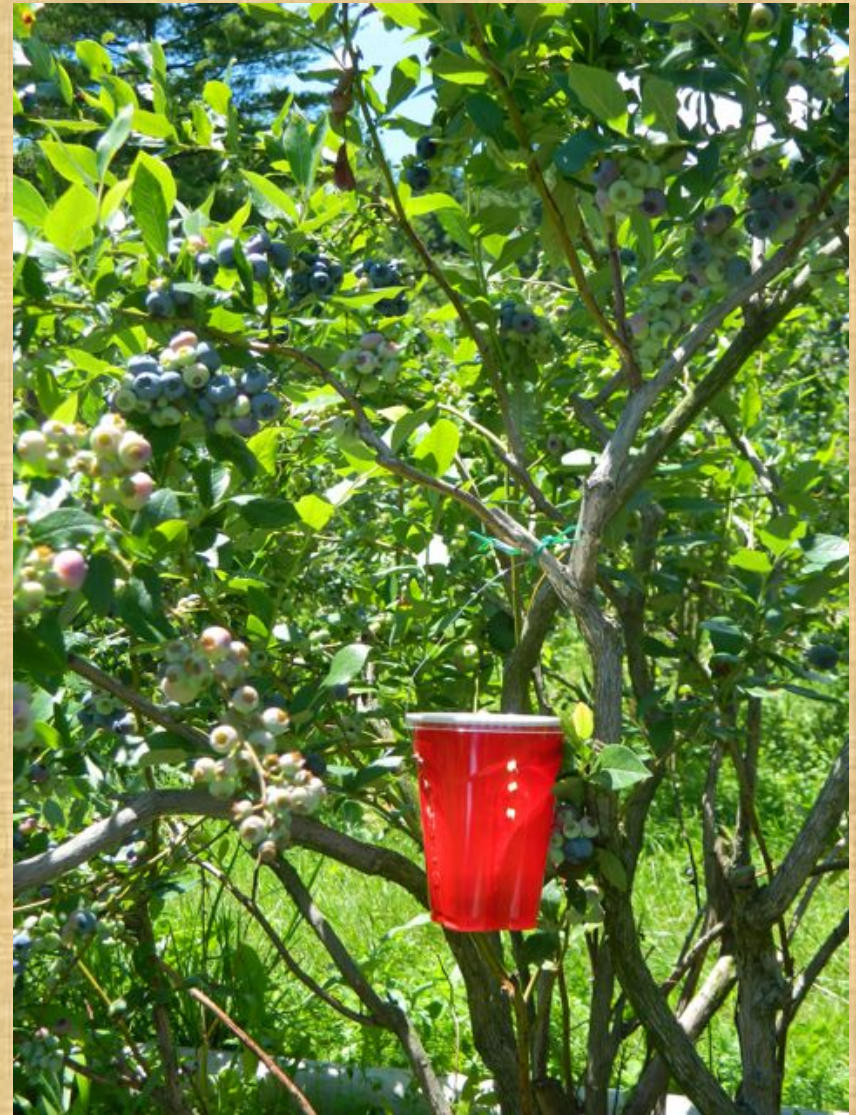


Trapping for SWD adults

Hang trap in shade



Raspberry



Blueberry

African fig fly



In Virginia – November 2012



SWD Management Cultural Control

- Harvest fruit promptly to eliminate breeding sites
- Destroy nearby overripe or rotten fruit

Updates:

<http://www.virginiafruit.ento.vt.edu/SWD.html>



SWD Management Chemical Control

Resistance Management will be critical, because:

Many generations per year

Many offspring (350) per female

- Need materials with short pre-harvest intervals
- Need materials of various modes of action
- Need to rotate in a spray program!
- In high risk crops, need to spray weekly or more often
- Need local research on efficacy



SWD Management

Chemical Control – Commercial Blueberry

From 2014 Pest Management Guide to Horticultural and Forest Crops:

<http://pubs.ext.vt.edu/456/456-017/456-017.html>

| Preharvest spray Material | Class | Rate |
|------------------------------|-------------------------------|-----------------|
| Entrust 80WP | spinosyn | 1.25-2.0 oz |
| Delegate 25G | spinosyn | 3.0-6.0 fl oz |
| Malathion 8F | organophosphate | 2.5 pt |
| Imidan 70W | organophosphate | 1.5 lb |
| Lannate SP | carbamate | 0.25-0.5 lb |
| Mustang Max | pyrethroid | 4.0 oz |
| Danitol 2.4EC | pyrethroid | 10.7-18.0 fl oz |
| Asana XL | pyrethroid | 9.6 fl oz |
| Brigade 10WSB | pyrethroid | 16.0 oz |
| PyGanic 1.4EC | pyrethrins | 64 fl oz |
| Azera | pyrethrins/azadirachtin (IGR) | 2–3 pt |
| Exirel | diamide | 13.5-20. fl oz |

Exirel received a state label for blueberries in Virginia on February 14, 2014



SWD Management

Chemical Control – Commercial Caneberry

Critical to use insecticides that have short PHI

PHI's of 0-3 days are generally acceptable

From 2014 Pest Management Guide to Horticultural and Forest Crops:

<http://pubs.ext.vt.edu/456/456-017/456-017.html>

Preharvest spray

| Material | Class | Rate | PHI |
|-----------------|-------------------------------|---------------|------------|
| Entrust 80WP | spinosyn | 1.25-2.0 oz | 1 d |
| Delegate 25G | spinosyn | 3.0-6.0 fl oz | 1 d |
| Malathion 8EC | organophosphate | 2.0 pt | 1 d |
| Mustang Max | pyrethroid | 4.0 oz | 1 d |
| Brigade 10WSB | pyrethroid | 16.0 oz | 3 d |
| Asana XL | pyrethroid | 4.8-9.6 fl oz | 7 d |
| PyGanic 1.4EC | pyrethrins | 64 fl oz | 0 d |
| Azera | pyrethrins/azadirachtin (IGR) | 2–3 pt | 0 d |

Exirel is NOT labeled for caneberries in Virginia as of today

A Request ...

To aid in proposal development,
please send grower testimonials
on SWD experience to:

dgpfeiff@vt.edu

Caneberry Pests: Japanese Beetle

Causes Direct Injury to Caneberries



Caneberry Pests: Japanese Beetle

- Berry feeder
- Timing makes control difficult
- May need to spray late prebloom
- Lower populations in years following drought



Primocane versus floricane: Effects on IPM?

Protracted bloom/fruit period
Later bloom/fruit period



Insecticides for Japanese beetle

| Material | Rate | PHI |
|------------------|---------------|-----|
| Sevin 80S | 2 lb | 7 d |
| Sevin XLR | 2 qt | 7 d |
| Aza-Direct | 12.5-42 fl oz | 0 d |
| Assail 30SG | 4.5-5.3 oz | 1 d |
| Actara 25WG | 3 oz | 3 d |
| Surround 95WP | 12.5-50 lb | 0 d |
| Kaolin | | |
| Organic | | |
| Visible residues | | |

Caneberry Pests: Tarnished plant bug

- Adults overwinter in weedy areas, and legumes such as alfalfa.
- 3-4 generations per year in mid-Atlantic area



Caneberry Pests: Tarnished plant bug

Kills individual drupelets, small fruit

Treat when 1 TPB in every two flower clusters





Caneberry Pests: Tarnished plant bug

Prevent flowering weeds

**But do not mow flowering weeds while
bramble fruit or blossoms are present**



Caneberry Pests: Stink bugs

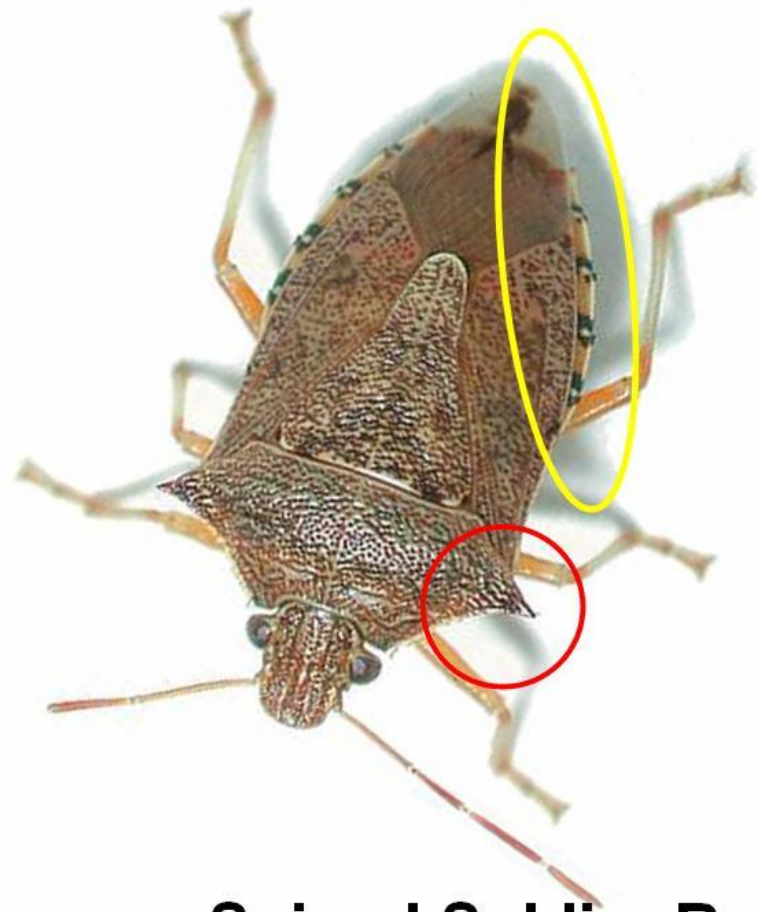
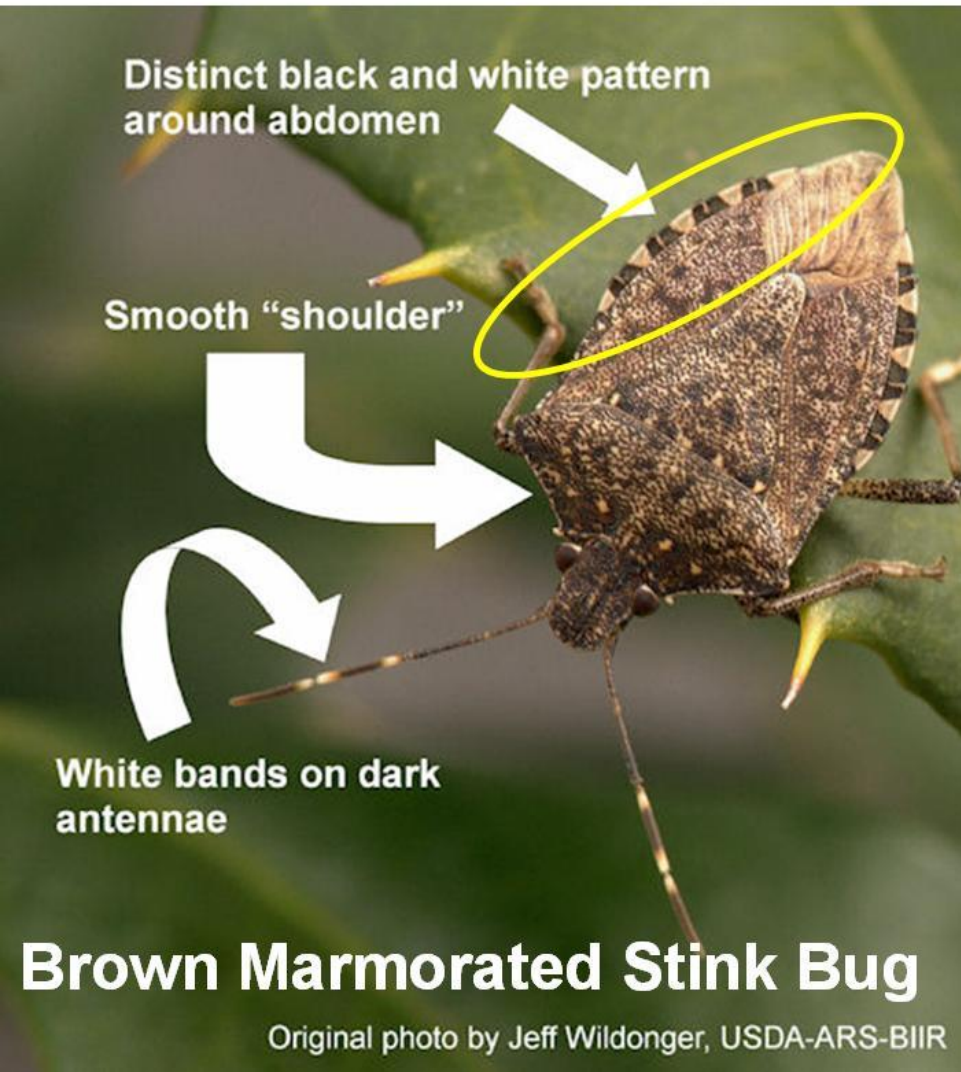


Caneberry (and Blueberry) Pest: Brown Marmorated Stink Bug





Adults – BMSB versus Spined Soldier Bug



Look very closely at the white and black pattern on the abdomen. Both adults have a pattern on their abdomen. Both have a black triangle with a white line running through each one. **HOWEVER**, BMSB has very distinct white triangles that the spined soldier bug does not have. Spined soldier bugs have spiny shoulders and are predators.

Stink bug Injury to raspberry



Green stink bug: Insertion of stylets -



Insecticides for BMSB

From 2014 Pest Management Guide to Horticultural and Forest Crops:
<http://pubs.ext.vt.edu/456/456-017/456-017.html>

| Material | Rate |
|-----------------|---------------|
| Actera 25WDG | 3.0 oz |
| Assail 30SG | 4.5-5.3 oz |
| Azera | 2.0-3.0 pt |
| Brigade 10WSB | 8-16 oz |
| Malathion 8F | 2.0 pt |
| Pyganic 1.4EC | 64 fl oz |
| Sniper 2 | 3.2-6.4 fl oz |

Borers: Cause indirect injury to canes

Raspberry
crown borer



Rednecked
cane borer



Raspberry cane borer





Other
Aphids
Thrips
Mites

Insect Management in Blueberries



Blueberry Pests: Fruitworms

Cranberry Fruitworm



Cherry Fruitworm



Feeding damage: Both cause shrunken and prematurely blue berries



Cranberry fruitworm: Webbing and frass--'Messy'



Cherry fruitworm: little webbing, No frass

Insecticides for fruitworm complex

| Material | Rate | PHI |
|----------------|---------------|------|
| Intrepid 2F | 10-16 fl oz | 7 d |
| Entrust 80W | 1.25-2 oz | 3 d |
| Diazinon 50W | 1 lb | 7 d |
| Sevin XLR Plus | 1-2 pt | 7 d |
| Dipel ES | 1-4 pt | 0 d |
| Esteem 35WP | 5 oz | 7 d |
| Delegate 25WG | 3-6 oz | 3 d |
| Malathion 8F | 1.5-2.5 pt | 1 d |
| Assail 30SG | 4.5-5.3 oz | 1 d |
| Asana XL | 4.8-9.6 fl oz | 14 d |

Blueberry Pests: Blueberry Maggot



NCSU, USDA

Insecticides for blueberry maggot

| Material | Rate | PHI |
|----------------|---------------|------|
| Entrust 80W | 1.25-2 oz | 3 d |
| Imidan 70W | 1.5 lb | 3 d |
| Surround 95WP | 12.5-50 lb | 0 d |
| Danitol 2.4EC | 10.7-18 fl oz | 21 d |
| Delegate 25WG | 3-6 oz | 3 d |
| Sevin XLR Plus | 1-2 pt | 7 d |
| Malathion 8F | 1.5-2.5 pt | 1 d |
| Assail 30SG | 4.5-5.3 oz | 1 d |
| Asana XL | 4.8-9.6 fl oz | 14 d |
| Entrust 80W | 1.25-2 oz | 3 d |

Blueberries: Plum curculio



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Famous Entomologists

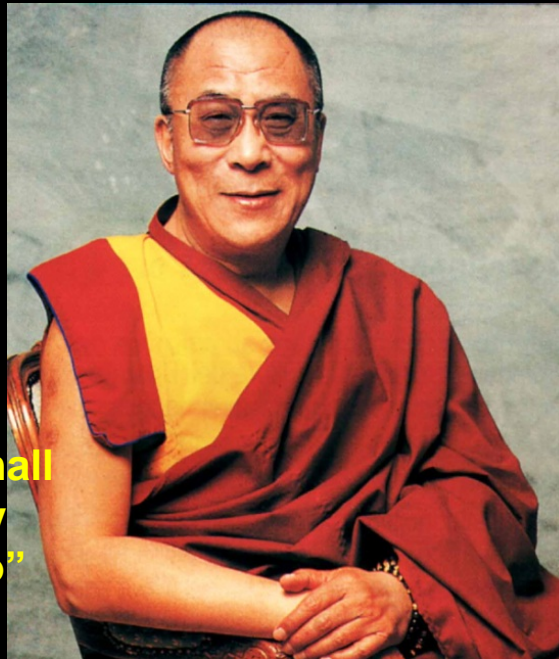


“You can teach a congressman almost as much as you can teach a flea.”

Mark Twain

“If you think you're too small to make a difference, try sleeping with a mosquito”

Dalai Lama



**“Float like a butterfly,
Sting like a bee.
The hands can't hit
what the eyes can't see.”**

Muhammad Ali