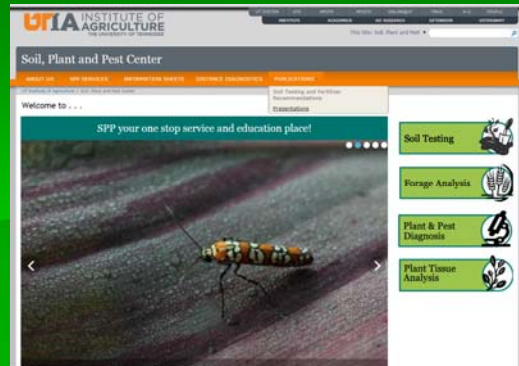


Fruit and Vegetable Insect Update

Frank A. Hale, Ph.D.
Professor
Entomology & Plant Pathology



Find PDFs of presentations and links to new publications at the Soil Plant and Pest Center web site under publications and presentations



Calypso 4 F (thiacloprid)

- Bayer CropScience is no longer making Calypso although any existing stocks can still be used
- This is perplexing since thiacloprid is a cyano-substituted neonicotinoid and relatively non-toxic to bees

Final cancellation order for sulfoxaflor¹

- We had already added Transform WG and Closer SC to the 2016 Southeastern U.S. Vegetable Crop Handbook when we were informed of the cancellation order
- Dow AgroSciences plans to “work diligently to support renewed U.S. EPA sulfoxaflor registrations”²

¹http://www.epa.gov/sites/production/files/2015-11/documents/final_cancellation_order-sulfoxaflor.pdf

²<https://www.dowagro.com/en-us/newsroom/pressreleases/2015/11/sulfox-epa-decision#.VqZUCPrLcs>

Final cancellation order for sulfoxaflor

- Dow AgroSciences stated that with “Four full years of widespread U.S. product use – with additional use in Canada, Australia and other nations – have demonstrated excellent sulfoxaflor performance worldwide with no noted adverse effects on pollinators.”¹
- Dow is pursuing re-registration of sulfoxaflor insecticides (personal communication)

¹https://www.dowagro.com/en-us/newsroom/pressreleases/2015/11/sulfox-epa-decision#.VqZN5_krLcs

Final cancellation order for sulfoxaflor

- “As part of this recent action, EPA has issued an existing stocks provision allowing growers to use sulfoxaflor-containing products they have in hand consistent with directions on the pre-existing product label.”

https://www.dowagro.com/en-us/newsroom/pressreleases/2015/11/sulfox-epa-decision#.VqZN5_krLcs

Closer SC (sulfoxaflor)

- Existing stocks labeled for use on Brassica (Cole) leafy vegetables, cucurbit vegetables, leafy vegetables (except Brassica) and watercress
- For aphids, silverleaf whitefly, sweetpotato whitefly, and thrips (suppression only)

Closer SC (sulfoxaflor)

- Existing stocks labeled for use on Fruiting vegetables and okra
- For aphids, plant bugs, greenhouse whitefly (outdoors), silverleaf whitefly, sweetpotato whitefly, thrips (suppression only)

Closer SC (sulfoxaflor)

- Existing stocks labeled for use on leaves of root and tuber vegetables
- For aphids, leafhoppers, greenhouse whitefly (outdoors), silverleaf whitefly, & sweetpotato whitefly

Closer SC (sulfoxaflor)

- Existing stocks labeled for use on listed sucking insects on pome fruits, strawberry, stone fruit, small fruit vine climbing (except fuzzy kiwifruit) and low growing berry, and tree nuts

Additions to the 2016 Southeastern U.S. Vegetable Crop Handbook

- Silvanto 200 SL (flupyradifurone) 1.67 lb ai/gallon or 17.09% (Bayer CropScience LP)
- IRAC Mode of Action Group 4D (Nicotinic acetylcholine receptor competitive modulator) – butenolides chemical subgroup

Sivanto 200 SL

- Labeled for use on Brassica (cole) leafy vegetables – foliar application
- For leafhoppers, aphids, and whiteflies
- PHI – 1 day
- Minimum intervals between applications – 7 days

Sivanto 200 SL

- Bushberry – foliar application
- For aphids, blueberry thrips, and blueberry maggot
- PHI – 3 days
- Minimum interval between applications – 7 days

Sivanto 200 SL

- Cucurbit vegetables -- foliar for leafhoppers, aphids, squash bug and whiteflies and soil applied for aphids, leafhoppers, whiteflies, suppression of cucurbit yellow stunting disorder virus
- Fruiting vegetables – foliar for leafhoppers, aphids, Colorado potato beetle, psyllid, whiteflies and suppression of chilli thrips and tomato yellow leaf curl virus

Sivanto 200 SL

- Other crops on label include:
- Leafy vegetables (except Brassica)
- Legume vegetables (succulent or dried)
- Low growing berry (lowbush blueberry, strawberry etc.)
- Pome fruit
- Root vegetables
- Small fruit vine (except fuzzy kiwifruit) – grape, gooseberry etc.
- Tuberous and corn vegetables
- Tree nut

Additions to the 2016 Southeastern U.S. Vegetable Crop Handbook

- Torac (tolfenpyrad) 1.29 lb ai/gallon or 15% (Nichino America, Inc.)
- IRAC Mode of Action Group 21A (Mitochondrial complex I electron transport inhibitors)

Sivanto Prime

- Sivanto Prime will be replacing Sivanto 200 SL
- It is essentially the same product and the result of a new global marketing initiative by Bayer CropScience

Sivanto Prime Honey Bee-Safe Profile

- Low intrinsic toxicity to adult and immature stages of honey bees
- No adverse effects on foraging honey bees, their foraging activity, brood and colony development, hive vitality and honey bee health or on over-wintering colonies when used according to label instructions

<http://www.sivanto.com/sivanto-documents.html>

Torac

- Labeled for use on leafy vegetable (Crop group4) – except brassica vegetables
- Labeled for leafhoppers, aphids (excluding lettuce aphid), flea beetle, & thrips

PROTECTION OF POLLINATORS



APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

Look for the bee hazard icon in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.

Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications or contact with residues on plant surfaces after foliar applications.
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When using this product, take steps to:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product onto beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in bee kills.

treatment site, the beekeeper providing the pollination services must be notified no less than 48 hours prior to the time of the planned application so that the bees can be removed, covered, or otherwise protected prior to spraying.



2. FOR FOOD CROPS AND COMMERCIAL GROWN ORNAMENTALS NOT UNDER CONTRACT FOR POLLINATION SERVICES BUT ARE ATTRACTIVE TO POLLINATORS

Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen unless one of the following conditions is met:

- The application is made to the target site after sunset.
- The application is made to the target site when temperatures are below 55°F.
- The application is made in accordance with a government-initiated public health response.
- The application is made in accordance with an active state-administered apiculture registry program where beekeepers are notified no less than 48 hours prior to the time of the planned application so that the bees can be removed, covered, or otherwise protected prior to spraying.
- The application is made due to an imminent threat of significant crop loss and a documented determination consistent with an IPM plan or predetermined economic threshold is met. Every effort should be made to notify beekeepers no less than 48 hours prior to the time of the planned application so that the bees can be removed, covered, or otherwise protected prior to spraying.

Trap Crops for Organic IPM

- Since insects have differing host preference, we can use to help control them
- Pest insects attracted to the trap crop can be vacuumed or sprayed with an insecticide

Organic integrated pest management recommendations presented by Dr. Ayanava Majumdar (Dr. A), Alabama Cooperative Extension System

Why use trap crops?

- Admire (imidacloprid) is relied on extensively on cucurbit and other crops
- Reports in South Carolina of Admire not controlling striped cucumber beetles
- Trap crops allow for alternative insecticides to be used on a much reduced acreage

Trap Crops

- a field perimeter or border trap crop of a preferred host works best for small gardens
- Additional interplanted strips of the trap crop is best for larger fields

Organic integrated pest management recommendations presented by Dr. Ayanava Majumdar (Dr. A), Alabama Cooperative Extension System

Trap Crops

- Early planted Hubbard squash is an effective trap crop for a main crop of watermelon, cantaloupe or cucumber
- Hubbard squash lured 65% of the cucumber beetles and 90% of the squash bugs when treated with insecticide sprays for both pests
- Baby Blue Hubbard more attractive to cucumber beetles than New England Hubbard

Organic integrated pest management recommendations presented by Dr. Ayanava Majumdar (Dr. A), Alabama Cooperative Extension System

Trap Crops for Tomatoes

- Early planted mix of rows of Peredovik sunflower and a silage sorghum (NK300) is an effective trap crop for tomato
- The sunflower is cheap, quick to bloom and attractive to stink bugs and leaf-footed bugs

Organic integrated pest management recommendations presented by Dr. Ayanava Majumdar (Dr. A), Alabama Cooperative Extension System

Trap Crops for Tomatoes

- Sorghum (100 day crop) needs to be planted early enough so that it is heading before tomatoes produce fruit (plant 6 feet from tomatoes to prevent shading)
- Spray sorghum heads and sunflowers once per month for stink bug and leaf-footed bug control
- Mustang Max is effective for non-organic while Pyganic plus Entrust or vacuuming trap crops can be used in organic production

Organic integrated pest management recommendations presented by Dr. Ayanava Majumdar (Dr. A), Alabama Cooperative Extension System

Brown Marmorated Stink Bug



Brown Marmorated Stink Bug

- Pest of many types of plants including various fruit trees, shade trees, woody ornamentals, legumes (including soybeans) and vegetables
- Has the potential to become a major agricultural pest
- A nuisance pest in homes and buildings
- Its tendency to get into vehicles will allow this hitchhiker to quickly expand its range



Prepared by Julieta Brambila, USDA-APHIS-PPQ, Gainesville, FL

Brown Marmorated Stink Bug Damage to Mature Nectarines



Image courtesy of C. Holko, Maryland Dept. of

Brown Marmorated Stink Bug Damage on Apple



Images courtesy of C. Holko, Maryland Dept. of Ag.

BMSB Damaged Tomato



Image courtesy of Thomas Kuhar et al. at:
<http://www.plantmanagementnetwork.org/pub/php/bief/2012/stinkbug/>

Heavy BMSB Infestation on Tomatoes



Image courtesy of Thomas Kuhar et al. at:
<http://www.plantmanagementnetwork.org/pub/php/bief/2012/stinkbug/>

BMSB Damaged Bell Peppers

Images courtesy of Thomas Kuhar et al. at:
<http://www.plantmanagementnetwork.org/pub/php/bief/2012/stinkbug/>



BMSB Damaged Sweet Corn



Image courtesy of Thomas Kuhar et al. at:
<http://www.plantmanagementnetwork.org/pub/php/bief/2012/stinkbug/>

BMSB Damaged Green Beans



Image courtesy of Thomas Kuhar et al. at:
<http://www.plantmanagementnetwork.org/pub/php/bief/2012/stinkbug/>

BMSB Damaged Okra

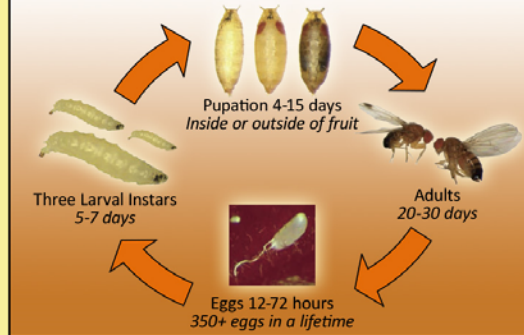


Image courtesy of Thomas Kuhar et al. at:
[http://www.plantmanagementnetwork.net/pub/php/bief/2012/stinkbug/](http://www.plantmanagementnetwork.org/pub/php/bief/2012/stinkbug/)

Stink Bug Control on Tomato

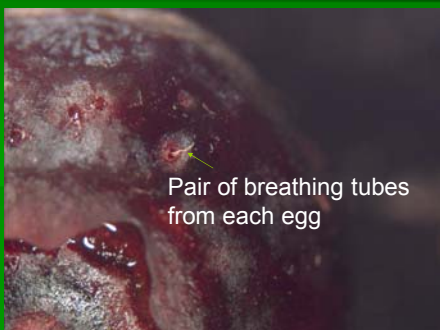
- pyrethroid (Mustang Max [zeta-cypermethrin], Hero [zeta-cypermethrin plus bifenthrin] etc.), MOA 3A
- dinotefuran, MOA 4A (Soil or foliar treatment) Venom 70 SG, Scorpion 35 SL
- thiamethoxam, MOA 4A, Actara 25 WDG

Life Cycle of the Spotted Wing Drosophila *Drosophila suzukii* (Matsumura)



Courtesy of Washington State University Extension

Spotted wing drosophila oviposition on blueberry



Pair of breathing tubes from each egg

Spotted wing drosophila larva and damaged blueberry



Caudal spiracles of larva
Oviposition wound used as a larval breathing hole

Spotted wing drosophila larva in calyx of blueberry



Making a Spotted Wing Drosophila Trap

- Use a 32 oz clear plastic cup with lid
- Punch, drill or use soldering iron to make 12 holes (3/16")
- Knot ends of a nylon cord in two of the holes like a bucket handle
- Make a mixture of 4 tablespoons sugar, 2 tablespoons yeast, and 32 oz water (single trap, use 2/3 Tbsp sugar, 1/3 Tbsp yeast, 5.25 water)
- <http://ncsmallfruitipm.blogspot.com/search/label/SWD>
- Add 5.25 fl oz to your clear plastic cup, refrigerate the rest
- Mark fluid level with magic marker on outside of cup
- Add 1-2 drops of unscented dish soap to break surface tension of solution
- Add lid and deploy in the field
- <http://ncsmallfruitsipm.blogspot.com/2011/06/do-it-yourself-spotted-wing-drosophila.html>

Information courtesy of H. Burrack, NCSU

Commercial Lures for SWD

- Trece and Scentry lures are just as effective as sugar, water and yeast but easier to use

Spotted Wing Drosophila (SWD) in Wine Grapes and Bunch Grapes

- SWD is not as serious a pest on grapes with most damage being seen on soft or damaged fruit
- Wine grapes can likely sustain greater injury than fresh market grapes

Spotted Wing Drosophila (SWD) in Wine Grapes and Bunch Grapes

- While risk begins at veraison, risk increases significantly when fruit reach 15 degrees Brix
- In North Carolina, not much spraying is being done for SWD on wine and bunch grapes

SWD and Strawberries

- Even though some SWD can be found in strawberries in May and June, it is not a big enough problem for most growers to do much spraying

Southern Highbush Blueberries and SWD

- In North Carolina, growers are not detecting SWD in southern highbush blueberries
- SWD usually doesn't show up in damaging numbers until later in rabbiteye blueberry season (early July and later)

Spotted Wing Drosophila Control for Commercial Fruit Production

Pyrethroid, spinosyn, organophosphate, & the anthranilic diamide class (Group 28 cyazypyr {DuPont Exeril 0.83 SE} for blueberries only) insecticides effective against SWD with weekly treatments starting at ripening (fruit coloring) to as close to harvest as the label allows

Rotation of insecticides with different Modes of Action

Efficacy reduced in rainy conditions so reapply in the event of rain

Sanitation, harvest and fruit destruction, may reduce infestation

H. Burrack, NCSU

the Southern Region small fruit consortium

Home
SRSFC Activities
Crops
Weather
IPM/Production Guides
County Agent Training
Site Map

IPM/Production Guides

- Blueberries
 - Southeast Regional Blueberry Integrated Management Guide
 - Southeast Regional Blueberry Horticulture and Growth Regulator Guide
 - Southeast Regional Organic Blueberry Pest Management Guide
- Bramble
 - Southeast Regional Brambles Integrated Management Guide
 - Southeast Regional Bramble Production Guide
- Bunch Grapes
 - Southeast Regional Bunch Grapes Integrated Management Guide
- Muscadines
 - Southeast Regional Muscadine Grapes Integrated Management Guide
- Strawberries
 - Southeast Regional Strawberry Integrated Management Guide
 - Southeast Regional Strawberry Planting/Production Guide

<http://www.smallfruits.org/SmallFruitsRegGuide/index.htm>

2015 Southeast Regional Organic Blueberry Pest Management Guide A Guide for Managing Diseases, Insects, Weeds and Wildlife in Blueberries in the Southeast

Commodity Editor
Elizabeth Little (University of Georgia)

Section Editors

Pathology: Phil Brannen (University of Georgia), Elizabeth Little (University of Georgia), Bill Cline (North Carolina State University), and Steve Bost (University of Tennessee)
Entomology: Ashfaq Sial Ahmad (University of Georgia), Frank Hale (University of Tennessee), Hannah Burrack (North Carolina State University), Oscar Liburd (University of Florida) and Ricardo Bessin (University of Kentucky)
Weed Science: Mark Czamota (University of Georgia), Katie Jennings (North Carolina State University)
Vertebrate Management: David Lockwood (University of Tennessee)

Senior Editors
Phil Brannen (University of Georgia)
Powell Smith (Clemson University)

Recommendations are based on information from the manufacturer's label and performance data from research and extension field tests. Because environmental conditions and grower application methods vary widely, suggested use does not imply that performance of the pesticide will always conform to the safety and pest control standards indicated by experimental data.

This publication is intended for use only as a guide. Specific rates and application methods are on the pesticide label, and these are subject to change at any time. Always refer to and read the pesticide label before making any application! The pesticide label supersedes any information contained in this guide, and it is the law.

Pre-Harvest (first color)		through Harvest (cont)				
Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Spotted Wing Drosophila						
	spinosad (Eutrust 80S)	1.25 to 2 oz	++	4 hrs	3 days	Overuse may lead to resistance in insect populations. Eutrust 80S cannot be applied more than 3 times in a cropping season. Only two consecutive applications of Eutrust can be made. If more treatments are needed, rotate to another class of insecticide, such as Pyrethroids, for at least one application.
	pyrethrins (Dipel DF)	16 to 64 fl oz/A	++	12 hrs	0 days	Not as effective as spinosad for SWD but can be treated with spinosad if SWD pressure remains high. Short residual activity.
Blueberry stem borer						Blueberry stem borer, <i>Olfia nigrata</i> , is a longhorn beetle and also attacks rhododendrons and azaleas. This pest can be managed by pruning out and removing the infested portion of canes, often before and while, as soon as larvae are detected in the sapwood. Cut the stems well below their brown, hollowed section, where the stems are still green and not hollow. Promptly destroy each wilted cane containing a larva. This ensures that the larva does not migrate into the crown of the plant. Late season caterpillars are often located on a few branches. Hand removal and/or spot treatments are typically sufficient.
Yellow-necked, azalea, red humped caterpillars, spawners,	Hand removal		++++			
	Bacillus thuringiensis (Dipel DF)	0.5 to 1.0 lb	+++	4 hrs	0 days	It is a bacterium that is effective in controlling lepidopteran insect pests. It must be eaten to be effective. Apply to small, early-stage caterpillars. Safe for beneficials.
Fire ant	See DORMANT recommendations					

African Fig Fly (AFF)

- Originally from Africa, this invasive drosophilid was found in Brazil in 1999 and Florida in 2005 and since then it has been found in 11 additional states (Pfeiffer 2013) plus **Tennessee** (Knox, Davidson, & Dickson Counties) in **2013** (found in grapes & raspberries in Knox Co.)



Pfeiffer, D. G. 2013. Progress Report submitted Feb. 10. Second Quarterly Report.

African Fig Fly (AFF)

- Not sure how much damage it causes since its ovipositor is not nearly as large and serrated as with the spotted wing drosophila
- They may attack fruit wounded by SWD or damaged by other means
- Dr. D. G. Pfeiffer has found more AFF larvae emerging from grapes so its importance as a grape pest is undetermined



Questions?

