Grape Insect Management Update

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The Ohio State University

What's new for insecticides?

	2015	2014	2013
New products	Sivanto	Nealta	Closer
New uses	-	-	Venom/ Scorpion

Sivanto™

- A.I.: flupyradifurone
- IRAC group 4D (butenolides);
  - ‘cousin’ to neonicotinoids
- 200 SL (1.67 lbs a.i./gal)
- By Bayer
- Federal label January 2015

Sivanto™ on grapes

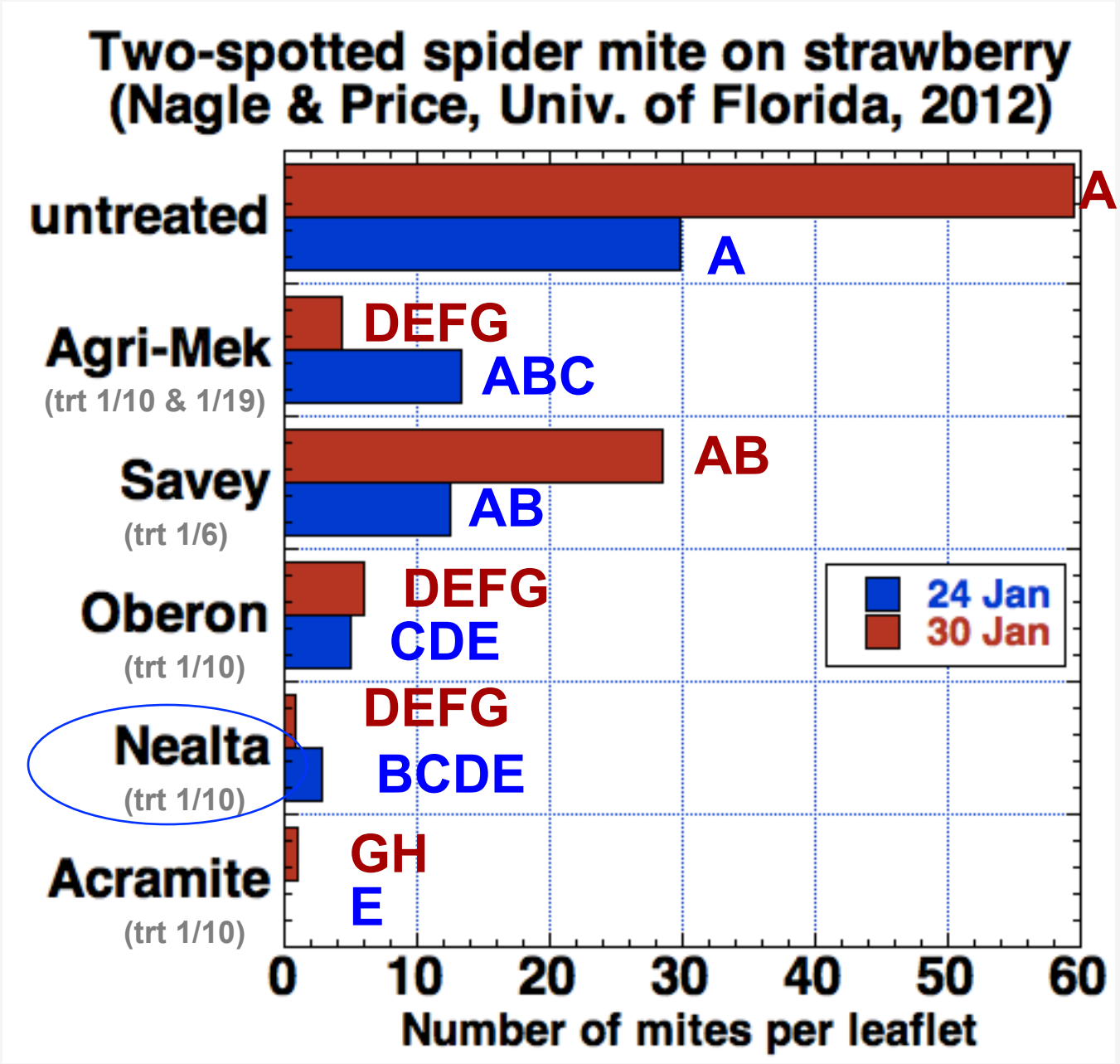
Rate	***Foliar*** *(PHI: 0 day)*	***Soil*** *(PHI: 30 days)*
Low (7-10.5 fl oz/A)	**Leafhoppers**	
Medium (12-14 fl oz/A)	**Vine mealybug**	
High (21-28 fl oz/A)		**Leafhoppers** **Vine mealybug**

Nealta™

- Miticide
  - European red mite
  - 2-spotted spider mite
- 1.67 SC (suspension concentrate)
- A.I.: cyflumetofen
- IRAC group 25 (new)
- By BASF
- Federal label May 2014

Nealta™ on grapes

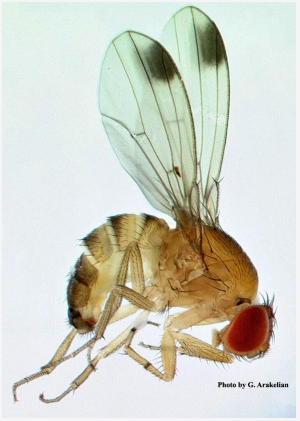
- Pre-harvest interval: 14 days
- Rate: 13.7 fl oz/A
- Limit 2 applications/year


Two-spotted spider mite on strawberry
(Nagle & Price, Univ. of Florida, 2012)
untreated
A
A
Agri-Mek
(trt 1/10 & 1/19)
DEFG
ABC
Savey
(trt 1/6)
AB
AB
Oberon
(trt 1/10)
DEFG
CDE
Nealta
(trt 1/10)
DEFG
BCDE
Acramite
(trt 1/10)
GH
E
24 Jan
30 Jan
0
10
20
30
40
50
60
Number of mites per leaflet

Nealta™

- Efficacy
  - As good as Acramite & Oberon
  - New mode of action
  - Excellent rotation partner
- Predators
  - Not as harsh as Zeal or Envidor

New Pests



- Spotted lanternfly
- Spotted wing Drosophila
- Brown marmorated stink bug

Potential pest of fruit crops in Ohio:

Spotted lanternfly

- Found Sept 2014, Berks Co., PA (NW of Phila.)
- Native to China
- A planthopper
- Sucks sap
- 1” long
- Poor flier
- Stong jumper

Spotted lanternfly: hosts

- Feed on grape, apple, stone fruit
- Hosts in fall:
  - Tree of Heaven
  - Grapes
- Congregate on trunk at base

Spotted lanternfly: damage

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

Spotted lanternfly: eggs

Egg masses:

- **Laid in September**
- **New masses: covered with gray pitch-like material**
- **Older masses: columns of brown seed-like columns**
- **On trees, stones, furniture**

Spotted lanternfly: life cycle

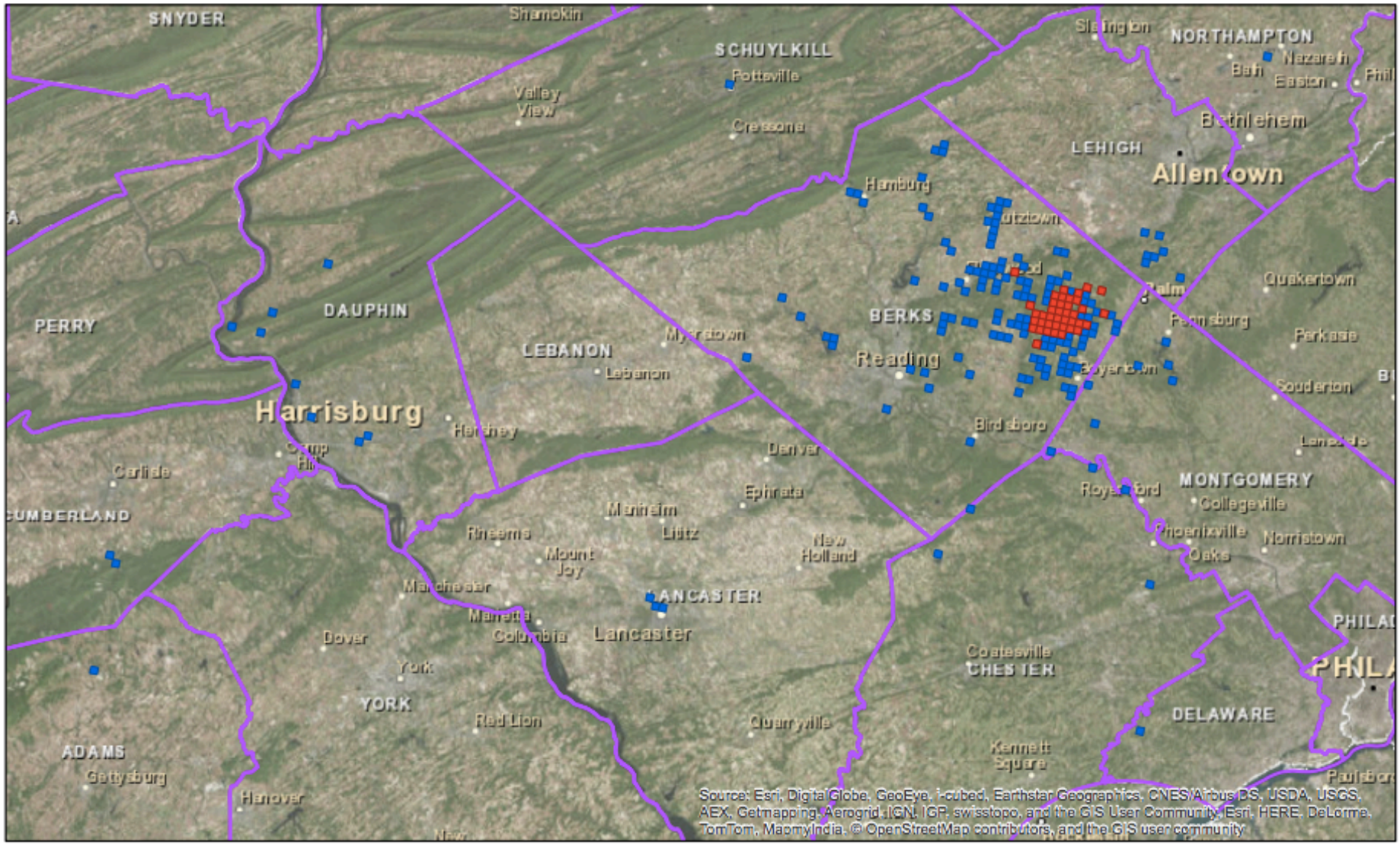
- Egg hatch April, May
- 4 nymph sub-stages
- Young: black with white spots
- Older: red with white spots
- Adults by July

Spotted lanternfly: where to look?

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

Lycorma Detection Survey

Results Through 15 December 2014

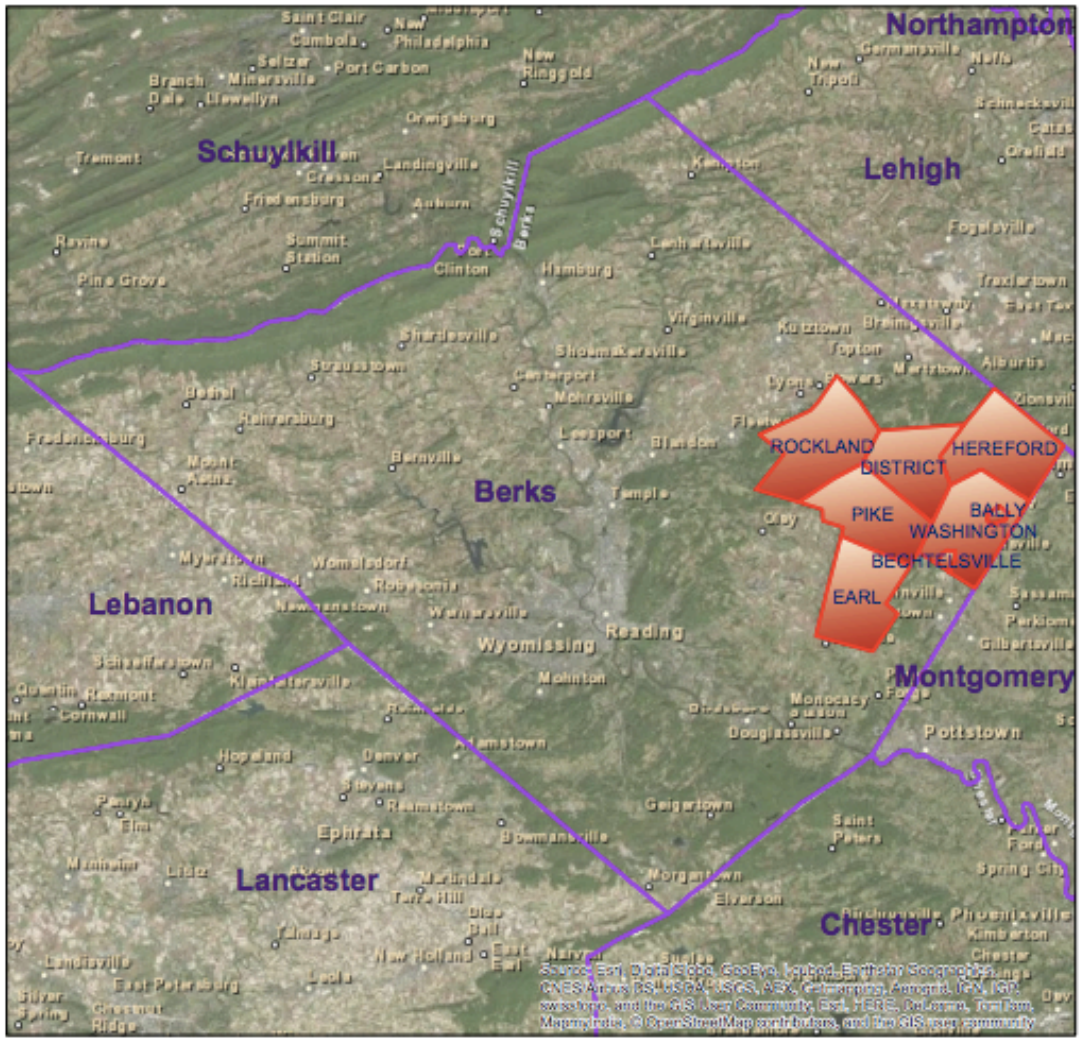


Survey Grids

- Surveyed - Positive
- Surveyed - Not Found

Spotted Lanternfly Quarantine Map

Townships Under Quarantine As of December 13, 2014



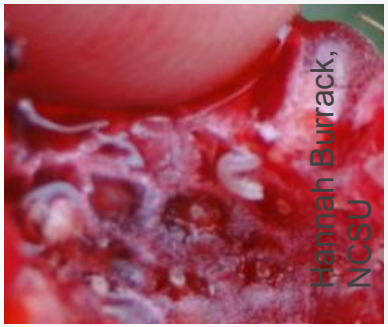
Legend

- Township Under PDA Quarantine
- Pennsylvania County Border

pennsylvania
DEPARTMENT OF AGRICULTURE

A new pest:
Spotted wing Drosophila

- attacks <u>healthy</u> ripening fruit
- **Early:** cherries
- **Mid:** raspberries, blueberries, blackberries
- **Late:** grapes
- Also peaches, plums, strawberries, cherry tomato



Status of SWD on winegrapes

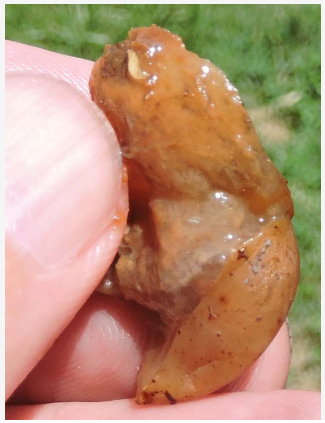
- in West: grapes not preferred
- In East: more problem
- Why?
  - More wild host plants in east
  - Higher humidity
  - Higher rainfall

Injury on grapes

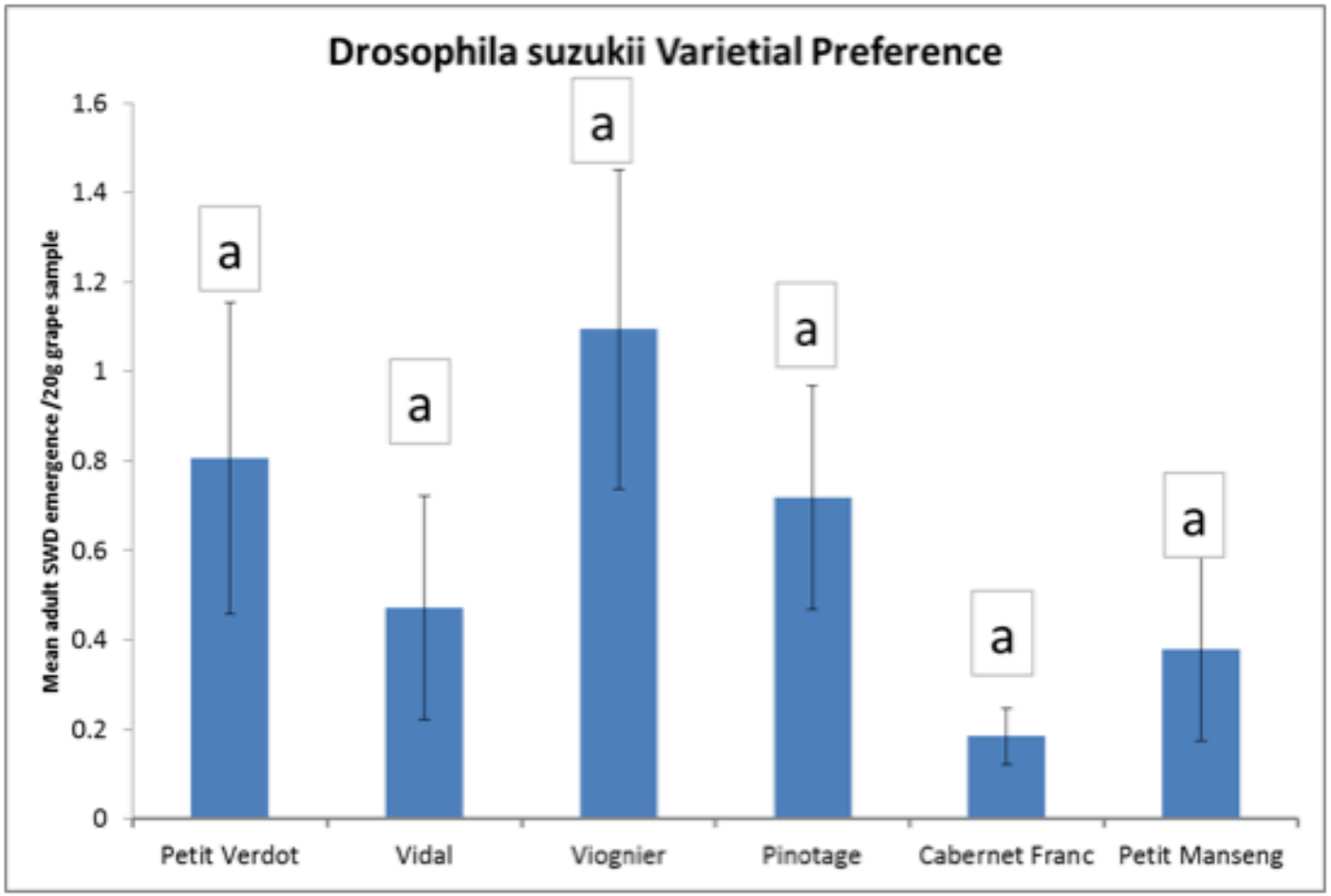
Adult SWD on pinot noire

Status of SWD on winegrapes

- Red varieties most at risk
- White varieties also at risk
- Worst in thin-skin varieties
- Worst in late varieties



Doug Pfeiffer, Virginia Tech



No significant difference in preference or survivorship among 6 varieties (but study to be repeated)

Doug Pfeiffer, Virginia Tech

Time of attack on grapes?

- Veraison? no
- Egg-laying begins ~15º brix

Time of attack on grapes?

Sample Date	8/19	8/27	9/2	9/9	9/12
# days after trtmt	6	8	6	7	3
Brix	16.9	18.4	20.3	21.2	21.9
	Infested grape berries				
Exirel 8 oz Induce	**0**	**0**	**1.1**	**3.8**	**6.7**
Exirel 4 oz Induce Monterey	**0**	**0**	**2.9**	**7.9**	**8.8**
Exirel 8 oz Induce Monterey	**0**	**0**	**0**	**7.9**	**7.4**
Control	**0**	**0**	**1.9**	**18.0**	**17.2**

Doug Pfeiffer, Virginia Tech

Relationship with African fig fly

- From same family as SWD
- Detected in vinegar traps
- 2012: NC, VA, MD, PA, NY, CT, MI, WI
- Africa to Brazil, 1999
- 2005: FL

African Fig Fly: damage

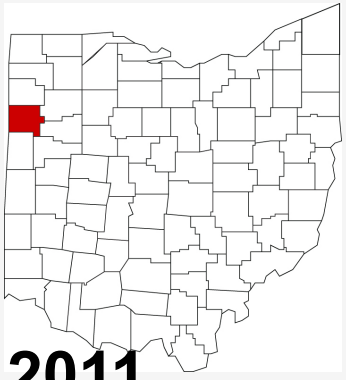
- Attacks injured & overripe fruit
- On figs & various tropical fruits
- Potential to harm temperate fruit

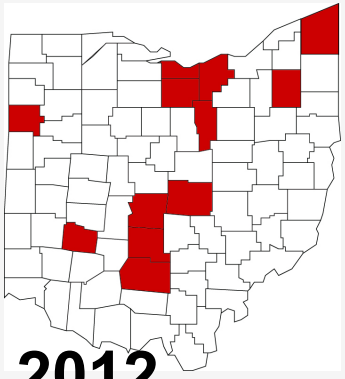
African Fig Fly: grapes in Virginia

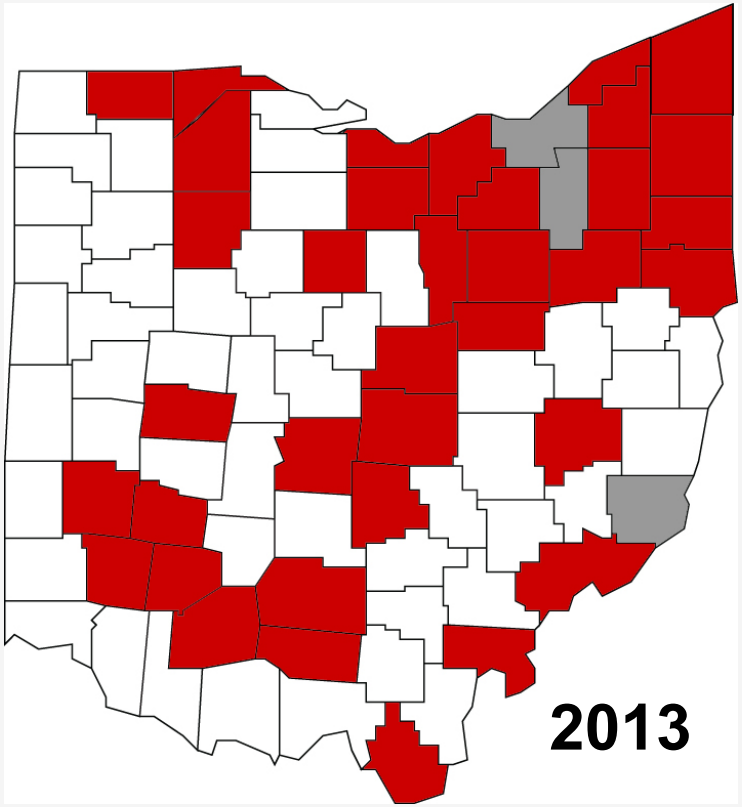
- Infested fruit held in lab
- Most adults emerged were AFF, not SWD
- AFF can out-compete SWD larvae
- Likely: SWD initiated injury, then AFF laid eggs & out-competed SWD

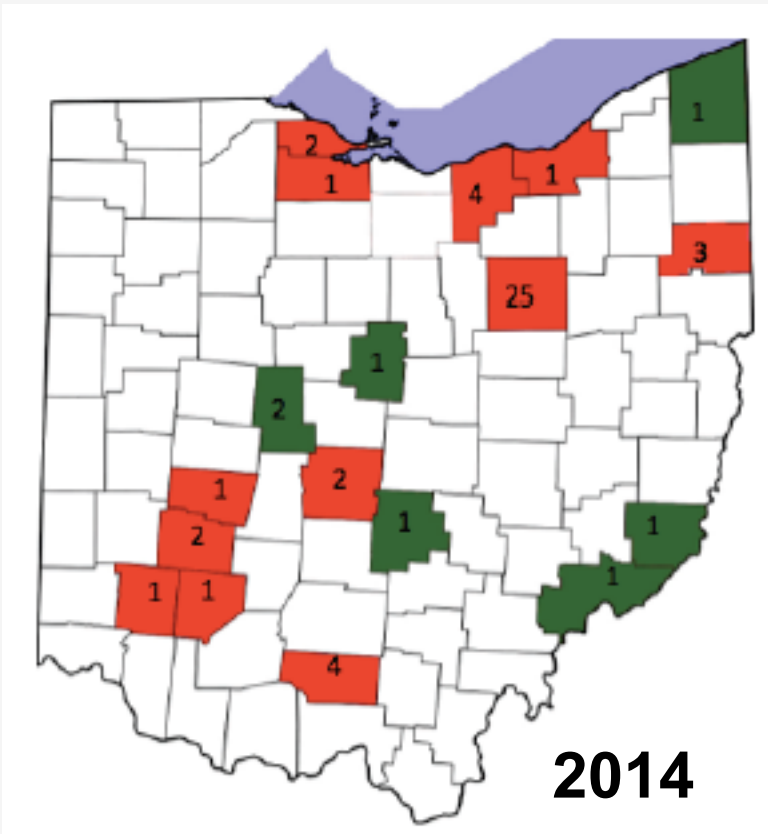
Doug Pfeiffer, Virginia Tech

SWD Range in Ohio









Trap network
Red: found
Green: not found

Spotted wing Drosophila in Ohio

- **Bad news**
  - Widespread
  - Severe damage
- **Good news**
  - Under control if insecticide program used
  - Traps help determine need

Monitoring spotted wing Drosophila

Scenario	*Action needed*
SWD not yet found on farm	Use bait trap for adult fly, weekly, all season or until first detection of adult
SWD was found on farm last year	Use bait trap for adult fly, until first catch of the new year, to determine when spray schedule should start
SWD was found on farm this year	Use salt test weekly to see if control program effective

Traps to monitor adult SWD flies

- Make your own trap
- Option 1:
  - Use 1 quart clear deli container
  - Make ¼” holes around 1 side
- Option 2:
  - 24 oz peanut butter jar
  - Make 5 holes @1”, cover with mesh
  - Add red tape

Bait for traps

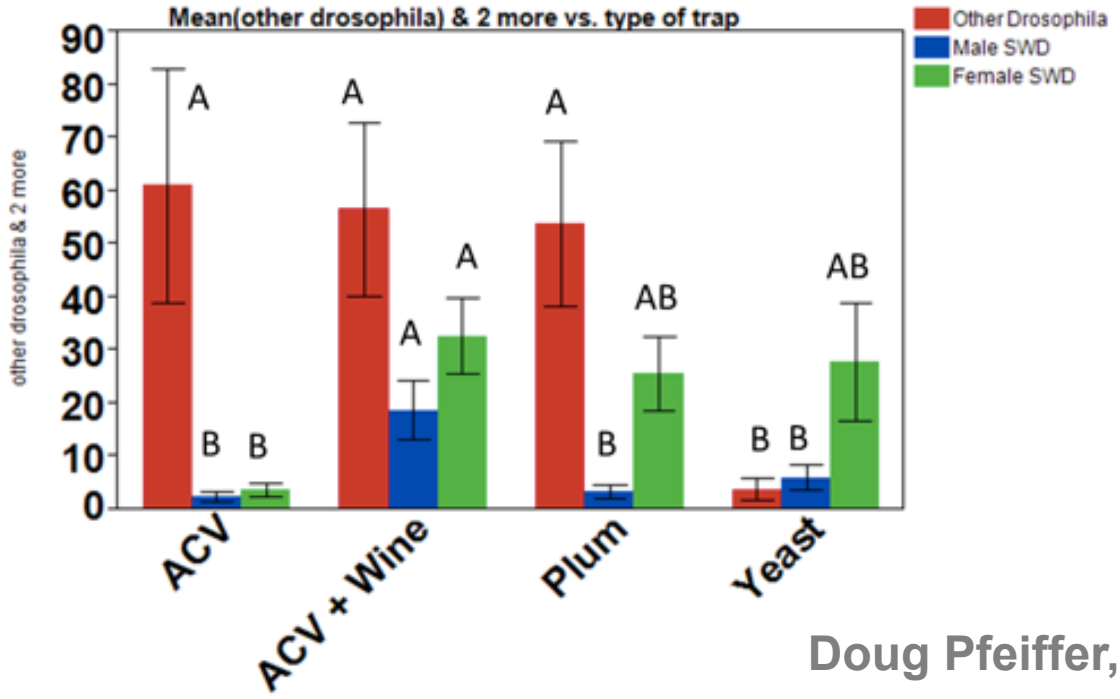
- **Apple cider vinegar (1 inch)**
  + a drop of dish soap
- **Alternative: fermenting bait**
  - **Mix: Yeast (1/4 tsp active dry)**
    Sugar (1/2 tsp)
    Flour (2 Tbsp)
    Water (4 tsp)
  - **Put in 4-oz cup with mesh cover**
  - **Float cup on apple cider vinegar in jar trap**

Bait study in VA vineyard

- **Apple cider vinegar (60%) + Merlot (40%)**

  + a drop of dish soap

- **Change biweekly**



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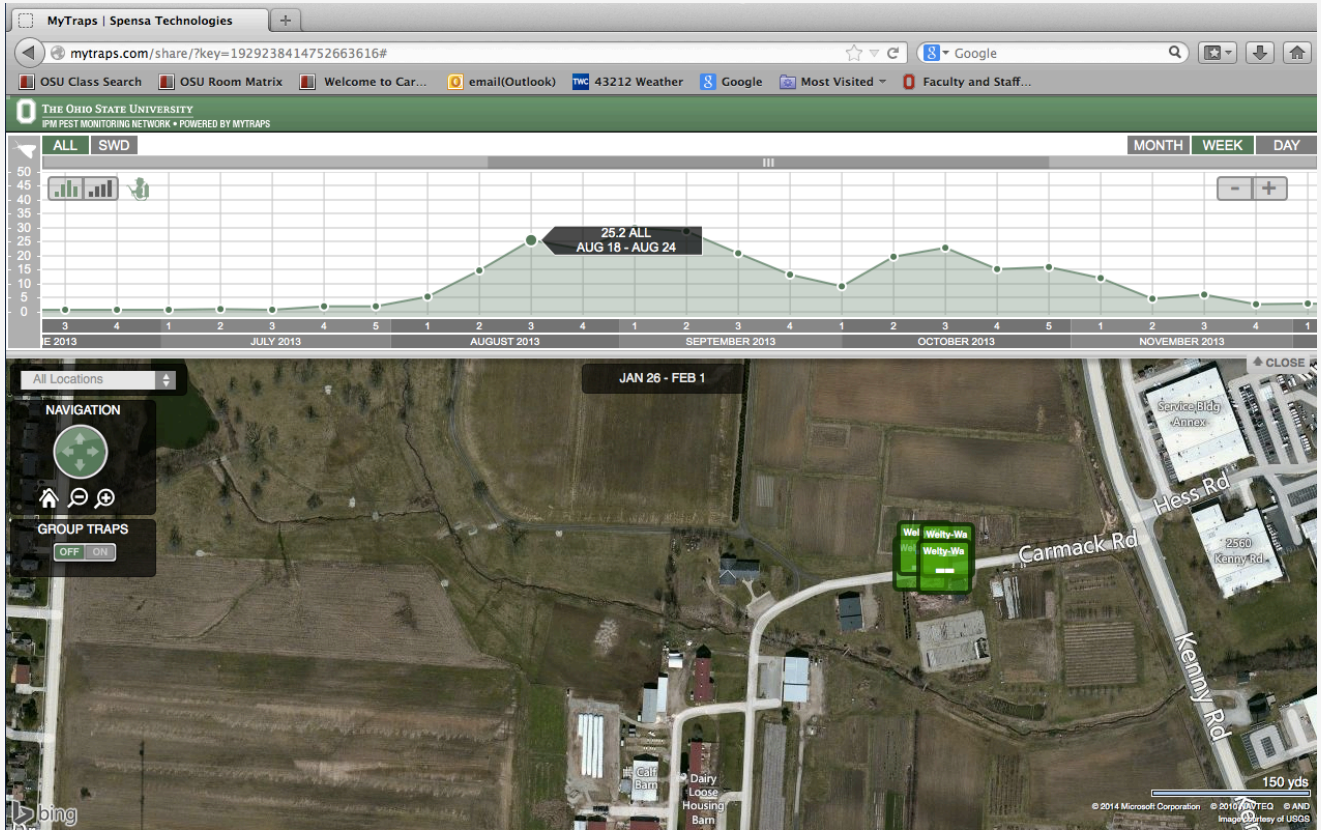
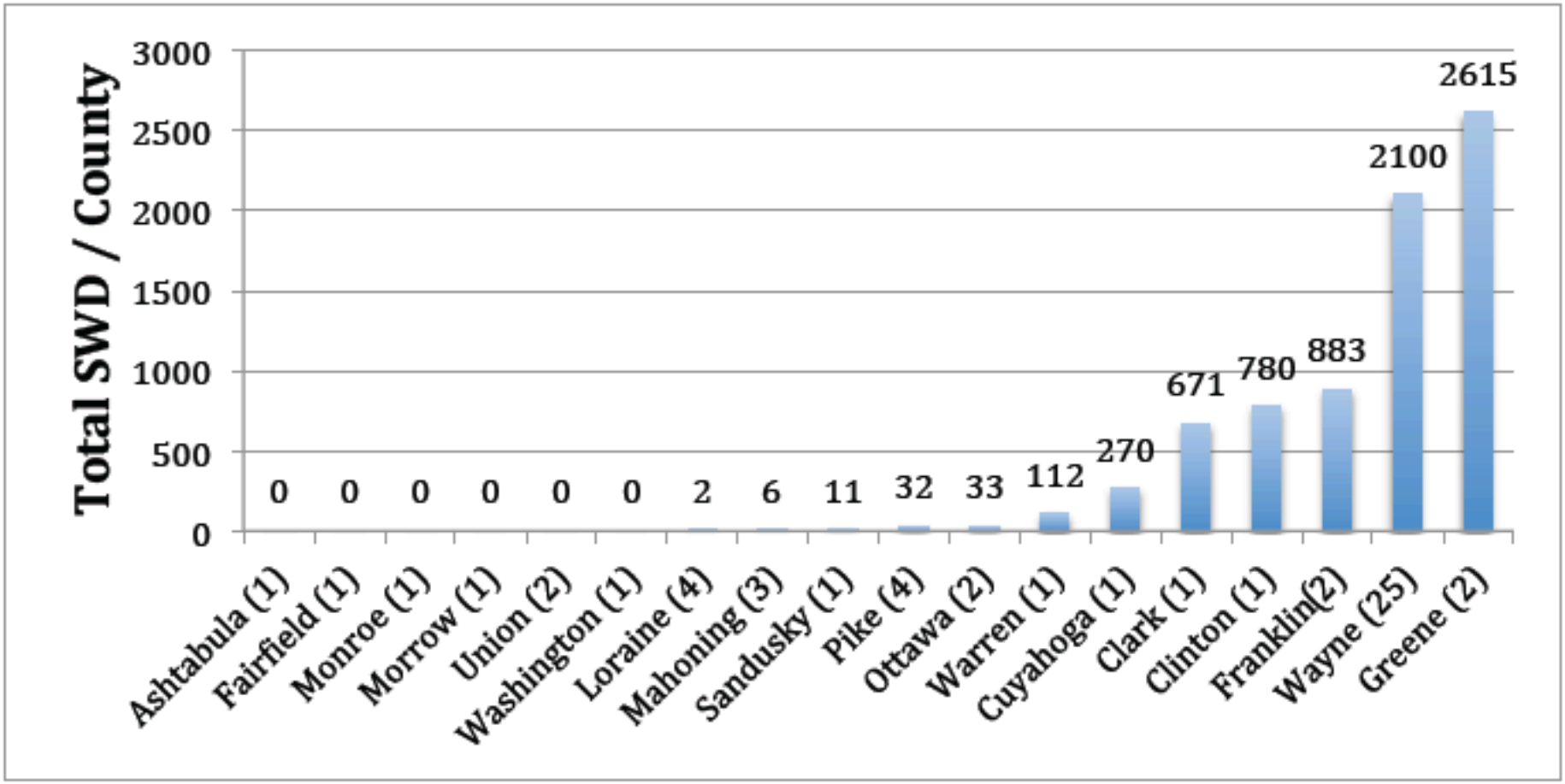
Trap network 2013 & 2014

- **26 traps in 14 counties**
- **trap counts on MyTraps website**
  http://mytraps.com/share/?key=19292384147526636 16

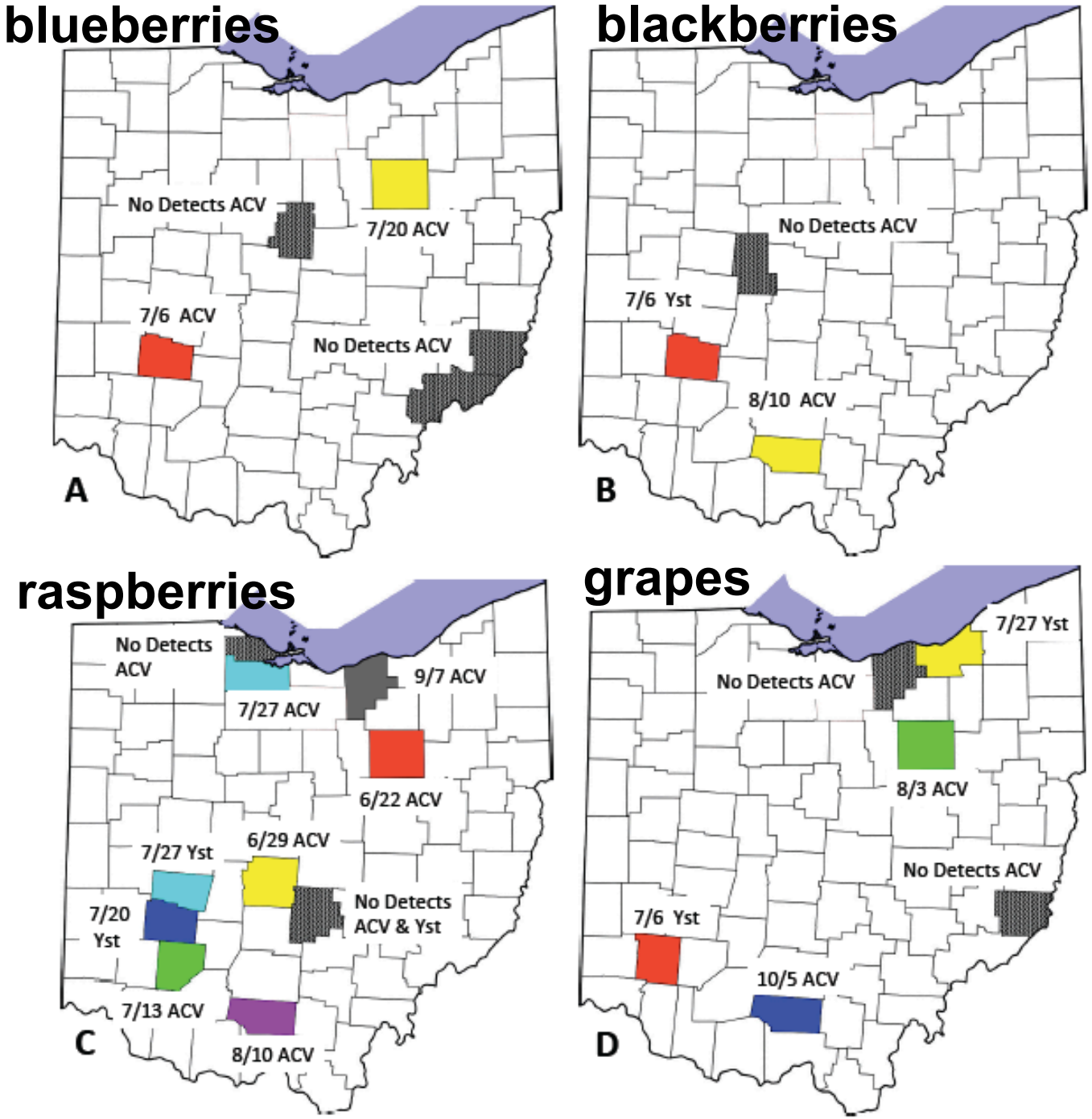


Spotted wing Drosophila in Ohio: results of trapping, 2014



First detect of SWD adults in traps, 2014

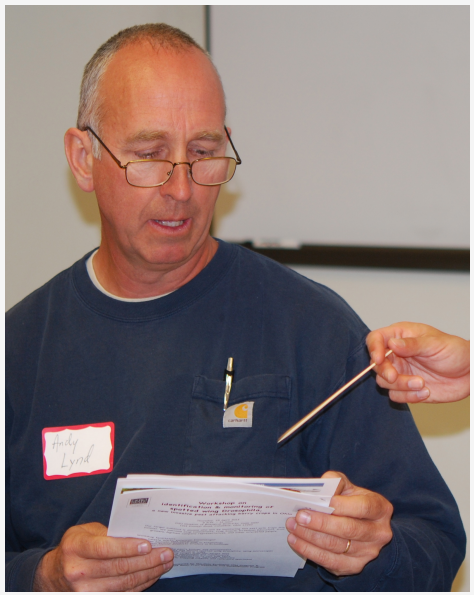
ACV= vinegar
Y = yeast



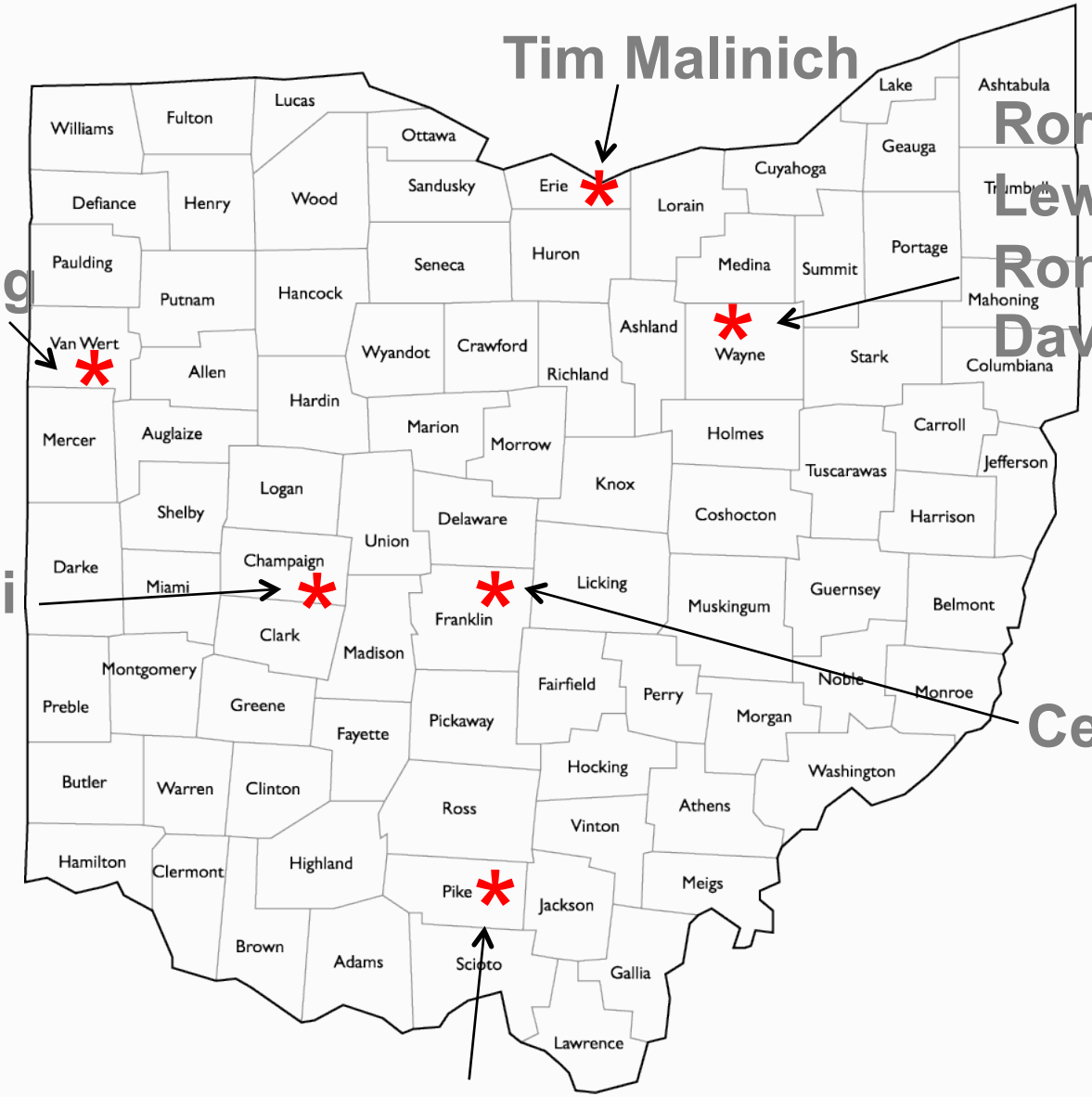
SWD Workshop, April 2013 & 2014






Identifiers with microscopes



Tim Malinich

Rory Lewandowski, Ron Becker, Dave Scurlock

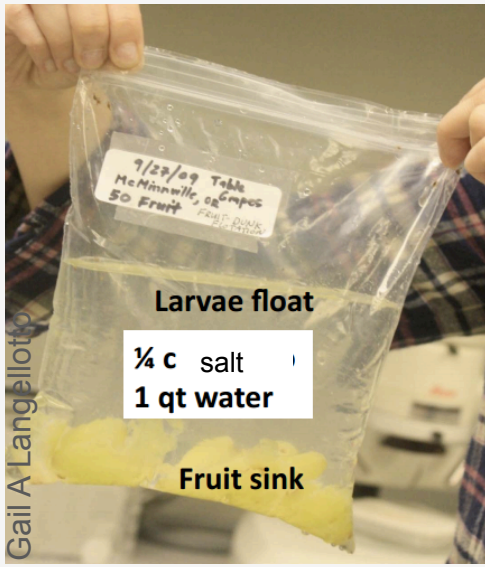
Curtis Young

Jim Jasinski

Celeste Welty

Thom Harker, Gary Gao, & Brad Bergefurd

Test fruit for SWD larvae with salt test

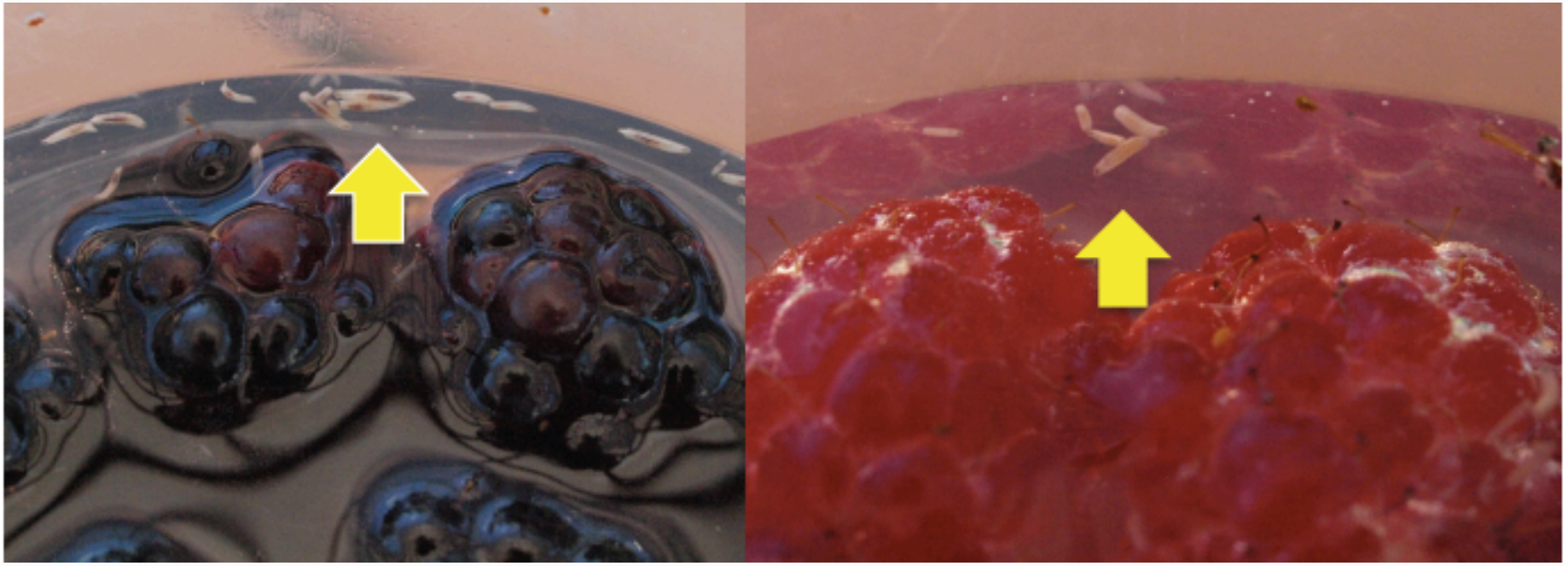


- Put fruit in zip-top bag
- 4 cups warm water + 1/4 cup salt
- Examine for floaters in 15 minutes
- To find smallest larvae, pour through coffee filter

Salt test: proportions

Salt	Warm water
1 Tablespoon	1 cup
¼ cup	1 quart (4 cups)
1 cup	1 gallon

Salt test



salt test results: fruit lots inspected for SWD larvae at Holmes County produce auction

Fruit	Auction lots SWD positive	Auction lots SWD negative	% Positive
mulberry	0	2	0
elderberry	0	8	0
plums	0	1	0
garden huckleberry	0	1	0
ground cherry	0	1	0
grapes	3	32	9
blackberry	3	8	27
red raspberry	12	14	46

Salt test results, Holmes County, 2014, by week, grapes

Date	Number of lots grapes	
	+ (infested)	- (clean)
6/25 to 8/5		all
5-Aug	0	0
7-Aug	0	0
14-Aug	0	0
19-Aug	0	1
21-Aug	0	0
26-Aug	0	0
28-Aug	0	1
2-Sep	1	1
4-Sep	2	3
9-Sep	0	2
11-Sep	0	3
16-Sep	0	4
17-Sep	0	e
18-Sep	0	2
26-Sep	0	8
30-Sep	0	3
2-Oct	0	3
9-Oct	0	1
sum	3	32

SWD in grapes in SW Ohio 2014

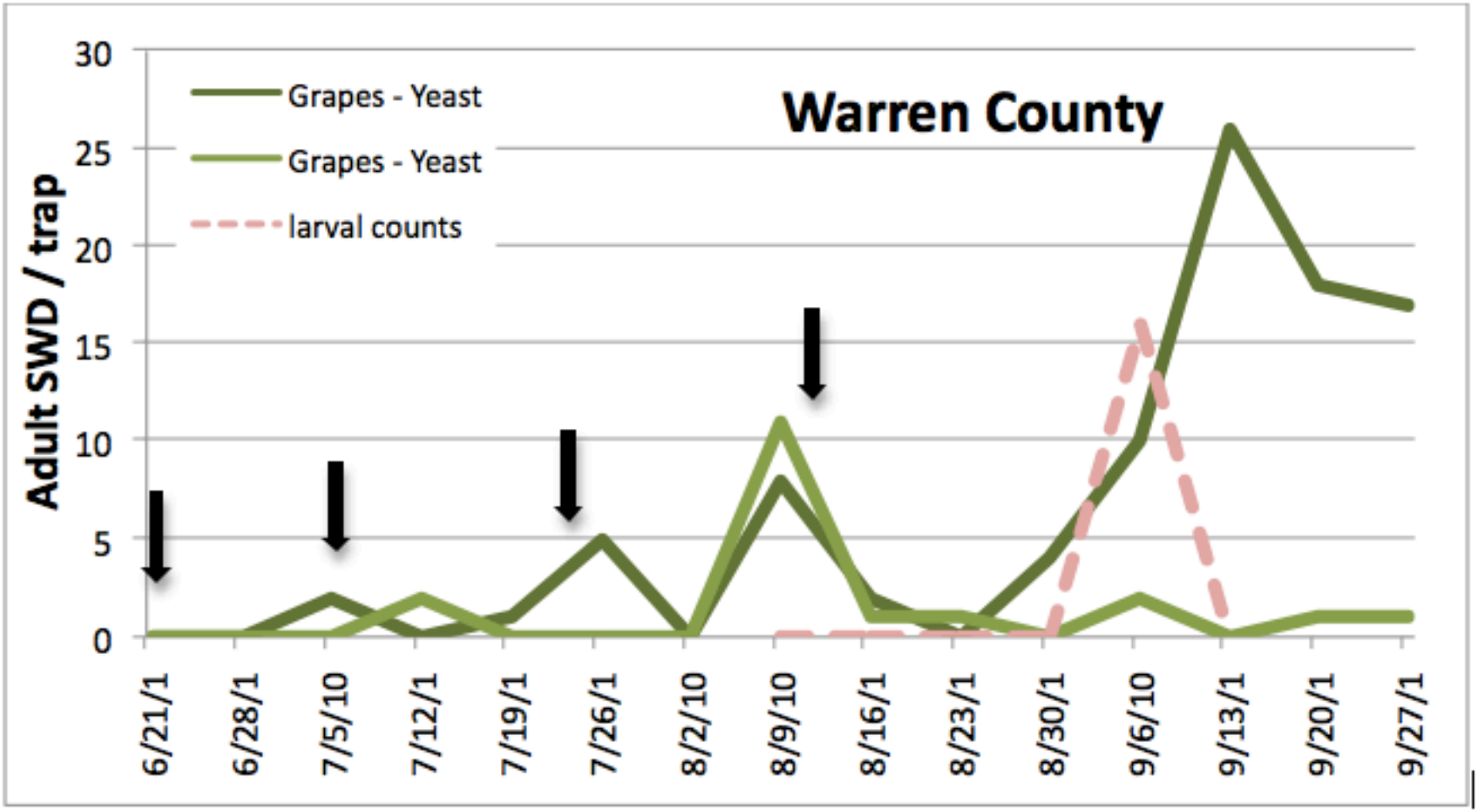


Figure 4. Fruit sprays in Warren County on Vidal grapes. Sevin (32 oz/A) was applied on May 6 and Danitol (10 oz/A) was applied May 23, June 5, June 21, July 7, July 25, and August 13.

Management of spotted wing Drosophila

- Prompt harvest as soon as ripe
- Chill fruit as soon as harvested
- Sanitation
  - Destroy leftover fruit
  - Culls in clear plastic bags in sun, 1 week
  - Strongly recommended
- Remove wild hosts
- Insecticides

Removal of nearby wild hosts

- Wild blackberry
- Pokeweed
- Mock strawberry
- Tartarian honeysuckle
- Bush honeysuckle
- Silky dogwood
- Persimmon
- Rose hips

Chart for SWD on all crops

(http://bugs.osu.edu/welty/pdf/SWD_Ohio_handoutV11.pdf)

Efficacy	Product	Residual activity (days)	Pre-harvest interval (PHI)						
			raspberry, blackberry	blue-berry	straw-berry	grape	cherry	peach	plum
Very effective	§ Delegate	5-7	1 day	3 days	X	7 days	7 days	14 days	7 days
	§ Radiant	5-7	X	X	1 day	X	X	X	X
	! Mustang Max	7-10	1 day	1 day	X	1 day	14 days	14 days	14 days
	! Brigade	7-10	3 days	1 day	0 days	30 days	X	X	X
	! Hero	7-10	3 days	1 day	X	30 days	X	X	X
	! Danitol	7-10	3 days	3 days	2 days	21 days	3 days	3 days	3 days
	! Asana	7-10	7 days	14 days	X	X	14 days	14 days	14 days
	! Baythroid	7-10	X	X	X	3 days	7 days	7 days	7 days
	! Warrior	7-10	X	X	X	X	14 days	14 days	14 days
	! Pounce	7-10	X	X	X	X	3 days	14 days	X
	Imidan	7	X	3 days	X	14 days	7 days	14 days	7 days
	! § Diazinon	7	7 days	7 days	5 days	X	21 days	21 days	21 days
	! Lannate	3-6	X	3 days	X	X	X	4 days	X
Effective	Malathion	5-7	1 day	1 day	3 days	3 days	3 days	7 days	X
	Entrust [OMRI]	3-5	1 day	3 days	1 day	7 days	14 days	14 days	7 days
Moderately effective	Sevin	10	7 days	7 days	7 days	7 days	3 days	3 days	3 days
	§ Assail	1-3	1 day	1 day	1 day	3 days	7 days	7 days	7 days
Slightly effective	Pyganic [OMRI]	1-3	0 days	0 days	0 days	0 days	0 days	0 days	0 days
Not effective	Actara	1-3	3 days	3 days	X	5 days	14 days	14 days	14 days
	Admire Pro	1-3	3 days	3 days	7 days	0 days	7 days	0 days	7 days

! *Restricted-Use Pesticide*

§ *Not allowed in greenhouses or high tunnels*

X *means that the product is NOT ALLOWED for use on that crop.*

Insecticides for SWD on grapes

Product	*PHI* *(days)*	*Limit* *(if used at max rate)*	*Residual* *(days)*
Mustang Max *	1	6 ap.	7-10
Assail *	3	2 ap.	1-3
Malathion *	3	2 ap.	5-7
Baythroid *	3	4 ap.	7-10
Delegate *	7	4 ap.	5-7
Entrust [OMRI]	7	3 ap.	3-5
Sevin	7	5 ap.	7-10
Imidan	7/14	3 ap.	7
Danitol *	21	2 ap.	7-10
Brigade, Hero *	30	1 ap.	7-10

News: sucrose adjuvant to increase efficacy

- Add sucrose (sugar)
- Very low rate: 1.2 gram/liter
- Assume 50 gal water/acre
- = 1 pound/acre

Sucrose 2.4 g/L: trial on grape foliage in CT, 2012

- 7 insecticides with vs w/o sucrose
- Expose residues 1, 2, 4, 8 days old
  - Entrust
  - Delegate
  - Assail
  - Malathion
  - Belay
- Increased mortality with sucrose
  - 11% after exposure to 1-d residue
  - 6% after exposure to 2-d residue

Sucrose adjuvant: trials

- **Blueberry (NJ, 2013)**
  - Delegate & Exirel w/ sucrose 1.2 g/L
  - w/ sucrose: 95-100% reduction in larvae
  - w/o sucrose: 46-91% reduction
- **Blueberry (NJ, 2013)**
  - Delegate & Assail, w/ sucrose: 76% reduction
  - Brigade & Imidan, w/o sucrose: 65% reduction
- **Strawberry (NY 2012): Entrust + sugar reduced larvae >50% vs no sugar**

Biocontrol??

- Natives: ~2% parasitism
- Exploration in Korea
  - 4 parasitoid species
  - In quarantine @ Berkeley

SWD Management Summary

- Use bait traps, check weekly
- If any SWD in traps, start spray program when berries start to color
  - Spray every 7 days until final harvest
  - Alternate:
    - Delegate (7-day PHI) + sugar
    - Assail (3-day PHI) + sugar
    - Malathion (3-day PHI) + sugar
- Do a salt test with ripe fruit, weekly
  - If bad: use 5-day or switch product

Brown marmorated stink bug


adult


nymph

- Attacks fruits & seed pods
- Invading Ohio since 2007

Brown marmorated stink bug: injury on grapes & berries

Pheromone lure

- Improved lure by USDA-ARS
- Double lure for synergy
  - ARS#20 (10 mg)
  - MDT (66 mg)
- Available from several companies
  - AgBio
  - Rescue
  - Trécé
  - Scentry
  - Alpha Scents
  - Bedoukian

Stink bug pheromone traps

black pyramid
from AgBio ($30)

Home-made from PVC topped by ‘Dead-Inn’ trap from AgBio

Action threshold?

Tentative, for apples:

- **Cumulative capture since last spray**
- **Mean of 10 adults per trap**
- **Once > threshold:**
  - **spray**
  - **re-set count to zero**

Insecticides for stink bugs on grapes

group	*Product*	*PHI (days)*	*Limit (if used at max rate)*
neonicotinoids	Belay	0	2 ap.
	Venom/Scorpion	1	2 ap.
	Assail	3	2 ap.
	Actara	5	2 ap.
pyrethroids	Mustang Max	1	6 ap.
	Baythroid	3	4 ap.
	Danitol	21	2 ap.
	Brigade	30	1 ap.
spinosyns	Delegate	7	4 ap.
organophosphate	Malathion	3	2 ap.

Problem…

- **Pyrethroid use can flare secondary pests such as mealybugs & mites**

New insecticide for brown marmorated stink bug

- **Azera**
  - Organic compliant
  - OMRI listed
  - Pre-mix: azadirachtin + pyrethrins
  - New 2012
  - Made by MGK

the end

Info on fruit & veg. pests
http://bugs.osu.edu/welty/

Questions?

e-mail: welty.1@osu.edu
office phone: 614 292 2803
cell phone: 614 746 2429