Pesticide Applicator Training Program:

Insect Pests on Vegetables & Fruit

Celeste Welty
Extension Entomologist
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The Ohio State University

Insect Management News

- **Products**
  - New products
  - Expanded uses
  - Modified uses
- **Pests**
  - New invasives
  - 1 old foe

Inscalis

= common name of a.i.

- Products
  - Versys
  - Sefina
- a.i. = afidopyropen
- Group 9D
  - Affect feeding of aphids & relatives
  - Related to Fulfill (9B), Beleaf (9C)
- From BASF
- October 2018

Versys

- 0.83 DC (dispersible concentrate)
- Veg Crops, 0-day PHI
  - Cabbage & other Brassica head/stem veg.
  - Celery
  - Lettuces & other leafy vegetables
- Fruit Crops, 7-day PHI
  - Pome fruit
  - Stone fruit
- Pests
  - Aphids

Sefina

- 0.42 DC (dispersible concentrate)
- Crops
  - Cucurbits
  - Tomato, peppers, & other fruiting vegetables
- Pests
  - Aphids (low rate)
  - Whiteflies (high rate)

New mycoinsecticides

- 2 new products
  - BoteGHA ES (Certis)
  - BioCeres WP (BioSafe Systems)
- *Beauveria bassiana*: benefical fungus that can kill insects
- Each product with new strain
- Whiteflies, aphids, thrips
- All vegetable & fruit crops

Fortenza

- 48.8 FS (flowable suspension)
- a.i. = cyantraniliprole (same as Exirel)
- Group 28
  - Related to Coragen
- Sweet corn
- Seed treatment
- Prevents black cutworm, white grubs, wireworms
- May 2017
- From Syngenta

Highlights of previous 2 years

- **Harvata (2017)**
- **Sivanto (2015 & 2016)**

New insecticide: Harvanta

- A.I.: cyclaniliprole
- IRAC group 28 (diamides)
  - Related to Altacor & Coragen
- Formulation: 50SL
- 50 grams/liter = 0.42 lb a.i./gal
- By Summit Agro USA
- Federal label: September 2017

Harvanta

Crop	Pre-harvest interval (PHI), in days	Target
Leafy veg.	1	caterpillars, flea beetles, dipteran leafminers, pepper weevil, cucumber beetle, some thrips, some aphids
Brassica	1	
Fruiting veg.	1	
Cucurbits	1	

Re-entry interval (REI): 4 hours
Limit 4 applications at high rate
Limit 6 applications at low rate

Sivanto Prime

- A.I.: flupyradifurone
- IRAC group 4D (butenolides)
  - 'cousin' to neonicotinoids (4A)
- Systemic action
- Liquid: 1.67 lbs a.i./gal
- By Bayer
- Federal label: January 2015
- New uses: Sept. 2016

Sivanto on veg crops

Target:

- leafhoppers
- aphids
- whiteflies
- squash bug
- Colorado potato beetle

Crop	PHI (days)	
	foliar	soil
Brassica head & leafy	1	21
Cucurbits	1	21
Fruiting veg.	1	45
Leafy veg.	1	21
Legumes	7	-
Root veg.	7	-
Tuber/corm veg.	7	-

Sivanto on fruit crops

Target:

- leafhoppers
- aphids
- San Jose scale
- pear psylla
- vine mealybug
- blueberry thrips
- blueberry maggot

Crop	PHI (days)	
	foliar	soil
Blueberry	3	-
Strawberry	0	-
Grape	0	30
Apples, pears	14	-
Hops	21	-
Peaches	14	
Brambles	0	

Expanded uses

Products with registration expanded to additional crops

a.i.: tolfenpyrad
products: Torac & Apta

- Group 21A (related to Portal, Nexter)
- June 2018
- From Nichino

Torac SC

- Now allowed on
  - cucurbits
  - fruiting vegetables
  - Brassica leafy vegetables
  - Brassica head & stem vegetables
  - potatoes (East of Mississippi)
- Aphids, diamondback moth, flea beetles, pepper weevil, thrips

Apta SC

- **Now allowed on**
  - **Pome fruit**
- **Leafhoppers, aphids, apple maggot, leafrollers, psylla, curculio**

Magister SC

- a.i. = fenazaquin
- Group 21 (related to Portal, Nexter)
- Now allowed on hops
- Two-spotted spider mite
- Supplemental label
- May 2017
- From Gowan

‘FarMore FI400 Leafy’

- Commercial seed treatment
- For lettuce & other leafy veg.
- a.i. = thiamethoxam
- Group 4A
- Similar to:
  - FarMore FI400 Brassica (since 2014)
  - FarMore FI500 Onion (since 2012)
  - FarMore FI400 Cucurbits (since 2009)
- From Syngenta

Agri-Mek SC

for mite & leafminer control

New crops	Pre-harvest interval (PHI), in days
Caneberries	7
Sweet corn	7
Succulent beans	7
Greenhouse tomato	1
Green onions	7

Products with modified uses

Entrust SC

- a.i. = spinosad
- Group 5 (related to Radiant)
- For blueberries & other bushberries
  - suppression of spotted wing drosophila added
  - PHI reduced from 3 days to 1 day
- For peach
  - PHI reduced from 14 days to 1 day
- For plum
  - PHI reduced from 7 days to 1 day
- From Corteva (Dow)

Delegate WG

- a.i. = spinetoram
- Group 5 (related to Radiant)
- For peach
  - PHI reduced from 14 days to 1 day
- For plum
  - PHI reduced from 7 days to 1 day
- From Corteva (Dow)

Assail SGWG

- a.i. = acetamiprid
- Group 4A (related to Admire)
- For grapes
  - PHI reduced from 7 days to 3 days
- From UPI

Belay

- **No longer for tomato, peppers, eggplant, other fruiting veg.**
- **For cucurbits:**
  - **Do not apply after 4th true leaf on main stem is unfolded**
- **For potato:**
  - **Do not apply between 50% row closure and petal fall**
  - **Do not make more than 1 application / year prior to 50% row closure**
- **For grapes:**
  - **New limit of 1 application/year**

Pests of recent concern

- one potential: lanternfly
- Two recent:
  - stink bug
  - Spotted-wing drosophila
- One old: thrips

Potential pest of fruit crops in Ohio:

Spotted lanternfly

Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Spotted lanternfly

- A planthopper
- Sucks sap
- 1” long
- Poor flier
- Strong jumper

Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

USGS Bee Inventory and Monitoring Lab, Beltsville, Maryland

Spotted lanternfly: stages

- **Adult**
- **Young nymphs:** black with white spots
- **Older nymphs:** red with white spots

Spotted lanternfly: damage

- Weeping wounds of sap on bark
- Excrete large amounts of fluid
- Mold grows on sweet fluid

Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

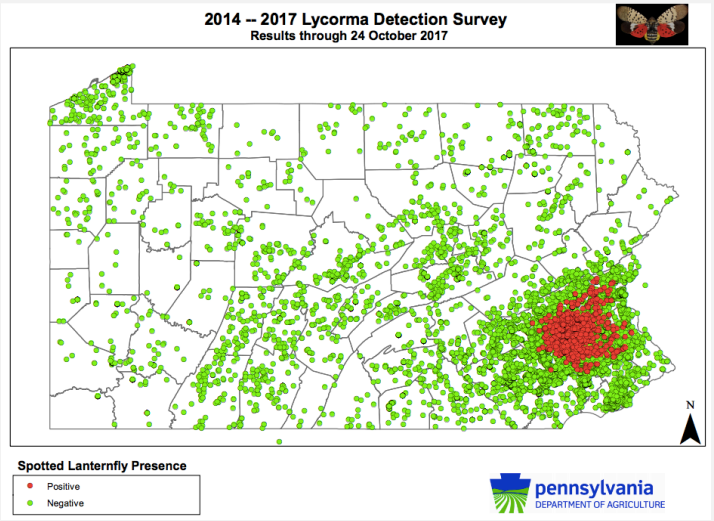
Pennsylvania Department of Agriculture, Bugwood.org

Spotted lanternfly: hosts

- **Feeds on:**
  - Grape
  - Apple
  - Cherry
  - Hops
- **Key host in fall:**
  - Tree of Heaven
- **Congregate on trunk at base**

Spotted lanternfly: spread?

- **In SE Pennsylvania since 2014**
  - Now in 13 counties
- **Detections:**
  - Delaware (Nov. 2017)
  - New York (Nov. 2017)
  - Virginia (Jan. 2018)
  - New Jersey (July 2018)
  - Maryland (Oct. 2018)



Spotted lanternfly: where to look?

- In evening or night: on trunk
- In day: at base of plant
- Eggs: on smooth surfaces (bark, brick, stone, dead plant tissue)

Spotted lanternfly: Ohio?

- **Any sightings or suspicions?**
  - **Please let us know!**
  - **Me**
  - **Your OSU county extension educator**
  - **OSU Dept. of Entomology**

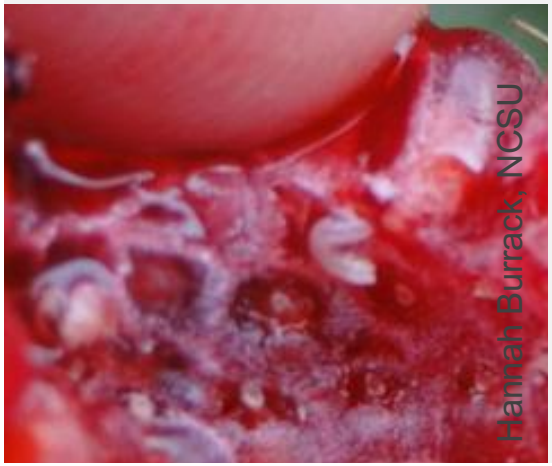
Brown marmorated stink bug

- **Attacks fruits & seed pods**
- **Invading Ohio since 2007**

Insecticides for stink bug

Product	*Apple*		*Peach*		*Raspberry*	
	PHI	*Limit*	*PHI*	*Limit*	*PHI*	*Limit*
Brigade, Hero	-	-	-	-	3	2-4 ap.
Danitol	14	2-4 ap.	3	2-4 ap.	3	2-3 ap.
Baythroid	7	1 ap.	7	2 ap.	-	-
permethrin	Not after petal-fall	2 ap.	14	3 ap.	-	-
Venom	-	-	3	1-2 ap.	-	-
Belay	7	1 ap.	21	2 ap.	-	-
Assail	7	4 ap.	7	4 ap.	1	5 ap.
Actara	35	3 ap.	14	2 ap.	3	2-3 ap.
Lannate	14	5 ap.	4	6 ap.	-	-
add? Closer						

A new pest of fruit crops in Ohio:
Spotted wing Drosophila



- **Invading Ohio since 2011**
- **Looks like common vinegar flies on overripe, fallen, decaying fruit**
- **The new species attacks <u>healthy</u> ripening fruit**
- **Larvae feed inside fruit**

Insecticide choices for SWD

Category	*Product*
Most effective	**a diamide: Exirel**
	spinosyns: Delegate, Radiant Entrust [OMRI]
	organophosphates: Imidan, Diazinon, Malathion
	pyrethroids: Mustang Maxx, Brigade, Pounce, Hero, Danitol, Baythroid, Warrior, Asana
	a carbamate: Lannate
Moderat-ely eff.	**a neonicotinoid: Assail** **a carbamate: Sevin**

Beware of number of sprays allowed
Example: raspberries

Product	*Pre-harvest interval*	*Maximum number of applications allowed* *(if used at max rate)*
Delegate	**1 day**	**3**
Mustang Maxx	**1 day**	**6**
Malathion	**1 day**	**3**
Entrust [OMRI]	**1 day**	**4**
Danitol	**3 days**	**2**
Brigade	**3 days**	**2**

Revisit an old pest: Thrips

- **Eastern flower thrips**
  - Strawberry
- **Western flower thrips**
  - Greenhouse crops
  - High tunnels

Eastern flower thrips

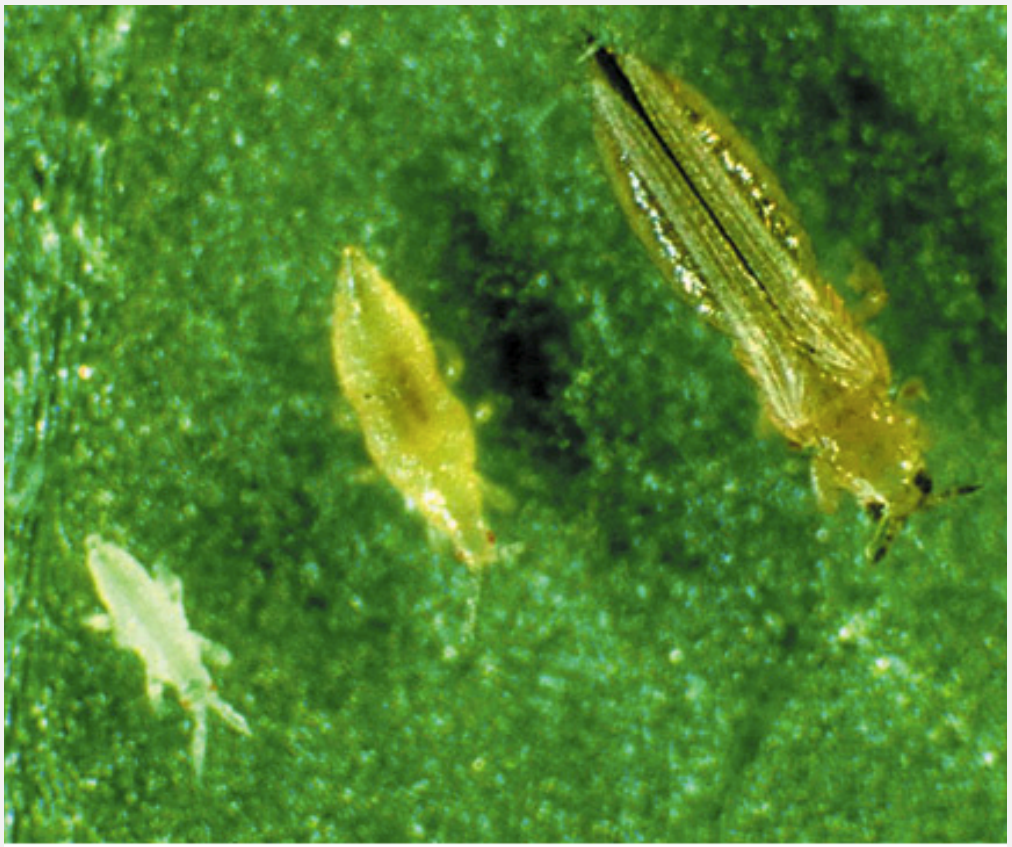
- Small (1/16” long)
- Narrow oblong body
- Yellow/brown
- Active; run fast
- Weak fliers

Flower thrips: life stages

Younger larva

Older larva

adult



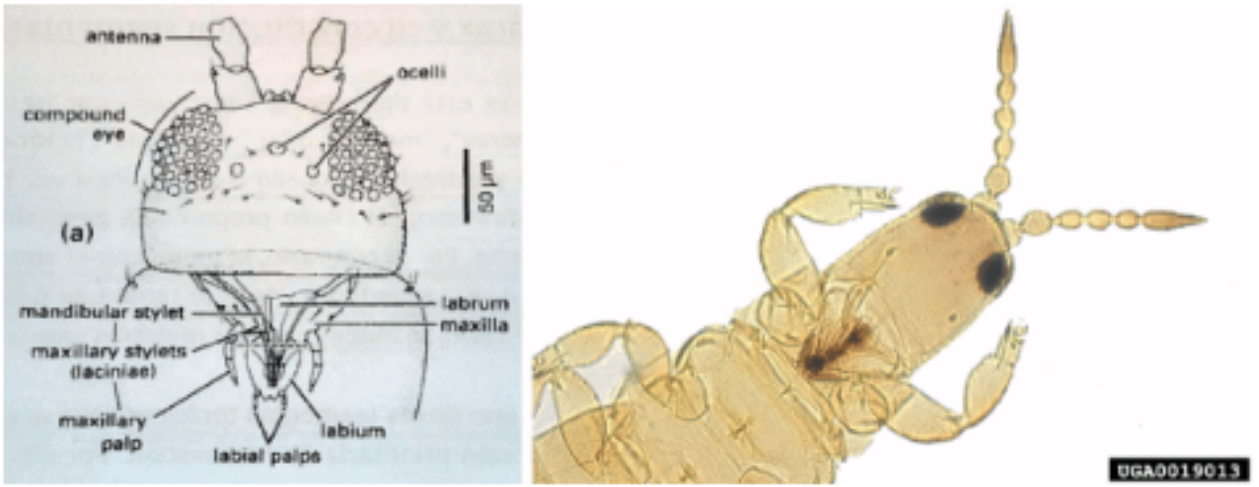
2. First and second larval instars plus adult of western flower thrips.

Eastern flower thrips: injury on strawberry

- Berries dull color
- Berries small, seedy, fail to enlarge or ripen
- Uneven maturity

Eastern flower thrips: feeding

- By rasping & sucking
- On strawberry:
  - During bloom & fruit set
  - Feed on seeds, tissue between seeds
  - Prefer protected sites like under calyx (cap)

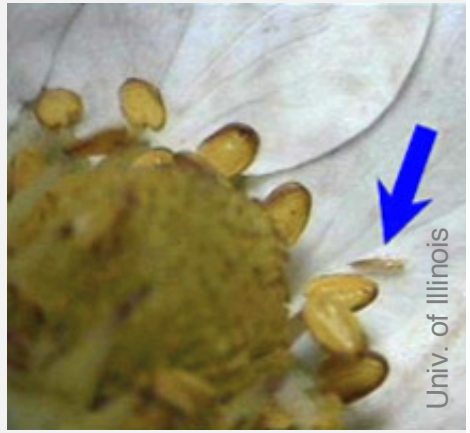


Scheme of thrips' mouthparts (lefts; image form personal notes from the course "Biology and Diversity of Arthropods", Universitat Autònoma de Barcelona) and frontal view of a thrip (right; property of John W. Dooley, USDA APHIS PPQ, Bugwood.org, CC).

Eastern flower thrips: Life history

- Do not overwinter well in North
- Long-distance migration via wind from South in spring
- Many generations per year

Eastern flower thrips:
Monitoring on strawberry

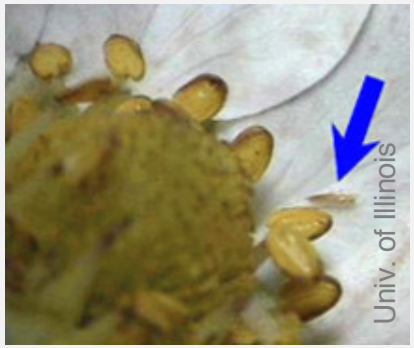


- **Begin when first blossoms open**
- **Methods:**
  - **Collect 5 to 10 blossoms**
  - **Tap blossoms onto white pan or cup**

    OR
  - **Place blossoms in zip-top bag, shake**
- **Sample 5 to 10 areas within a planting**
  - **In each area, pick 5 to 10 blossoms**
  - **Count the thrips in pan or bag**
  - **Calculate average number of thrips / blossom**
- **Repeat weekly until all berries reach diameter of a dime**

Eastern flower thrips: Action threshold on strawberry

- Counts in many plantings will be less than 1 thrips per flower, and control will not be needed
- Treat if > 2 thrips per flower
- Time treatment to avoid killing pollinators



Eastern flower thrips:
chemical control on strawberry

- **Conventional growers**
  - Thrips listed on label
    - Radiant (good)
    - Assail (good)
    - Sivanto (fair)
  - Thrips not listed on label
    - Lorsban (exc.; very early; 21-day PHI)
    - Brigade (exc.)
    - Danitol (exc.)
- **Organic growers**
  - Entrust (fair)
  - Neemix & Aza-Direct (fair)

Flower thrips on tomato

Figure 8. Thrips egg-laying scars on tomato

Flower thrips on pepper

Figure 5. Thrips feeding damage on pepper leaves.

Figure 7. Egg-laying scars and feeding damage on sweet pepper.

Flower thrips on cucumber

Figure 4. Thrips feeding damage on cucumber leaves.

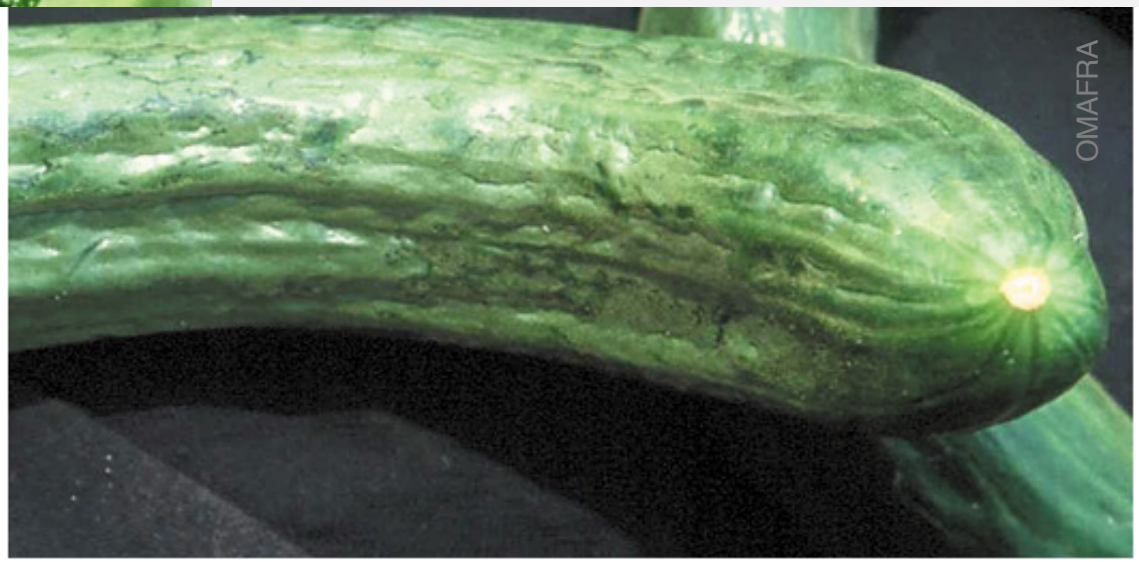


Figure 6. Thrips feeding damage on cucumber fruit.

Chemical control of thrips on outdoor crops

- **Effective:**
  - Radiant
  - Assail
  - Movento
- **Others:**
  - pyrethroids (Brigade, Mustang Maxx, Warrior, etc.)
  - Admire
  - Sivanto
  - Venom
  - Vydate
  - Harvanta

Chemical control of thrips in high tunnel crops

- **Not allowed:**
  - Radiant, Assail, Movento, Sivanto, Harvanta
- **Others:**
  - **pyrethroids** (Brigade, Mustang Maxx, Warrior, etc.)
  - **Admire**
  - **Venom**
  - **Vydate**

Thrips biocontrol by predators

- **Not realistic once population is large**
- **If thrips problem every year:**
  - **Consider biocontrol at start of season**
  - **Buy *Orius* bugs or predatory mites from a commercial insectary**

Flower thrips: Natural enemies

- *Orius* (predatory flower bugs)
- **Predatory mites**
  - *Amblyseius cucumeris*
  - *Ambylseius swirskii*
- **Available for purchase**

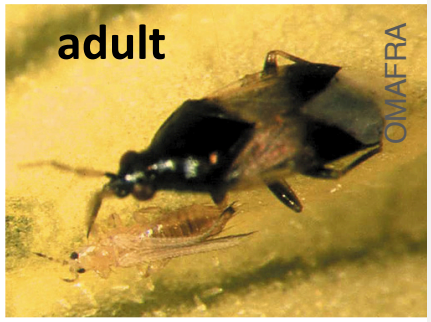


Figure 24. Adult *Orius* preying on western flower thrips.

Figure 1. Adult *Amblyseius swirskii* feeding on thrips larvae. Photograph by Steven Arthurs, University of Florida.

the end

Info on fruit & veg. pests
u.osu.edu/pestmanagement

Questions?
e-mail: welty.1@osu.edu
office phone: 614 292 2803