

# Pumpkins, Bt Sweet Corn & Invasive Pests

**Jim Jasinski, Celeste Welty, Sally Miller**

**Depts. of Extension, Entomology, and Plant Pathology**

**February 1, 2021**

**Virtual SW Specialty Crop Conference**

**Funded by OVSFRDP & IPM Program**



Photo by David Coyle, ©2018,  
Clemson University



**THE OHIO STATE UNIVERSITY**

COLLEGE OF FOOD, AGRICULTURAL,  
AND ENVIRONMENTAL SCIENCES



## Topics for Today

- Pumpkin
  - Biofumigation, Powdery mildew update, Hybrids
  - Virtual pumpkin field day
- Sweet corn
  - Bt sweet corn trial results
- Invasive pest update
  - SLF, BMSB & SWD
- Q & A ??

# Entomology personnel changes

- CW: retire May/June 2021 🤗
- 33 Years of service in fruit and veg growers 🤗
- Search underway: specialty crop entomologist
  - 60% extension, 20% research, 20% teaching



Golden Pumpkin Award 2020



# Biofumigation using Mustard cover crops

- Research 2018/19/20 (IPM/OVSFRDP)
- Cultural reduction soil borne diseases (Filthy Four)

plectosporium



phytophthora



Fusarium



pythium







# Plectosporium Blight

- Plecto is a fungal blight on petioles, leaves, vines, fruit and handles
- Soil borne and overwinters as a spore; thrives in 77F, humid, wet weather
- Disease on the upswing in Ohio







# Plectosporium Blight Field Symptoms







# Plectosporium Blight on Fruit/Handle







# Pumpkin - Biofumigation

The incorporation of fresh and finely ground plant biomass into the soil, releasing several substances able to **suppress** soil-borne pests (bacteria, fungi, nematodes, weed seeds)

- MCC makes glucosinolates in tissue, converts to biofumigant in soil
- Can Mustard CC suppress Plectosporium blight?







# 2019 Trial Design & TRTS - (RCB)



## Pacific Gold

6.5 lb/A

\$6.5 / lb



## Caliente 199

11 lb / A

\$6.5 / lb



½ rate PG +  
C199

UTC



MCC

MCC + PM Control



MCC

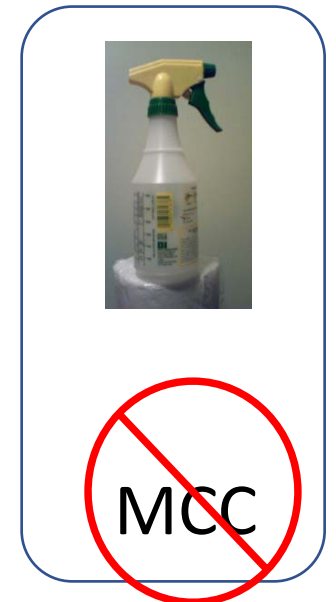


MCC



MCC

No MCC +  
Plecto Control



MCC

Early  
bloomer



# MCC Termination Process



- MCC **bush hogged**, roto-tilled, packed and sealed in 10-15 minutes







# MCC Termination Process



- MCC bushhogged, **roto-tilled**, packed and sealed in 10-15 minutes







# MCC Termination Process



- MCC bushhogged, roto-tilled, **packed** and sealed in 10-15 minutes







# MCC Termination Process



- MCC bushhogged, roto-tilled, packed and **sealed** in 10-15 minutes



>1,000 GPA



# Biofumigation Video on OSU IPM YouTube



Search



Using a Mustard Cover Crop for Disease Biofumigation on Pumpkin

467 views • Jun 15, 2019

6 0 SHARE SAVE ...



The Ohio State University IPM Program  
121 subscribers

SUBSCRIBE

CFAES





## 2019, 2020 WARS Study Results

- Research Trial
- Slight indications MCCs and Strobiluron trts sig. lower infestation than UTC
  - Petioles and leaf veins
- Low incidence (<25%) and severity (<1.2%) on handles
- 0% Plecto on fruit (both years)
- Strobilurons might suppress Plecto, do NOT control PM!
- **General conclusion:** low inoculum in field, dry to avg. weather, slight infections, slight reduction using MCC/Strobi





# 2020 On-Farm Strip Trial

MCC VS. No MCC (All strips had PM Control)

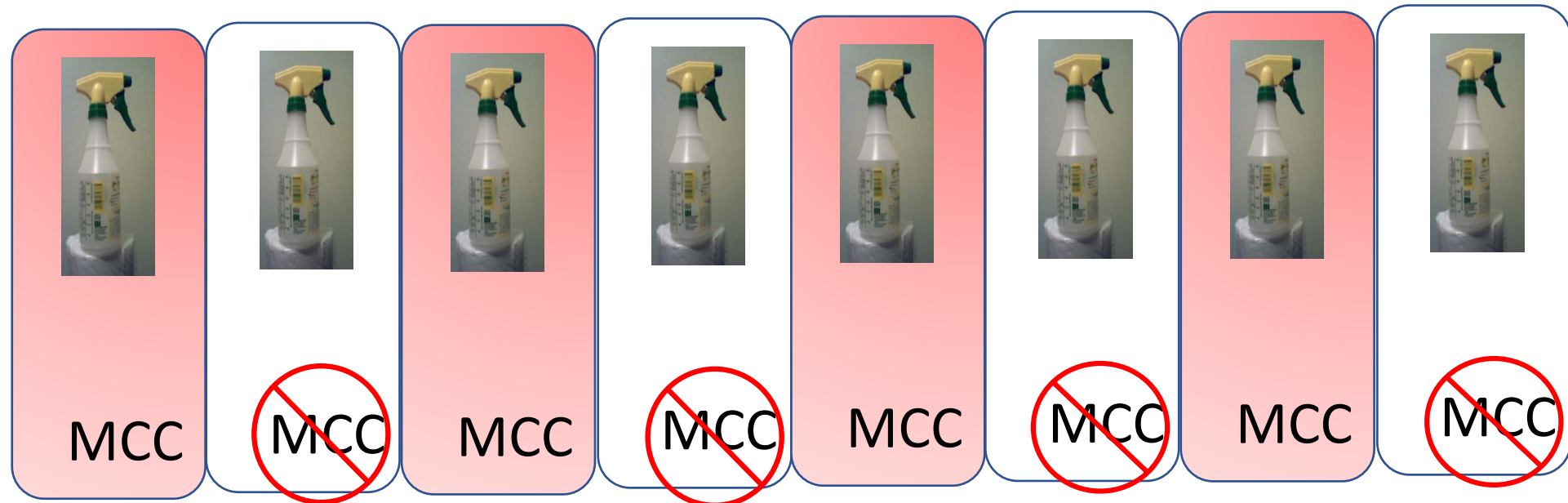
Quintec alt. w/ Procure

**Caliente Rojo**

10 lb / A

\$10 / lb

@ 100 lb N/A





# On-Farm Strip Trial





# 2020 On-Farm Strip Trial #2 – Aug. 28



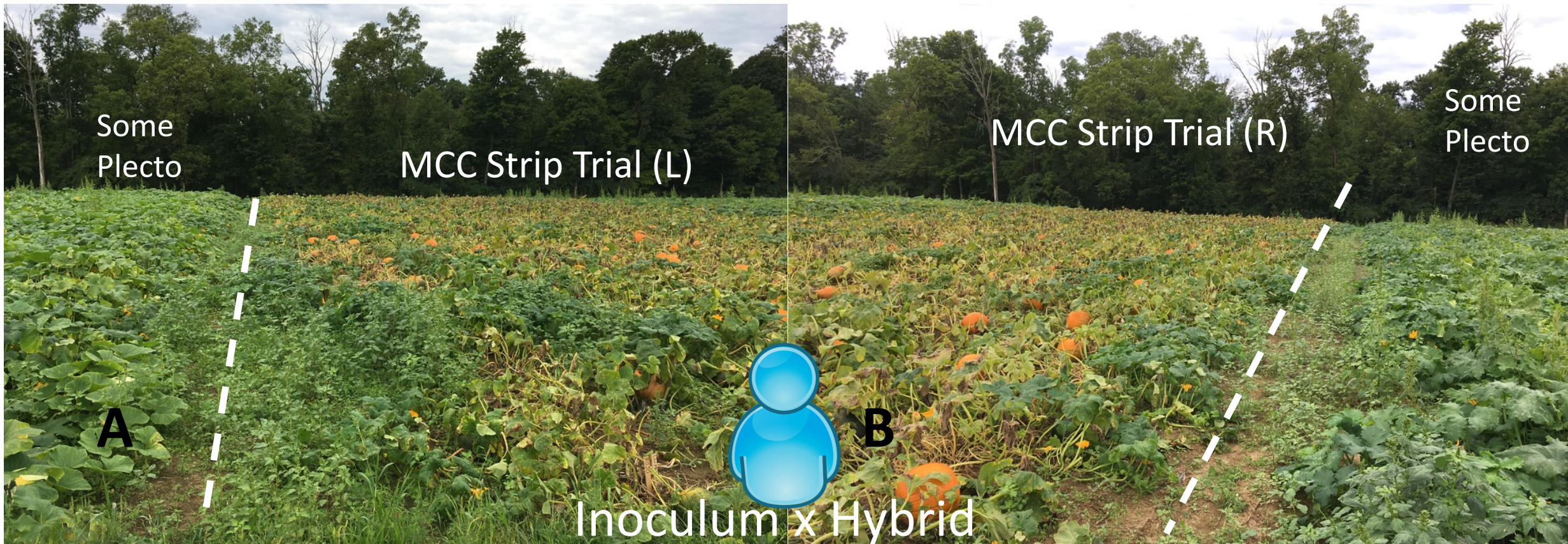
Hammered

Hammered



# 2020 On-Farm Strip Trial

95% plants infested, 80+% vines collapsed  
80+% handles blighted, 25% of fruit scarred (unmarketable), 50% fruit discounted







## 2020 On Farm Strip Trial – Conclusions

- Based on Plecto levels & damage, no evidence MCC strip trial was successful at this farm
  - Plant infestation, vine collapse, handle and fruit infestation
- Re-discovered susceptibility between hybrids
  - Squash/Moschata more resistant than Pumpkin
- Semi successful - Grower was interested in trying MCC process
- Noticed pollinator benefits and soil health



## MCC General Conclusions

- Variability by site and year; weather x hybrid interactions x inoculum
- Some evidence for reduction of Plecto using MCC/Strobilurons at **station**
- No evidence for reduction of Plecto based **on-farm** strip trial
- \***Best** case scenario for MCC success
  - Resistant hybrid + low spore load + dry weather
- \***Worse** case scenario
  - Susceptible hybrid + high spore load + wet weather
- Might explain variability in success (previous trials)
- Recommend MCC? Only if other benefits are considered
- Focus on soil health & pollinator benefits in future studies



# Pumpkin Virtual Field Day



- Introduction
- Biofumigation
- Herbicide weed screen
- PM fungicide trial
- Insect pests
- Hybrid trial
- Conclusion
- 70 min long

# Pumpkin Virtual Field Day

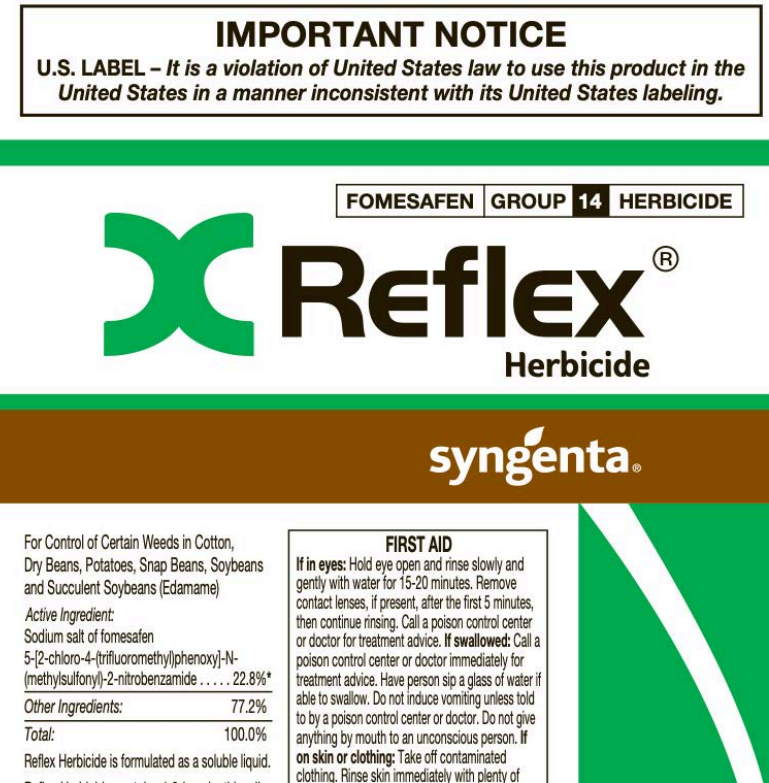
3D Pumpkin & Squash Hybrid Trial (Walk around the pumpkin patch)





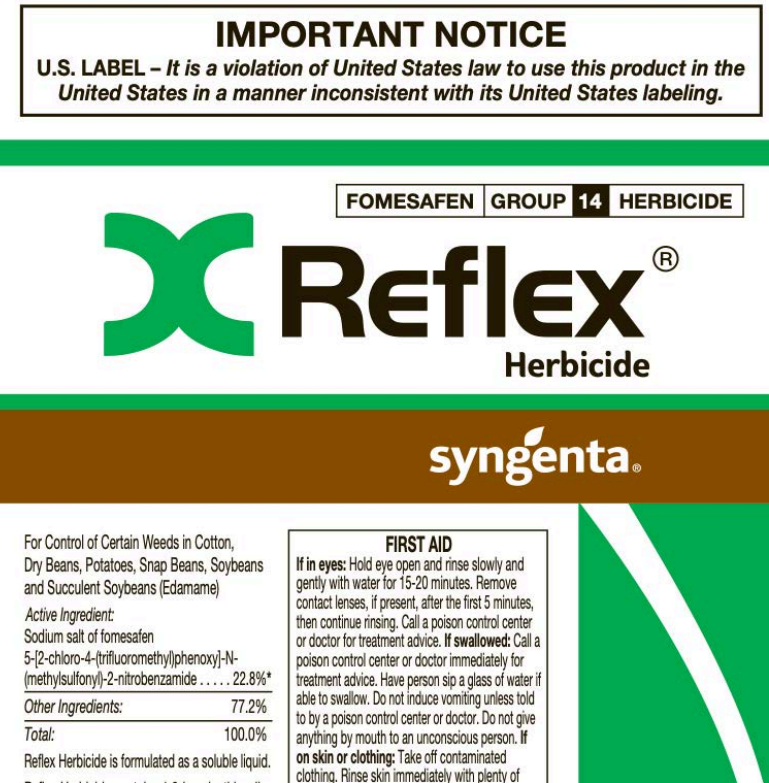
# Herbicide update – Reflex (Fomesafen)

- Approved 24(C) label May, 2020 (need label in hand)
- Signal word **Danger** / NOT Restricted Use
- Rate 0.5-1 pt/A pre-emergence; not recommended by itself
- Direct seed or transplant
- Broadleaves (c. ragweed, pigweed, LQ, EBN); some grasses (crab, goose)



# Herbicide update – Reflex (Fomesafen)

- Consider Reflex + Dual or Sandea or Strategy
- Summer and winter squash sensitive (Butternut v. sensitive)
- Rotational restrictions 0-18 months certain crops
- Complete review in Pumpkin Field Day video
- Plan to do weed screen trial in 2021 at WARS





# Powdery Mildew

- Occurs annually in OH, does **not** overwinter in OH
- Mid-July, scout top & bottom leaf surface, begin trt when PM first detected
- Trt 7-14 day schedule, 35-50 GPA, 60+PSI, rotate FRAC numbers





# Powdery Mildew

- Rotation Ex.: Quintec (13) alt. w/ Procure (3)
- Rotation Ex.: Luna Experience (3,7) alt. w/ Vivando (U8)
- Rotation Ex.: Flint (11) alt. w/ Luna Sensation (7,11)
- Can use M fungicides (Chlorothalonil, Manzate) every spray
- Consult MWVG for all fungicide recommendations





# Powdery Mildew Demo Trial

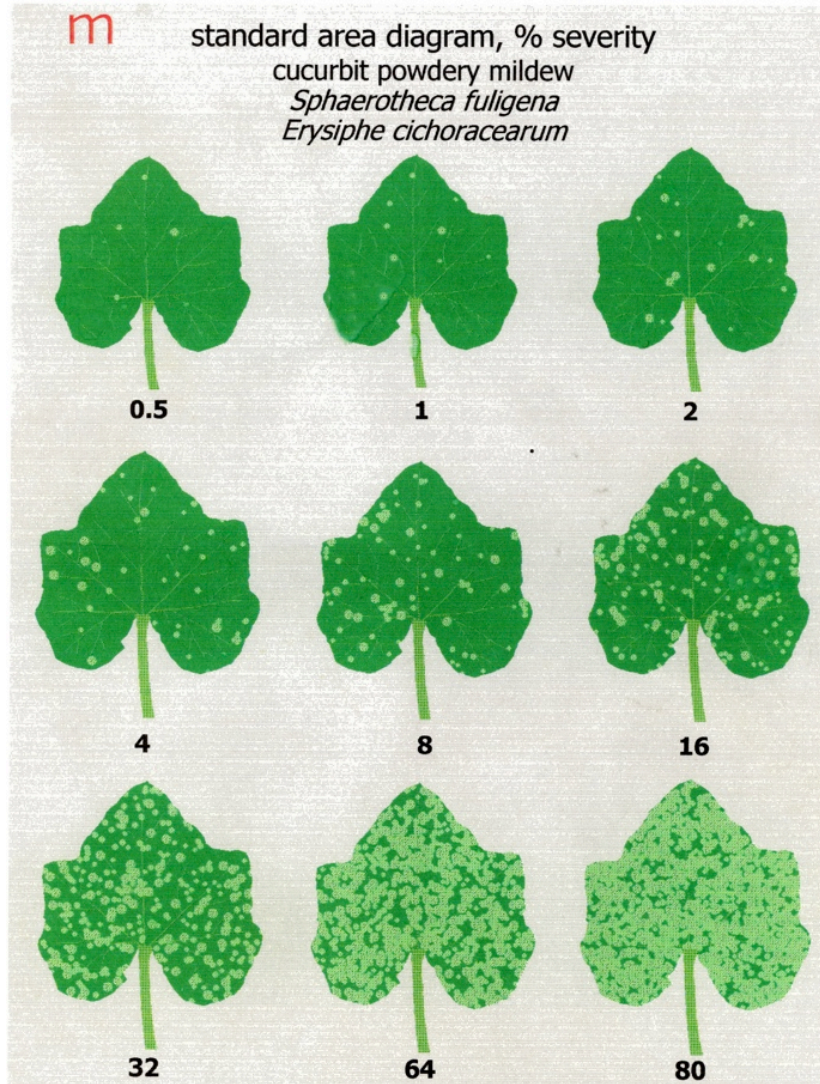


Figure 1. Percent powdery mildew infection chart.

- Efficacy of fungicide combinations
- Each TRT non-replicated, 80ft row
- Use PM **susceptible** hybrids
- Begin rating/spraying end of July
- Trt 7-14 days until mid Sept
- 6 random leaves per TRT
- % PM upper & lower leaf surface
- Part of pumpkin field day
- Compile report
- [u.osu.edu/jasinski.4/pumpkin](http://u.osu.edu/jasinski.4/pumpkin)

# Powdery Mildew Trial – 2020

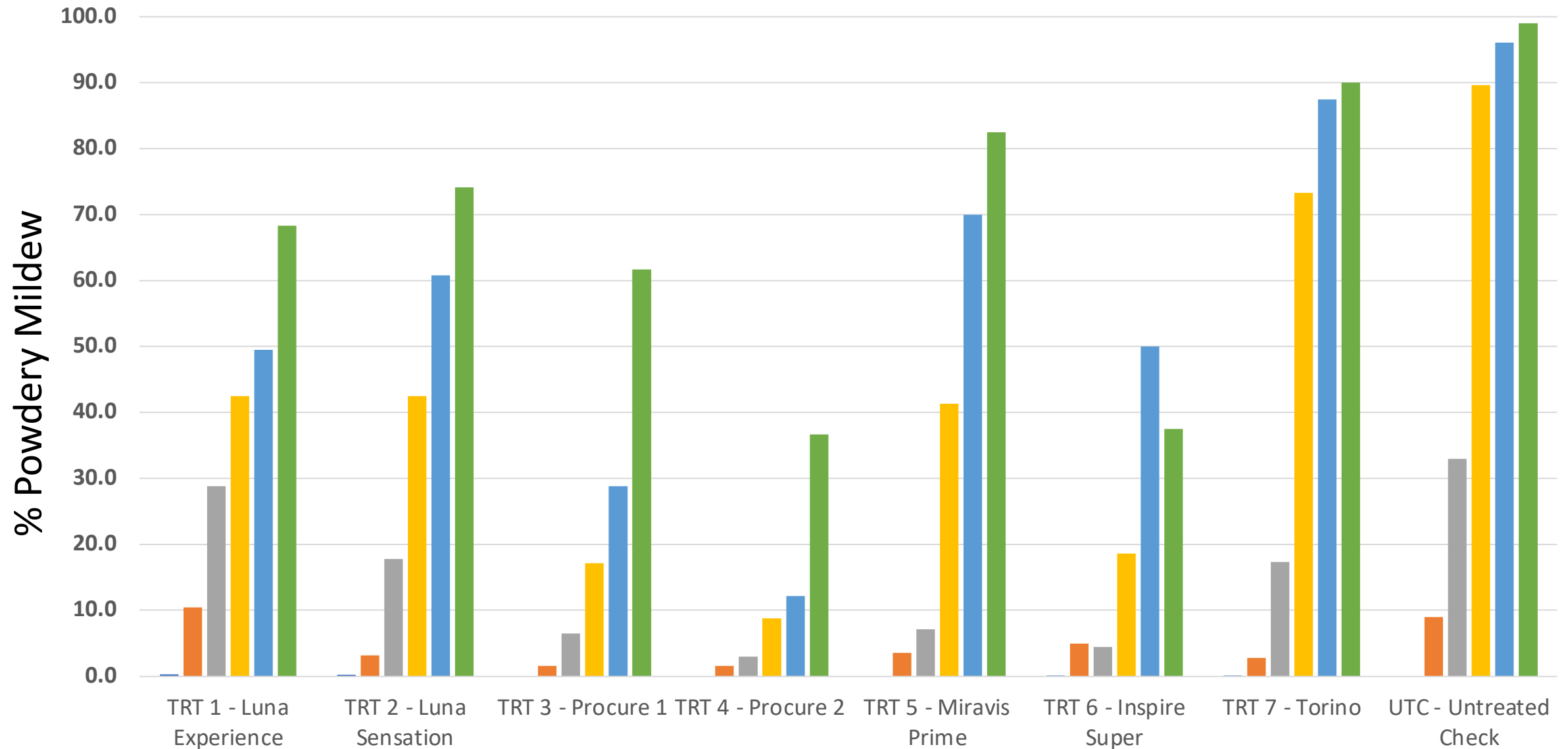
## Evaluating Programs



TRT	Product, Rate, FRAC Sprays 1 (7/29), 3 (8/14), and 5 (8/28)	Product, Rate, FRAC Sprays 2 (8/6), 4 (8/21), and 6 (9/4)
1	<b>Luna Experience</b> 6 fl oz + Manzate Pro 2.5lbs + Chemsurf 90 (0.125 v/v) [FRAC 7,3 +M] (Bayer, UPL)	<b>Vivando</b> 15.4 fl oz + Manzate Pro 2.5lbs + Chemsurf 90 (0.125 v/v) FRAC [U8 + M] (BASF, UPL)
2	<b>Luna Sensation</b> 6 fl oz + Manzate Pro 2.5lbs + Chemsurf 90 (0.125 v/v) (FRAC 7,11 + M) (Bayer, UPL)	<b>Vivando</b> 15.4 fl oz + Manzate Pro 2.5 lbs + Chemsurf 90 (0.125 v/v) FRAC [U8 + M] (BASF, UPL)
3	<b>Procure</b> 8 fl oz + Manzate Pro 2.5lbs + Vacciplant 14 fl oz (FRAC 3 + M +P4) (UPL)	<b>Vivando</b> 15.4 fl oz + Manzate Pro 2.5 lbs + Vacciplant 14 fl oz (FRAC U8 + M + P4) (BASF, UPL)
4	<b>Procure</b> 8 fl oz + Dexter MAX 3.2 lbs + Vacciplant 14 fl oz (FRAC 3 + M, 11 + P4) (UPL)	<b>Vivando</b> 15.4 fl oz + Manzate Pro 2.5 lbs + Vacciplant 14 fl oz (FRAC U8 + M + P4) (BASF, UPL)
5	<b>Miravis Prime</b> 11.4oz + Manzate Pro 2.5lbs + Chemsurf 90 (0.125 v/v) [FRAC 7,12 +M] (Syngenta, UPL)	<b>Procure</b> 8 oz + Manzate Pro 2.5 lbs + Chemsurf 90 (0.125 v/v) [FRAC 3 + M] (UPL)
6	<b>Inspire Super</b> 20oz + Manzate Pro 2.5lbs + Chemsurf 90 (0.125 v/v) [FRAC 9,3 + M] (Syngenta, UPL)	<b>Vivando</b> 15.4 fl oz + Manzate Pro 2.5lbs + Chemsurf 90 (0.125 v/v) FRAC [U8 + M] (BASF, UPL)
7	(1&3) <b>Torino</b> 3.4 oz + Manzate Pro 2.5 lbs; (5) <b>Procure</b> 8oz + Manzate Pro 2.5 lb [FRAC U6 +M] and [FRAC 3 + M] (Gowan, UPL)	<b>Quintec</b> 6oz + Manzate Pro 2.5lbs [FRAC 13 + M] (Gowan, UPL)



# PM Trial July 28- Sept. 14, 2020



# Powdery Mildew Demo Trial

## Fungicide Ratings Last Few Years

South Charleston (WARS)

### **Good to Great**

Miravis Prime & Inspire Super (new)  
Luna Experience, Luna Sensation  
Merivon, Vivando, Fontelis, Procure,  
Rally, Pristine

### **Variable Results**

Torino, Quintec

### **Protectant Sprays**

Bravo or Manzate (Not Good PM)



Treatment and rate/A	FRAC Group	% PM 9 DAE
Non-treated control		17.4 a
Torino 0.85SC, 3.4 fl oz	U06	18.1 a
Bravo Weather Stik 6SC, 48 fl oz	M	17.4 a
Pristine WG, 18.5 oz	11+7	14.5 ab
Merivon Xemium 2.09SC, 5.5 fl oz	11+7	13.1 abc
Aprovia Top, 13.5 fl oz	7+3	12.4 abc
Rally 40 WSP, 5 oz	3	11.8 abc
Quintec 2.08SC, 6 fl oz	13	8.2 bc
Fontelis 1.67SC, 16 fl oz	7	6.1 c
Inspire Super EW, 20 fl oz	3+9	0.4 d
Procure 480 SC, 8 fl oz	3	0.0 d
Vivando, 15.4 fl oz	50	0.0 d
Gatten, 8 fl oz	U13	0.0 d

## PM Control Lab Bioassay

Efficacy of fungicides against pumpkin powdery mildew in a bioassay, 2020

Ratings were made 9 days after treated plants were exposed to powdery mildew

Treatment and rate/A	FRAC Group	% PM 9 DAE	% PM 14 DAE
Non-treated control		17.4 a	45.5
Torino 0.85SC, 3.4 fl oz	U06	18.1 a	39.5
Bravo Weather Stik 6SC, 48 fl oz	M	17.4 a	40.5
Pristine WG, 18.5 oz	11+7	14.5 ab	40.5
Merivon Xemium 2.09SC, 5.5 fl oz	11+7	13.1 abc	36.6
Aprovia Top, 13.5 fl oz	7+3	12.4 abc	38.6
Rally 40 WSP, 5 oz	3	11.8 abc	32.8
Quintec 2.08SC, 6 fl oz	13	8.2 bc	25.6
Fontelis 1.67SC, 16 fl oz	7	6.1 c	29.1
Inspire Super EW, 20 fl oz	3+9	0.4 d	7.1
Procure 480 SC, 8 fl oz	3	0.0 d	0.5
Vivando, 15.4 fl oz	50	0.0 d	0
Gatten, 8 fl oz	U13	0.0 d	0.1

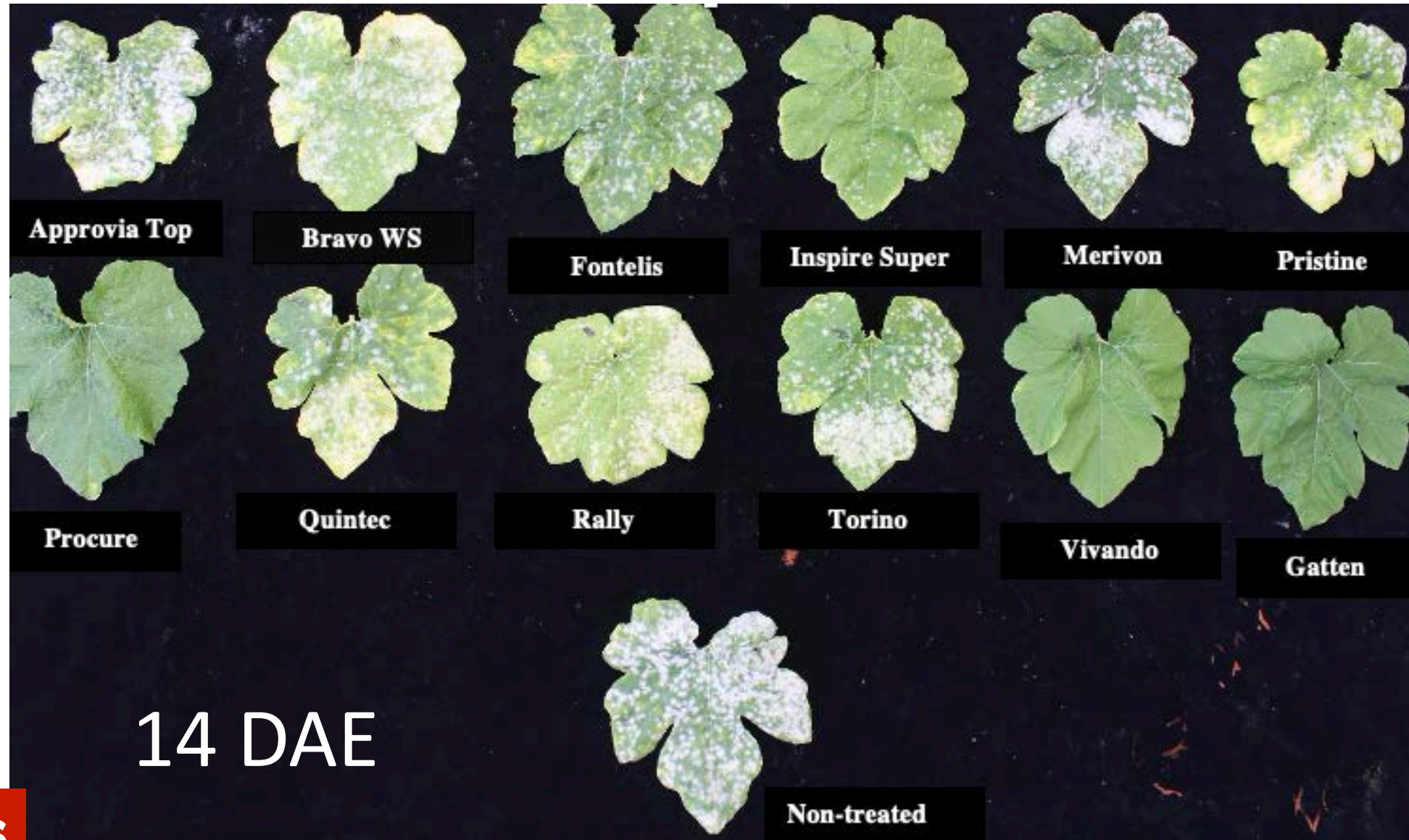
## PM Control Lab Bioassay

Efficacy of fungicides against pumpkin powdery mildew in a bioassay, 2020

Ratings were made 9 days after treated plants were exposed to powdery mildew



# Fungicide Efficacy Against Powdery Mildew





**Top Row (L to R):** Indian Doll, Blue Doll, Charisma, RPX 6208, Zeus, Specter, 20Kt Gold, Bayhorse Gold, Thor, Orange Sunrise

**Middle Row (L to R):** Red Witch, Crystal Star, Ritz, RPX 6229, Carrie, Hermes, Secretariat, Tom Fox

**Bottom Row (L to R):** Gum Drop, Bisbee Gold, Silver Edged, RPX 6875, Fall Splendor +, Sanchez, Snowball, Annabelle, Rockafellow, Half Pint



# 2020 Pumpkin and Squash Hybrid Trial



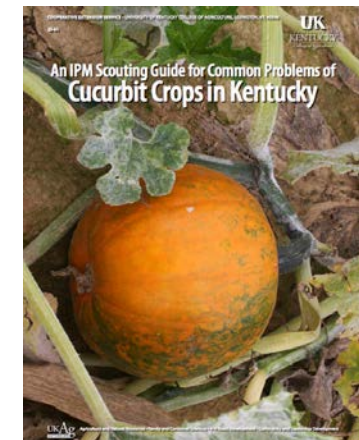
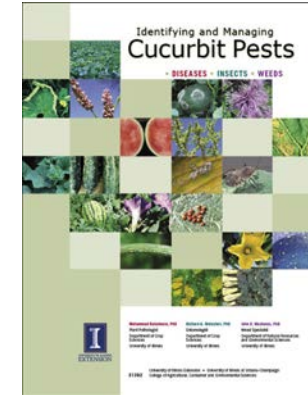
# 2020 Pumpkin and Squash Trial Results

Hybrid	Seed Company	PMT/PMR	Day to Maturity
20 Kt Gold	Rupp	PMT	100
Annabelle	Siegers	PMT	90
Bayhorse Gold	Rupp	PMT	100
Bisbee Gold	Rupp	PMT	90
Blue Doll	Harris	PMT	100
Carrie	Siegers	PMT	100
Charisma	Johnny's	PMT	98
Crystal Star	Harris	NA	100
Fall Splendor Plus	Sakata	PMT	105
Gum Drop	Johnnys	NA	100
Half Pint	Siegers	PMT	80
Hermes	Harris	PMT	90-95
Indian Doll	Harris	PMT	100
Orange Sunrise	Harris	PMT	100
Red Witch	Siegers	NA	95
Ritz	Siegers	NA	100
Rockafellow	Siegers	PMT	95
RPX 6208	Rupp	PMT	100
RPX 6229	Rupp	PMT	90
RPX 6875	Rupp	NA	90
Sanchez	Harris	NA	95
Secretariat	Harris	PMT	105
Silver Edged	Harris	NA	95
Snowball	Siegers	PMT	100
Specter	Harris	PMT	95
Thor	Siegers	NA	105
Tom Fox	Johnny's	NA	110
Zeus	Harris	PMT	110

Hybrid	Fruit Range (lb)	Avg Weight (lb)	Marketable Fruit (#)	Estimated Fruit / Acre**	Estimated Tons / A
20 Kt Gold	17.2 - 18.3	17.7	16	928	8.2
Annabelle	1.7 - 2.0	1.9	44	2552	2.4
Bayhorse Gold	15 - 20.7	18.1	15	870	7.9
Bisbee Gold	3.3 - 5.7	4.6	22	1276	2.9
Blue Doll	11.9 - 21.3	16.6	14	812	6.7
Carrie	10.0 - 13.9	12.5	14	812	5.1
Charisma	8.5 - 12.6	10	8	464	2.3
Crystal Star	9.9 - 12.9	11	16	928	5.1
Fall Splendor Plus	3.1 - 4.4	3.7	20	1160	2.1
Gum Drop	9.9 - 10.6	10.3	10	580	3.0
Half Pint***	1.1 - 1.4	1.3	45	2610	2
Hermes	10.0 - 13.1	12	12	696	4.2
Indian Doll	7.7 - 18.0	12.9	14	812	5.2
Orange Sunrise	11.5 - 14.7	13.5	16	928	6.3
Red Witch*	6.3 - 9.6	7.6	23	1334	5.1
Ritz	11.7 - 15.4	13.9	11	638	4.4
Rockafellow	1.9 - 2.1	2	45	2610	2.6
RPX 6208	12.1 - 20.5	16.2	16	928	7.5
RPX 6229	7.5 - 8.7	8.1	15	870	3.5
RPX 6875	4.2 - 5.0	4.6	14	812	1.9
Sanchez	3.4 - 5.0	4.5	26	1508	3.4
Secretariat	12.2 - 15.3	13.5	13	754	5.1
Silver Edged	3.4 - 6.1	4.7	16	928	2.2
Snowball	1.9 - 2.9	2.4	60	3480	4.2
Specter	8.3 - 13.4	11.5	14	812	4.7
Thor	14.6 - 17.2	15.7	16	928	7.3
Tom Fox	13.3 - 23.3	17.4	9	522	4.5
Zeus	13.9 - 17.1	15.4	15	870	6.7

# Pumpkin IPM Publications

- Identifying and Managing Cucurbit Pests (IL) \$11
- Pumpkin Production Guide (NRAES-123) \$39
- IPM Scouting Guide for Common Problems of Cucurbit Crops in Kentucky -pdf (free)





# Current Sources of IPM Information

- VegNet Newsletter/Blog
  - Updated daily/weekly through the season
- OSU IPM YouTube
  - Research, DIY, Hybrids

CFAES

The image shows two screenshots. The top screenshot is the homepage of the VegNet Newsletter, which is part of The Ohio State University's College of Food, Agricultural, and Environmental Sciences (CFAES). The page features a red header with the university's name and logo, and a large image of fresh spinach with the CFAES logo overlaid. The bottom screenshot is the YouTube channel page for 'The Ohio State University IPM Program', which has 221 subscribers. The channel page includes a banner image of a group of people in a field, a search bar, and a list of videos. The videos shown are 'Spotted Wing Drosophila' (3:55), '2012-18 SWD Distribution' (44:44), 'Managing Spotted Wing Drosophila using Exclusion...' (14:35), and 'New SWD Cooperator Orientation Webinar' (1:21:31).

# Current Sources of IPM Information

- Midwest Vegetable Production Guide
  - Updated annually by OSU & 7 other state's vegetable specialists
  - Online or hardcopy
  - <https://mwvegguide.org>

## Midwest Vegetable Production Guide for Commercial Growers

### 2020

#### Illinois

University of Illinois Extension  
C1373-20

#### Indiana

Purdue Extension  
ID-56

#### Iowa

Iowa State University Extension and Outreach  
FG 0600

#### Kansas

Kansas State University Research and Extension  
MF3279

#### Michigan

Michigan State University Extension  
E0312

#### Minnesota

University of Minnesota Extension  
BU-07094-S

#### Missouri

University of Missouri Extension  
MX384  
Lincoln University of Missouri  
Cooperative Extension and Research  
LUCER 01-2020

#### Ohio

Ohio State University Extension  
Bulletin 948



We're Online!



# Corn Earworm & B.t. Sweet Corn



# Bt Multi-state field trials, 2019 & 2020

- **Objective:** document susceptibility or resistance of “worms” to Bt
- 5 hybrids (3 Bt, 2 isoline)
- One large plot (80’ x 4 rows) per hybrid per site
- Late planted (June 21) to maximize worm pressure
- No insecticides sprayed at all
- Caterpillar must ingest Bt toxin to die
- At 31 sites in 16 States & 4 Provinces





# Hybrids evaluated

Hybrid	Series	Company	Year	Gene/Trait
Providence	Non-Bt	Rogers / Syngenta	<2003	-
BC 0805	Attribute	Rogers / Syngenta	2003	Cry1Ab
Remedy	Attribute II	Rogers / Syngenta	2013	Vip3A + Cry1Ab
Obsession	Non-Bt	Seminis/Monsanto	<2011	-
Obsession-II	Performance	Seminis/Monsanto	2011	Cry1A.105 + Cry2Ab2 + Cry3Bb1

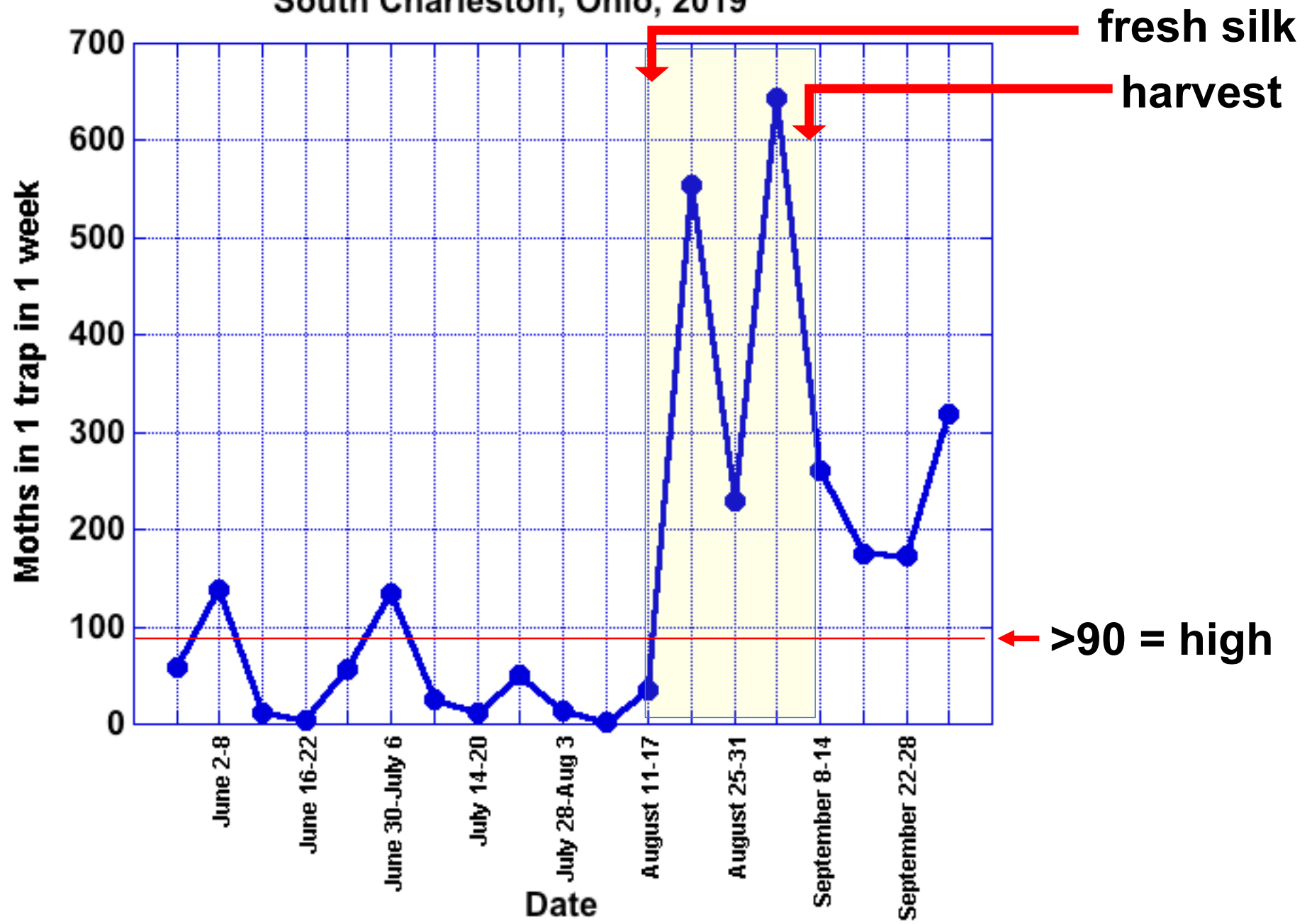
# Field trial details for Ohio

- WARS, South Charleston, OH
- No insecticide sprays
- 2019:
  - Heavy pressure by corn earworm
  - Harvested 9/9
- 2020:
  - Lighter pressure by corn earworm
  - Harvested 9/1

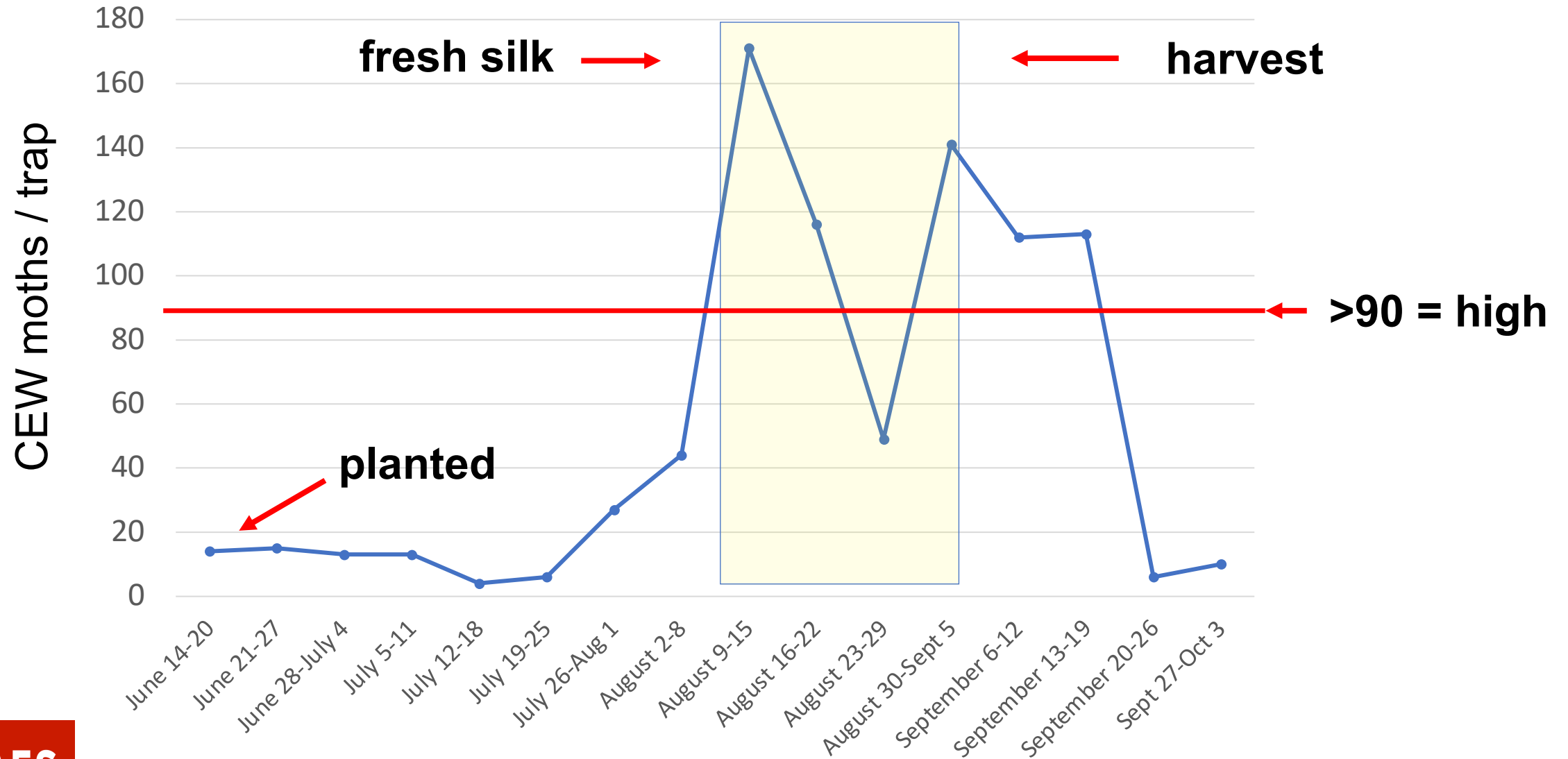




Catch of corn earworm moths in Hartstack pheromone trap,  
South Charleston, Ohio, 2019

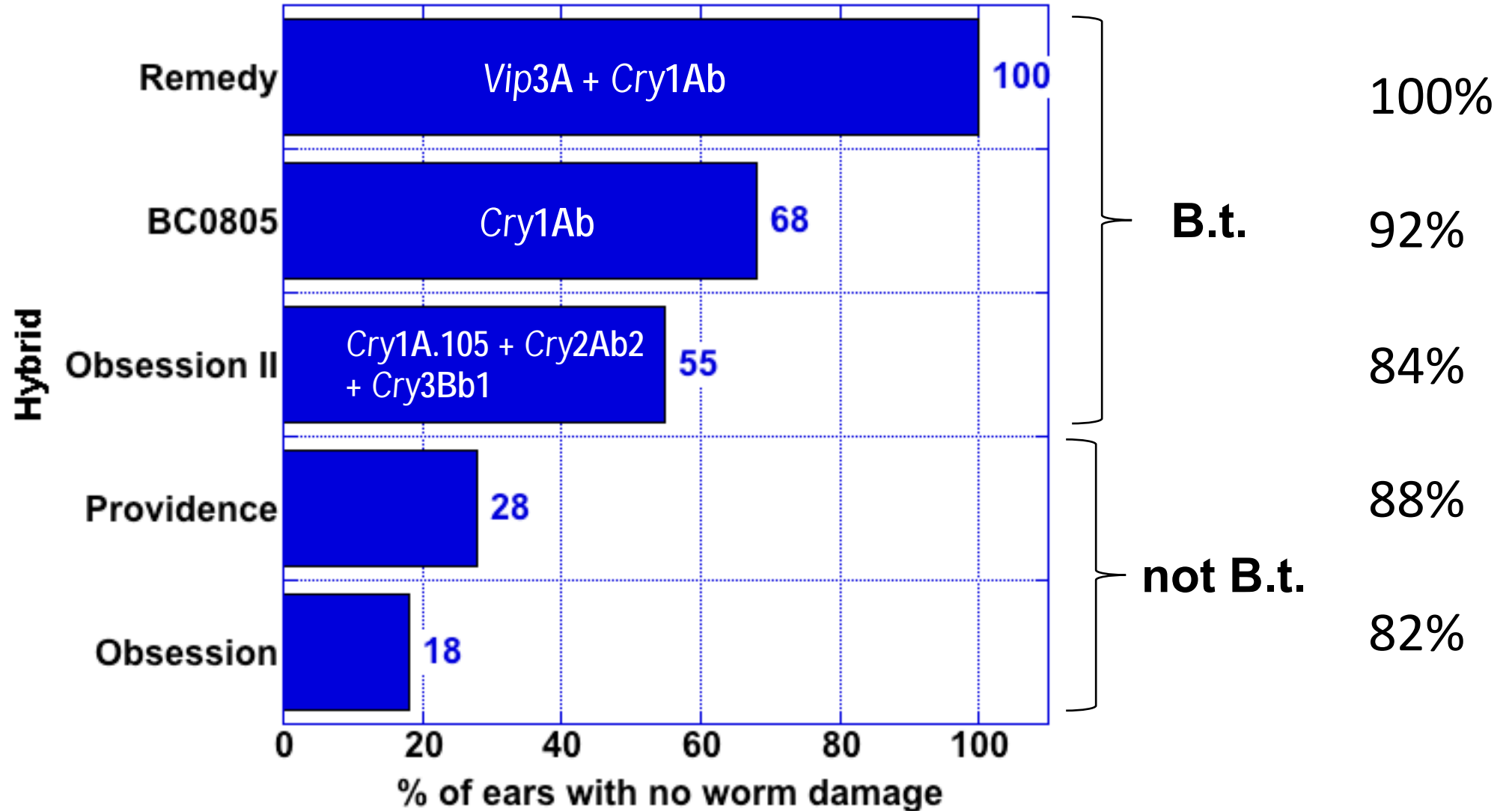


# CEW Flight WARS - 2020





Sweet corn: transgenic vs non-transgenic  
No insecticide sprays  
Large unreplicated plots  
Harvested 9/9/2019  
South Charleston, Ohio



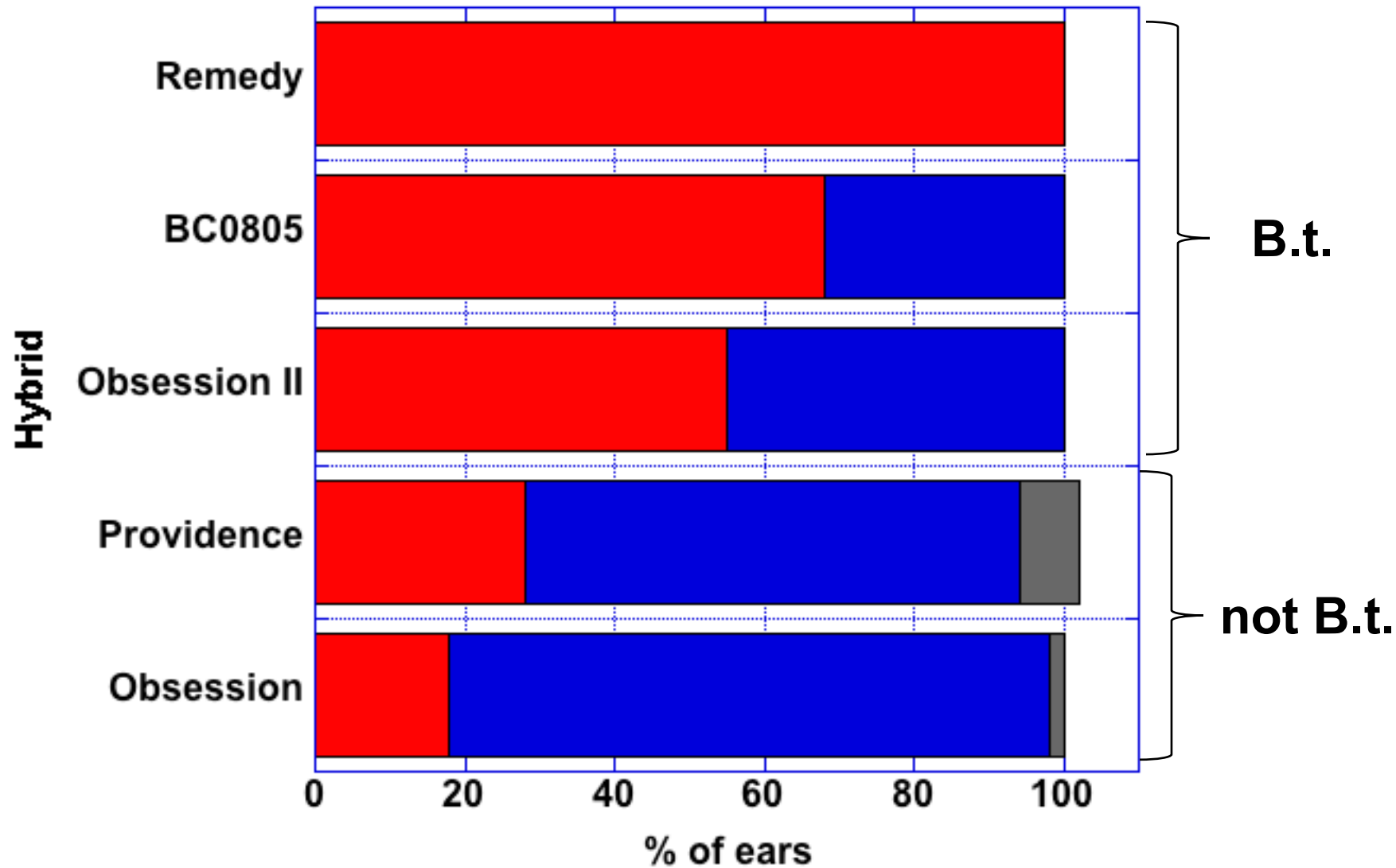
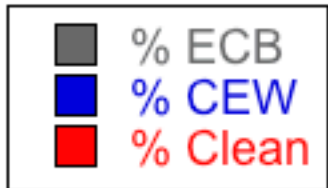
# Sweet corn: transgenic vs non-transgenic

No insecticide sprays

Large unreplicated plots

Harvested 9/9/2019

South Charleston, Ohio





# Conclusions – Ohio trial

- ‘BC 0805’ & ‘Obsession-II’ have lost efficacy although still better than non-BT isolines
  - % clean ears
  - Area damaged
  - Bt events *Cry1A.105* + *Cry2Ab2* + *Cry3Bb1* + *Cry1Ab* have lost efficacy
- ‘Remedy’ excellent worm control even with heavy pest pressure
  - Bt event *Vip3A* still effective

# Conclusions – multi-state data

**Summary of changes in % ear damage at beginning of  
Bt sweet corn release to today**

<b>Cry 1Ab</b>		
<u>% ears damaged</u>		
1996-2003	2017-2019	
15%	75%	~4% increase in damage/yr
<b>Cry 1A.105 + Cry2Ab2</b>		
<u>% ears damaged</u>		
2010-2012	2017-2019	
17%	75%	~8% increase in damage/yr
<b>Cry 1Ab + Vip3A</b>		
<u>% ears damaged</u>		
2008-2016	2019	
0.1%	0.5%	~0.1% increase in damage/yr

BC-0805

Obsession II

Remedy

**CFAES**

Credit: Brian Nault & Galen Dively



# How is B.t. sweet corn best used?

- Late plantings
  - Silking when field corn no longer silking
- Fields adjacent to houses
- Remember:
  - Much easier for grower 😊
  - Possibly undesirable to consumer 😞

# New pest of fruit crops - Spotted Lanternfly



Photo by David Coyle, ©2018,  
Clemson University



Lawrence Barringer,  
Pennsylvania Department of  
Agriculture, Bugwood.org



PA Dept. of Agriculture,  
bugwood.org

55634



Pennsylvania Department of  
Agriculture, Bugwood.org

5522653



NYS IPM staff

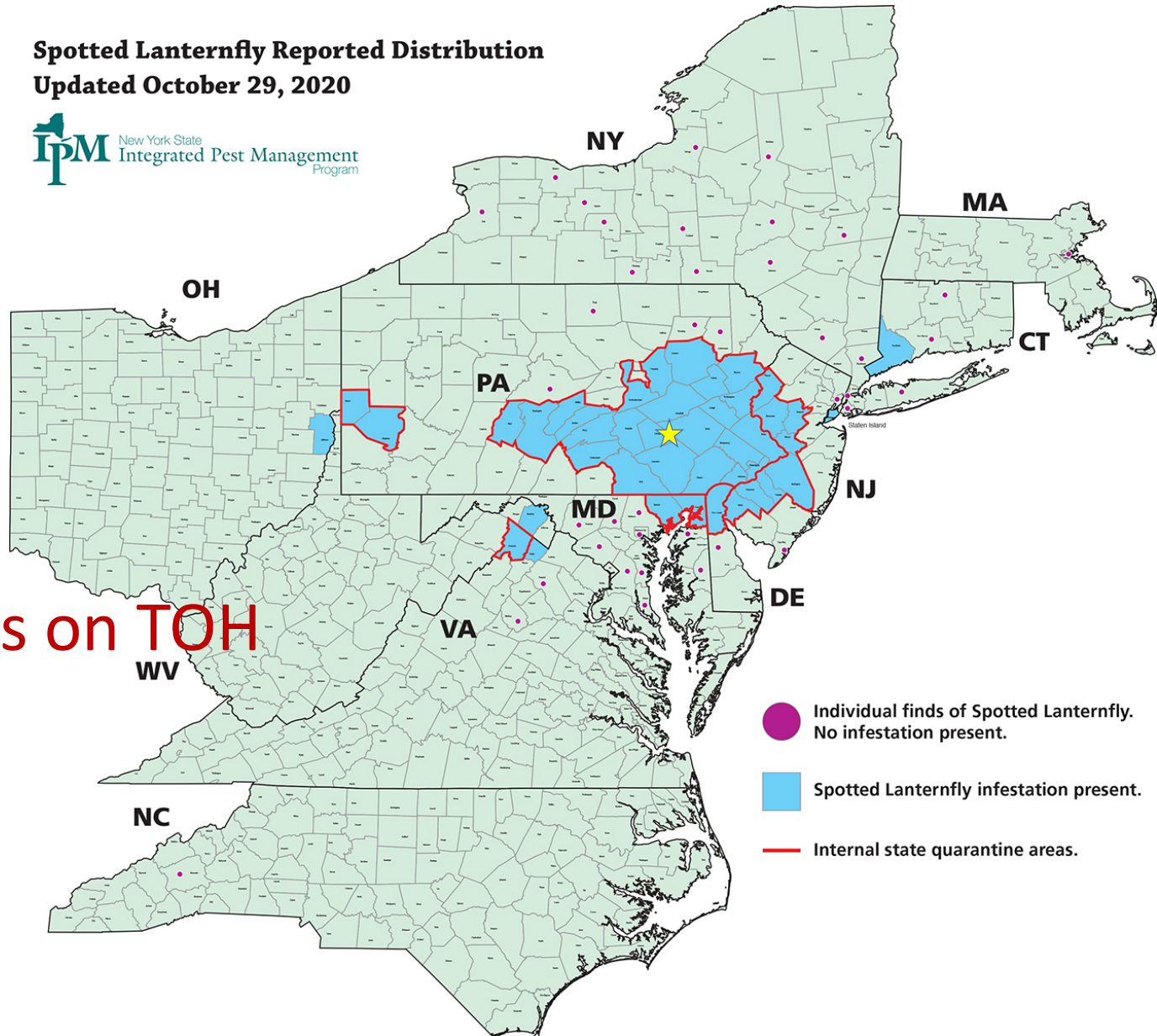


# Spotted Lanternfly Detected in OH

Spotted Lanternfly Reported Distribution  
Updated October 29, 2020



- 10/27/2021
- Jefferson Co.
- Mingo Junction
- Adults and egg masses on **TOH**
- Near a rail yard



# Spotted lanternfly

- *Lycorma delicatula*
- A planthopper
- Sucks sap
- 1" long
- Poor flier
- Strong jumper (1 - 3 m!)



Lawrence Barringer, Pennsylvania  
Department of Agriculture,  
Bugwood.org



USGS Bee Inventory and Monitoring  
Lab, Beltsville, Maryland



# Life stages



E. Swackhamer,  
Penn State Extension

Egg masses



Lawrence Barringer, Pennsylvania  
Department of Agriculture,  
Bugwood.org

Young nymphs:  
black with  
white spots

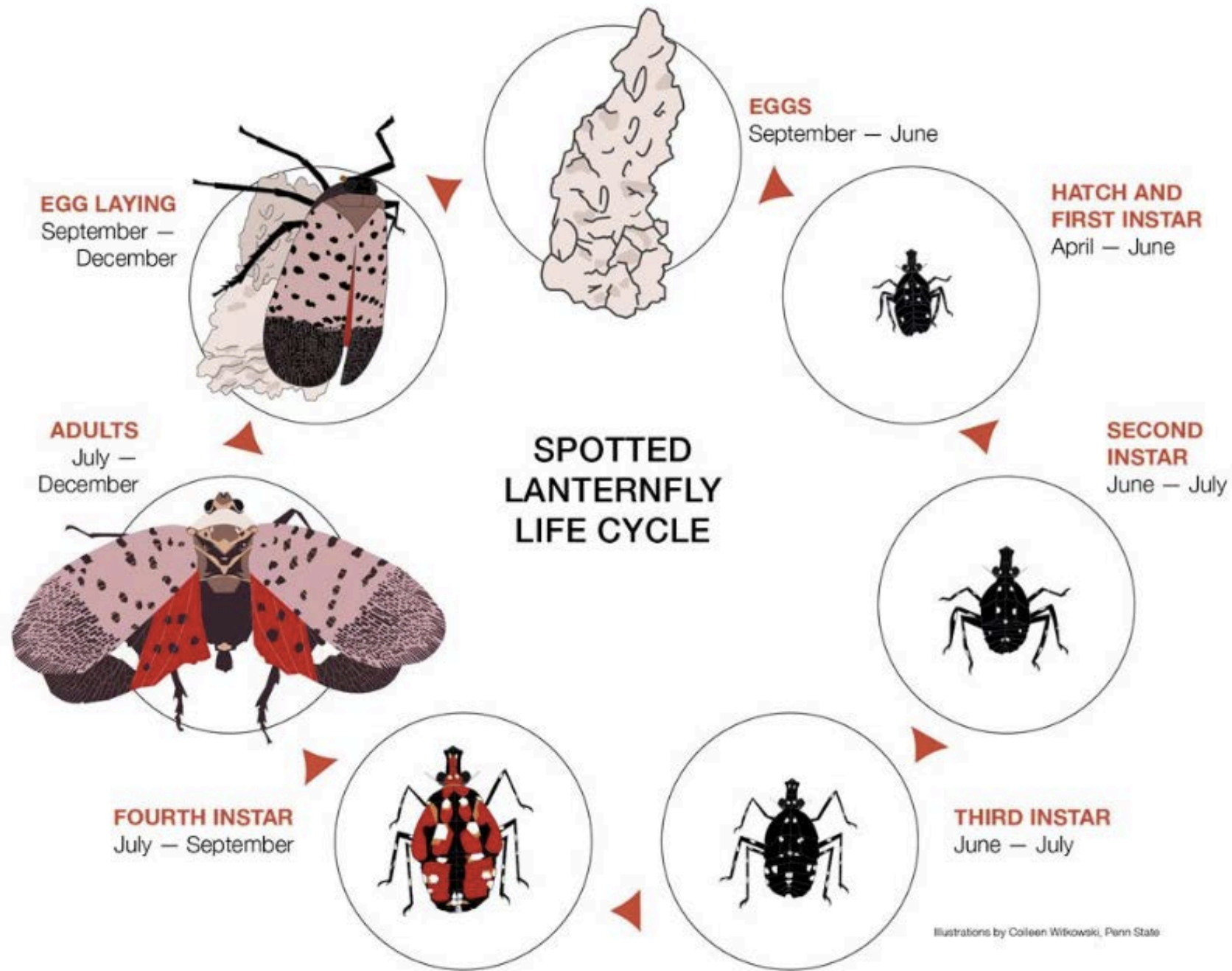


Older nymphs: red  
with white spots



Lawrence Barringer,  
Pennsylvania Department  
of Agriculture,  
Bugwood.org

Adult



Illustrations by Colleen Witkowski, Penn State



# Host plants

- Major hosts:
  - Tree of Heaven
  - Grape
  - Chinaberry
- Other crops:
  - Apple
  - Cherry
  - Peach
  - Blueberry
  - Hops
- Forest & ornamental trees:
  - Oaks
  - Walnuts
  - Poplars
  - Maples
  - Willows



# Damage

- Don't attack fruit
- Suck sap, feed on phloem
- Weeping wounds of sap on bark
- Excrete large amounts of sweet fluid (honeydew)
- Sooty mold grows on sweet fluid
- Do not vector diseases





# Insecticides Allowed\* on SLF?

<b>Efficacy</b>	<b>Product</b>	<b>Hops</b>	<b>Grape</b>	<b>Blue- berry</b>	<b>Peach</b>	<b>Cherry</b>	<b>Apple</b>
<b>Exc eggs</b>	<b>Lorsban</b>		√		√	√	√
<b>Exc/ good</b> nymph, adult	<b>Brigade</b>	√	√	√			
	<b>Actara</b>		√	√	√	√	√
	<b>Venom, Scorpion</b>		√		√		
<b>Good/ fair</b> nymph, adult	<b>Sevin</b>		√	√	√	√	√
	<b>Imidan</b>		√	√	√	√	√
	<b>Danitol</b>		√	√	√	√	√
	<b>Avaunt</b>		√	√	√	√	√
	<b>Vydate</b>						√
	<b>Closer</b>		√	√	√	√	√
	<b>MustangMaxx</b>		√	√	√	√	√
	<b>Assail</b>		√	√	√	√	√

# Insecticides for lanternfly adults

credit: Heather Leach, Penn. State Univ.

## Results

Days after treatment:

1

3

5

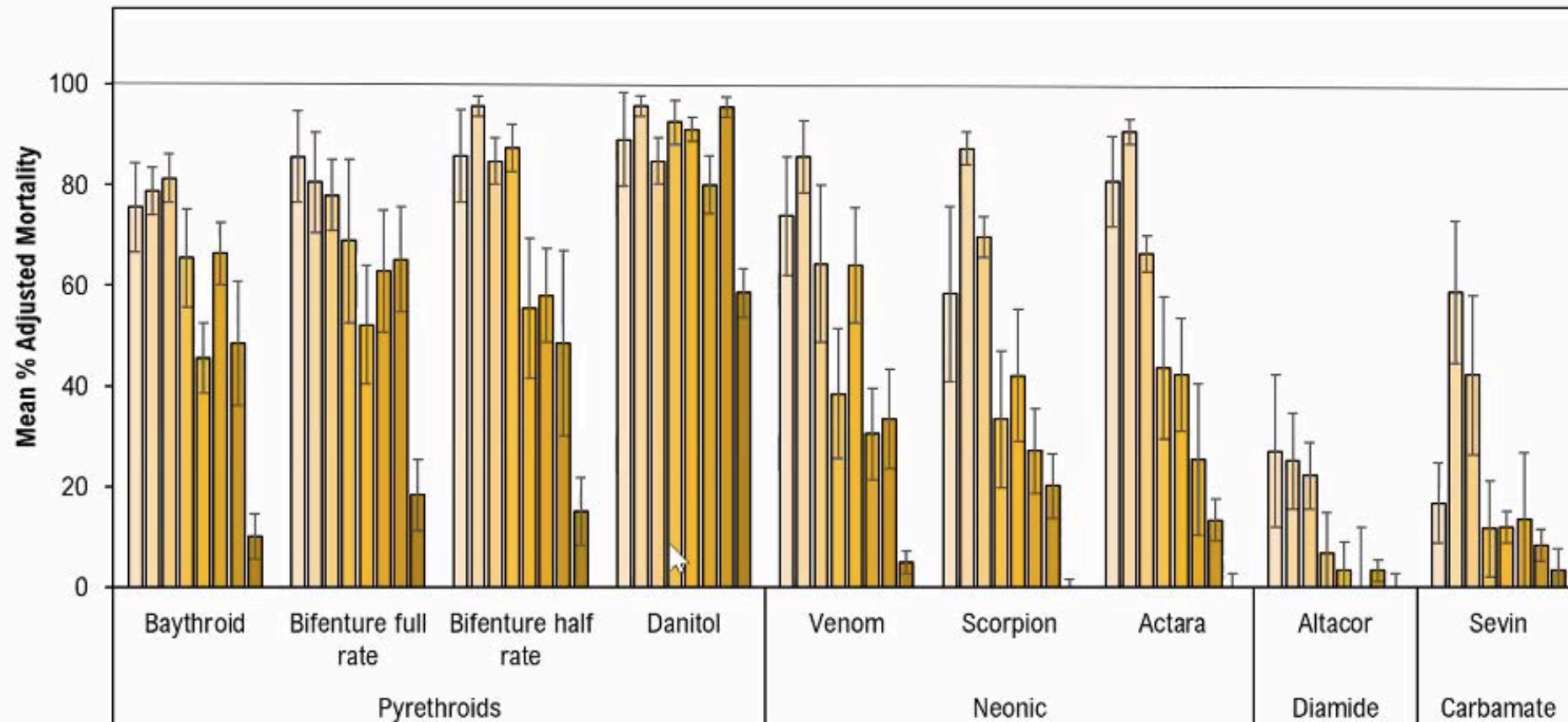
7

11

15

21

26





# Bifenture for grapes: Federal registration



- a.i. = bifenthrin
- 3.2 – 6.4 fl oz per acre for Japanese beetle, grape berry moth & other pests
- **limit 6.4 fl oz per acre per season**
- 30-day pre-harvest interval
- does not include post-harvest use
- SLF can be late invaders, damage vines after harvest

# 24(c) label, Bifenture for lanternfly

For control of Spotted Lanternfly (*Lycoma delicatula*) on Grapevines Post-Harvest:

RATE BIFENTURE EC/ACRE	APPLICATION INSTRUCTIONS	PHI (days)	RESTRICTIONS
0.10 lb. ai (6.4 fl. oz. product)	<p>Apply 6.4 fl. oz Bifenture EC per acre (0.1 lbs ai) to control Spotted Lantern Fly per application.</p> <p>Apply in a minimum of 25 Gal/A by ground or 10 Gal/A by air.</p> <p>Addition of an emulsifiable oil or non-ionic surfactant adjuvant may be tankmixed at 0.25% v/v may improve control.</p> <p>For best control thorough coverage is necessary.</p> <p>If a pre-harvest application has been made only 1 post-harvest application shall be made after harvest.</p> <p>If no pre-harvest application was made then 2 post-harvest applications shall be made after harvest no less than 7 days apart.</p> <p>Follow IPM guidelines for best management practices pertaining to rotation of insecticides with different, effective modes of action and local thresholds.</p>	30 Days	<p>Only 0.10 lbs ai/A (6.4 fl. oz) per acre is allowed pre-harvest. Pre-harvest interval (PHI) is 30 days.</p> <p>A single post-harvest application may follow a single pre-harvest application.</p> <p>Two post-harvest applications shall be made after harvest no less than 7 days apart.</p> <p>Do not apply more than 0.2 lbs ai (12.8 fl. oz product) per acre per season.</p>

- 'A single **post**-harvest application may follow a single **pre**-harvest application'
- 'If no pre-harvest application was made then **2 post-harvest** applications shall be made no less than 7 days apart'
- 6.4 fl oz per acre per application
- **Limit 12.8 fl oz per acre per season**



# Ohio 24(c) label for Bifenture on grapes label posted on PSEP website:

<https://pested.osu.edu/quicklinks/pesticidelabelresources/24c>

FIFRA Section 24(c)  
**SPECIAL LOCAL NEED LABEL**

**FOR DISTRIBUTION AND USE ONLY WITHIN THE STATE OF  
OHIO**

**BIFENTURE EC AGRICULTURAL INSECTICIDE**

**EPA REG. NO. 70506-57**

**EPA SLN NO. OH-200004**

**Expiration Date: July 15, 2025**

# Bifenture for lanternfly on grapes

- Probably not needed in most vineyards
- Prudent for growers to not use it pre-harvest, in case it is needed post-harvest
- Prudent for growers to have a supply available in case it is needed for lanternfly control
- **Do not spray for SLF until it has been confirmed in your operation!**



# Resources

## • U.osu.edu/spottedlanternfly



### Pest Alert

Animal and Plant Health Inspection Service  
Plant Protection and Quarantine

#### Spotted Lanternfly (*Lycorma delicatula*)

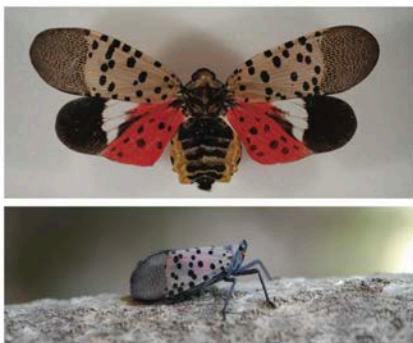
The spotted lanternfly is an invasive pest, primarily known to feed on tree of heaven (*Ailanthus altissima*) but has many other host plants, including grape, hop, apple, stone fruit, maple, poplar, walnut, and willow. The insect changes hosts as it goes through its developmental stages. Nymphs feed on a wide range of plant species, while adults prefer to feed and lay eggs on tree of heaven (*A. altissima*). Spotted lanternflies are invasive and can spread rapidly when introduced to new areas. While the insect can walk, jump, or fly short distances, its long-distance spread is facilitated by people who move infested material or items containing egg masses. If allowed to spread in the United States, this pest could damage the country's grape, orchard, and logging industries.

#### Distribution

The spotted lanternfly is present in China, Japan, South Korea, Taiwan, and Vietnam. In 2014, the insect was first detected in the United States in Pennsylvania. Since then, spotted lanternfly infestations have been detected in Delaware, Maryland, New Jersey, and Virginia.

#### Damage

Both nymphs and adults of spotted lanternfly cause damage when they feed, sucking sap from stems and branches. This can reduce photosynthesis, weaken the plant, and eventually contribute to the plant's death. In addition, feeding can cause resulting insects amounts of sids promote ther insects.



Adult spotted lanternfly

#### Description

Adult spotted lanternflies are about 1 inch long and one-half inch wide, and they have large and visually striking wings. Their forewings are light brown with black spots at the front and a speckled band at the rear. Their hind wings are scarlet with black spots at the front and white and black bars at the rear. Their abdomen is yellow with black bars. Nymphs in their early stages of development appear black with white spots and turn to a red phase before becoming adults. Egg masses are yellowish-brown in color, and most are covered with a gray, waxy coating prior to hatching.

#### Life Cycle

The spotted lanternfly lays its eggs on smooth host plant surfaces and on non-host material, such as bricks, stones, and dead plants. Eggs hatch in the spring and early summer, and nymphs begin feeding on a wide range of host plants by sucking sap from young stems and branches. Adults appear in late July and tend to focus their feeding on tree of heaven (*A. altissima*) and grapevine (*Vitis vinifera*). As the adults feed, they excrete sticky, sugar-rich fluid (honeydew). The fluid can build up on plants and on the ground underneath infested plants, causing sooty mold to form.



Ohio State University Extension

### Be Alert for Spotted Lanternfly

Jamie Dahl, Forest Outreach Coordinator, Central State University.  
Ashley Kulhanek, Educator, Agriculture and Natural Resources, Medina County, The Ohio State University.

The spotted lanternfly (SLF) (*Lycorma delicatula*) is a new non-native invasive insect pest to the United States. Spotted lanternfly is thought to be native to China, Japan, Vietnam and Taiwan. However, it has been reported as a serious non-native, invasive pest in Korea. In the United States, it was discovered in 2014 in southeastern Pennsylvania, Berks County. Spotted lanternfly has the potential to cause harm to the tree fruit, grape, and hops industries.

Though quarantined by the United States Department of Agriculture (USDA) Animal Plant Health Inspection Service (APHIS) and the Pennsylvania Department of Agriculture, as of March 2020 the insect has spread to additional counties within Pennsylvania and to Virginia, Delaware, Maryland, Massachusetts, New York, New Jersey, and West Virginia. For more information on its spread, please see the references at the end of this factsheet.

As with any new invasive species, early prevention and detection are crucial to manage spread and impact of these non-native pests. As of March 2020, SLF has not been confirmed in Ohio. Nonetheless, residents are asked to be vigilant and report any suspected finds to the [Ohio Department of Agriculture](#), to a [local Extension office](#), or via the [Great Lakes Early Detection Network \(GLEDN\) mobile app](#).



Image 1. Spotted lanternfly with wings fully extended. Source: Pennsylvania Department of Agriculture. [www.bugwood.org](http://www.bugwood.org)



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#### Host Range

The preferred host of SLF is Tree of Heaven (*Ailanthus altissima*) another introduced invasive species. SLF, however, feeds on a wide variety of plants throughout its life cycle, with nymphs reported as having a more diverse palate than their adult counterparts. Spotted lanternfly nymphs and adults have been reported feeding on wild and domestic grapes, hops, fruit trees, willow, various hardwood trees, pines, shrubs, and vines.

#### Identification

Spotted lanternfly is not a fly, but a type of planthopper (order Hemiptera, family Fulgoridae). These insects have four wings and a piercing-sucking mouthpart that is used to pierce their food source and suck out nutritive fluids. Spotted lanternfly is a large, sap-feeding planthopper that feeds from the phloem tissue of host plants. Adults measure approximately 1 inch long and ½ inch wide at rest, and 1½ to 2 inches wide with wings spread. The front wings are a translucent gray with black spots, transitioning to a black tiled pattern at the tips. The hind wings are red with patches of black and white (Image 1).

When at rest, the forewings lay tent-like over the body. The red coloration of the hindwing shows through, resulting in a pinkish appearance with black spots (Image 2).



Image 2. Spotted lanternfly, *Lycorma delicatula*. Source: Lawrence Barringer, Pennsylvania Department of Agriculture. [www.bugwood.org](http://www.bugwood.org)

<https://ohioline.osu.edu/factsheet/anr-83>

OHIO STATE UNIVERSITY EXTENSION

**ADULT**  
1" long  
½" wide at rest

Feeding: Sucks sap from woody tissue of host plants such as tree-of-heaven, hops & grape. Also fruit trees and other hardwoods.

Report SLF to the Ohio Department of Agriculture (ODA) by calling 614-728-6400

USDA Pest Alert

PHOTOS: Lawrence Barringer & Pennsylvania Dept. of Agriculture, Bugwood.org

**SPOTTED LANTERNFLY (SLF)**  
Identification Card

Adults appear mid-July thru Fall. Adults die in winter.

Spotted lanternfly nymphs hatch in May, are black with white spots, & develop red patches as they grow.

**Signs of SLF include:**

- Sap weeping from wounds
- Fungus and mold growing on sap
- Wasps / hornets attracted to sap
- Egg masses laid Sept until freeze on bark, rocks, hard surfaces

Fresh egg masses are gray and often covered in a mud-like coating, not always. Size is 1 inch long or more if multiple masses overlap. Old eggs are tan and resemble rows of seeds.

Nymphs and adults feed through a piercing-sucking mouthpart, sucking sap from woody tissue and stems.

CFAES

Need ID Cards?

# Report Spotted lanternfly

- Any sightings or suspicions?
- Collect a specimen, if possible
- Take a picture!
- Report on Great Lakes Early Detection Network App
- Please let us know!
  - Your OSU county extension educator
  - OSU Dept. of Entomology
  - Ohio Dept. of Agriculture



# Spotted Wing Drosophila



- Invading Ohio since 2011
- Attacks healthy ripening fruit
- Larvae feed inside fruit



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AND ENVIRONMENTAL SCIENCES

# Injury – Key Points

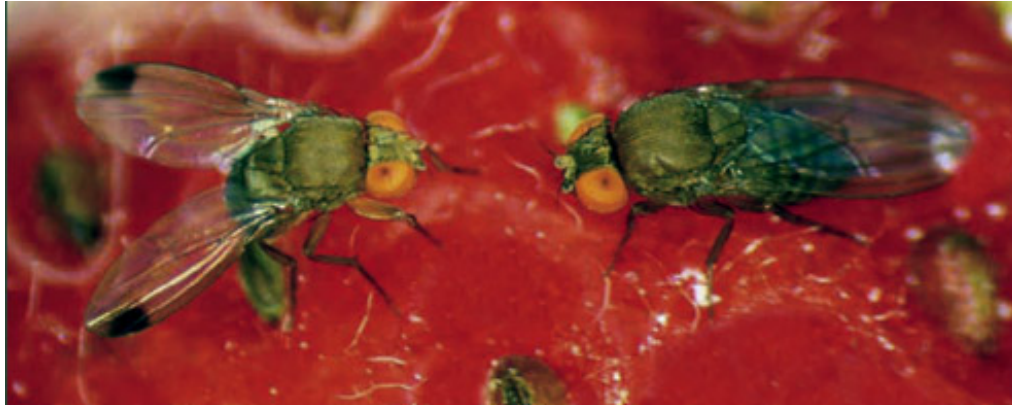


Photo by Bev Gerdeman,  
Washington State Univ.

**Adult flies**

- Attack **healthy** fruit using sharp ovipositor
- Slice open fruit skin, deposit egg
- Larvae feed inside fruit
- Skin collapses in 2-3 days; molds
- New generation every 10-25 days



Photo by E. Beers

**Egg being deposited  
by female fly**



**Ovipositor**



# Fruit injury by Spotted wing Drosophila



**CFAES**

# 2011-20 SWD Distribution

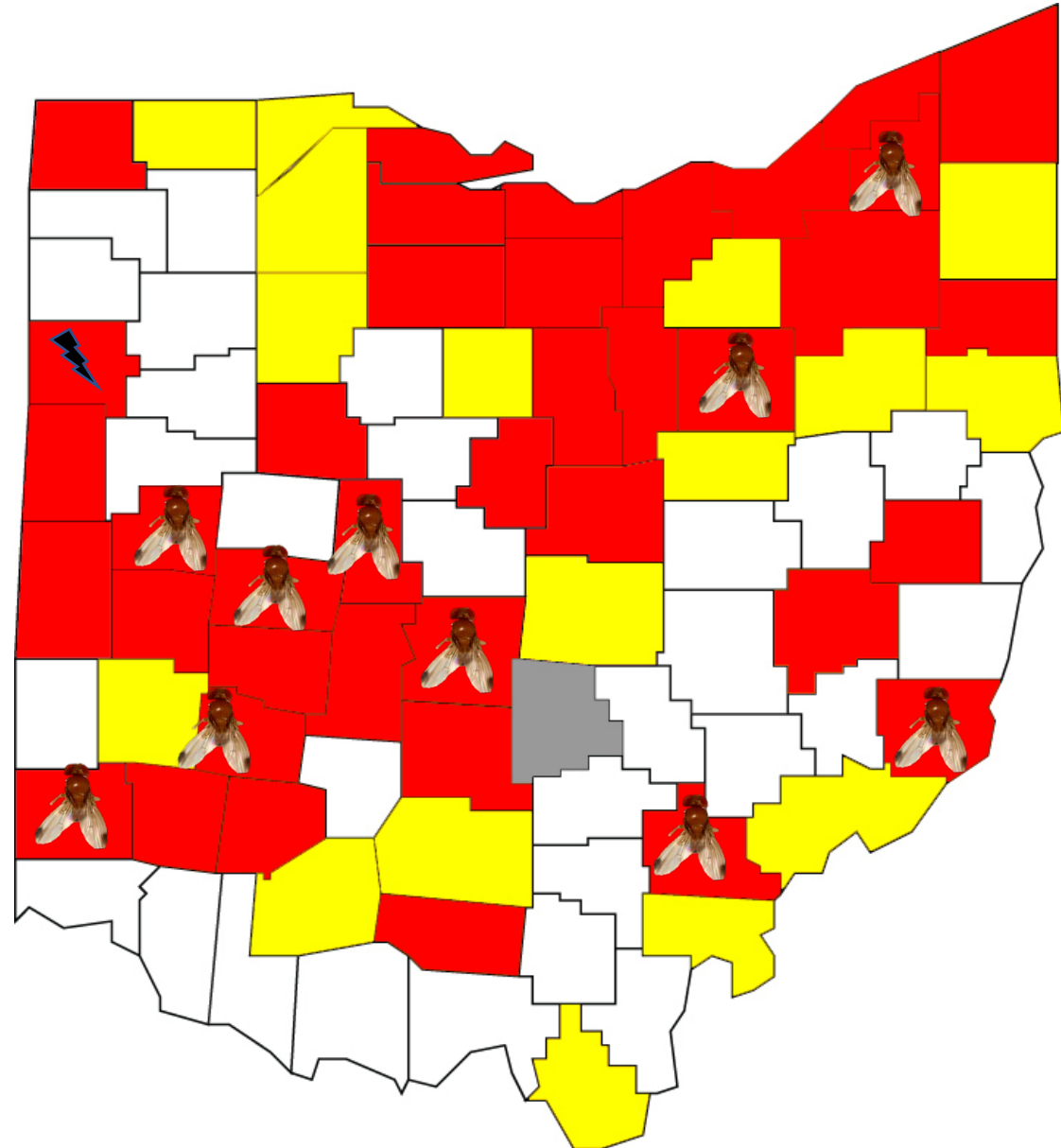
**Red** = Confirmed (39)

**Yellow** = Suspected

**Gray** = Surveyed, not found

**White** = Not surveyed

 = surveyed in '20





# General Management

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-Monitor w/ Scentry lure



-Identify



-1 SWD; ripe fruit? Begin treatment through harvest

-Consult chart on insecticide options



**CFAES**

<https://fruitgrowersnews.com>

# Insecticide choices for SWD-Updated

<i><b>Category</b></i>	<i><b>Product</b></i>
<b>Most effective</b>	diamides: <b>Exirel, Verdepryn</b>
	spinosyns: <b>Delegate, Radiant, Entrust</b> <b>[OMRI]</b>
	organophosphates: <b>Imidan, Malathion</b>
	pyrethroids: <b>Mustang Maxx, Hero, Danitol, Baythroid, Pounce, Asana</b>
	a carbamate: <b>Lannate</b>
<b>Moderately effective</b>	none
<b>Slightly effective</b>	<b>Grandevo</b> <b>[OMRI]</b> , <b>Venerate</b> <b>[OMRI]</b> , <b>Pyganic</b> <b>[OMRI]</b>



# Chart for SWD on all fruit crops - Updated

( [u.osu.edu/pestmanagement/](http://u.osu.edu/pestmanagement/) )

INSECTICIDE OPTIONS (based primarily on trials in OR, WA, CA, MI, NJ, NC, FL):

Efficacy on SWD	Mode of action group	Product	Residual activity (days)	Pre-harvest interval (PHI)						
				raspberry, blackberry	blueberry	strawberry	grape	cherry	peach	plum
Very effective	5	§ Delegate	5-7	1 day	1 or 3 days	X	7 days	7 days	1 day	1 day
	5	§ Radiant	5-7	X	X	1 day	X	X	X	X
	28	§ Exirel	5	1 day	3 days	1 day	X	3 days	3 days	3 days
	28	§ Verdepryn	5-7	1 day	1 day	1 day	7 days	7 days	7 days	7 days
	3A	! Mustang Maxx	7-10	1 day	1 day	X	1 day	14 days	14 days	14 days
	3A	! Hero [2(ee)]	7-10	3 days	1 day	X	30 days	X	X	X
	3A	! Danitol	7-10	3 days	3 days	3 days	21 days	3 days	3 days	3 days
	3A	! Baythroid [2(ee)]	7-10	X	X	X	3 days	7 days	7 days	7 days
	3A	! Pounce 25WP [2(ee)]	7-10	X	X	X	X	3 days	X	X
	3A	! Asana [2(ee)]	7-10	X	X	X	X	14 days	14 days	14 days
	1B	Imidan	7	X	3 days	X	7/14 days	7 days	14 days	7 days
	1A	! Lannate	3-6	X	3 days	X	X	X	X	X
Effective	1B	Malathion [2(ee)]	5-7	X	X	X	X	3 days	X	X
	5	Entrust [OMRI] [2(ee)]	3-5	1 day	1 day	1 day	7 days	7 days	1 day	1 day
Moderately effective	-	Grandevo [OMRI]	1-3?	0 days	0 days	0 days	0 days	0 days	0 days	0 days
	-	Venerate [OMRI]	1-3?	0 days	0 days	0 days	X	0 days	0 days	0 days
Slightly effective	3A	Pyganic [OMRI]	1-3	0 days	0 days	0 days	0 days	0 days	0 days	0 days

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

! Restricted-Use Pesticide.

§ Not allowed in greenhouses or high tunnels.

OMRI means allowed for use in organic production.

2(ee) means SWD not listed as target pest on the federal label but is listed on a 2(ee) recommendation label.



# Chart for SWD on all fruit crops-Updated

- **Version with max number of applications**
- **On website** ( [u.osu.edu/pestmanagement/](http://u.osu.edu/pestmanagement/) )

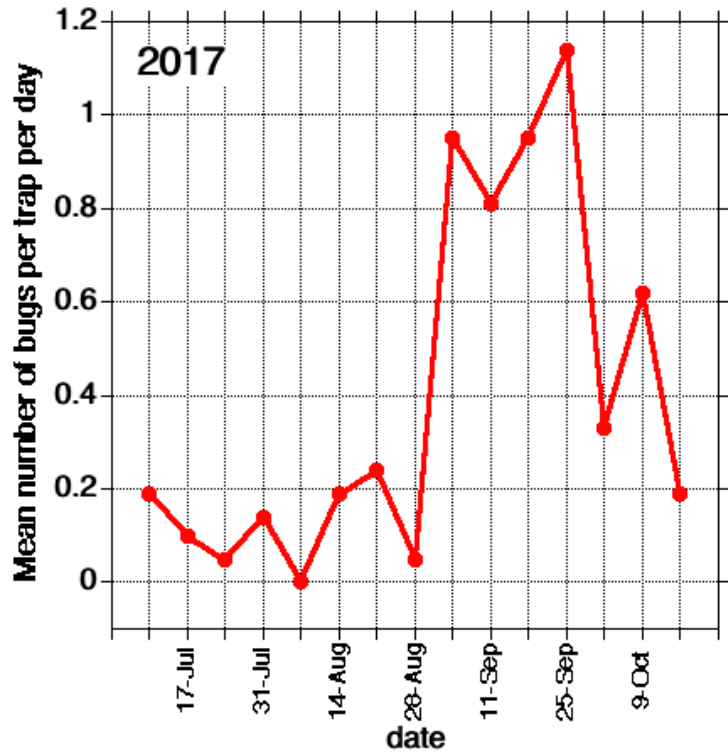
Efficacy on SWD	Mode of action group	Product	Residual activity (days)	Pre-harvest interval (PHI) in days, and maximum number of applications ('aps') allowed, assuming maxir					
				raspberry, blackberry	blueberry	strawberry	grape	cherry	peach
Very effective	5	§ Delegate	5-7	1 day (3 aps)	1 day (3 aps high) 3 days (6 aps low)	X	7 days (4 aps)	7 days (4 aps)	1 day (4 aps)
	5	§ Radiant	5-7	X	X	1 day (3 aps)	X	X	X
	28	§ Exirel	5	1 day (3 aps)	3 days (3 aps)	1 day (3 aps)	X	3 days (3 aps)	3 days (3 aps)
	28	§ Verdepryn	5-7	1 day (3 aps)	1 day (3 aps)	1 day (3 aps)	7 days (3 aps)	7 days (3 aps)	7 days (3 aps)
	3A	! Mustang Maxx	7-10	1 day (6 aps)	1 day (6 aps)	X	1 day (6 aps)	14 days (6 aps)	14 days (6 aps)
	3A	! Hero [2(ee)]	7-10	3 days (2 aps)	1 day (4 aps)	X	30 days (1 ap)	X	X
	3A	! Danitol	7-10	3 days (2 aps)	3 days (2 aps)	3 days (2 aps)	21 days (2 aps)	3 days (2 aps)	3 days (2 aps)
	3A	! Baythroid [2(ee)]	7-10	X	X	X	3 days (4 aps)	7 days (2 aps)	7 days (2 aps)
	3A	! Pounce 25WP [2(ee)]	7-10	X	X	X	X	3 days (3 aps)	X
	3A	! Asana [2(ee)]	7-10	X	X	X	X	14 days (4 aps)	14 days (4 aps)
	1B	Imidan	7	X	3 days (5 aps)	X	7/14 days (3 aps)	7 days (3 aps)	14 days (4 aps)
	1A	! Lannate	3-6	X	3 days (4 aps)	X	X	X	
Effective	1B	Malathion [2(ee)]	5-7	X	X	X	X	3 days (4 aps)	X
	5	Entrust [OMRI] [2(ee)]	3-5	1 day (6 aps)	1 day (6 aps)	1 day (3 aps)	7 days (5 aps)	7 days (3 aps)	1 day (3 aps)
Moderately effective	-	Grandevo [OMRI]	3-7?	0 days	0 days	0 days	0 days	0 days	0 days
	-	Venerate [OMRI]	3-7?	0 days	0 days	0 days	X	0 days	0 days
Slightly effective	3A	Pyganic [OMRI]	1-3	0 days	0 days	0 days	0 days	0 days	0 days

# Brown marmorated stink bug on sweet corn

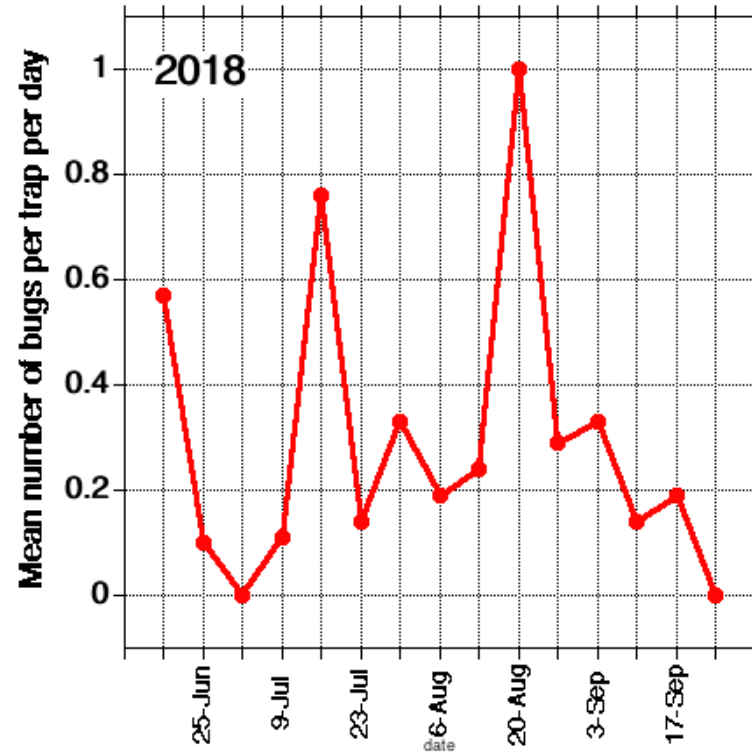




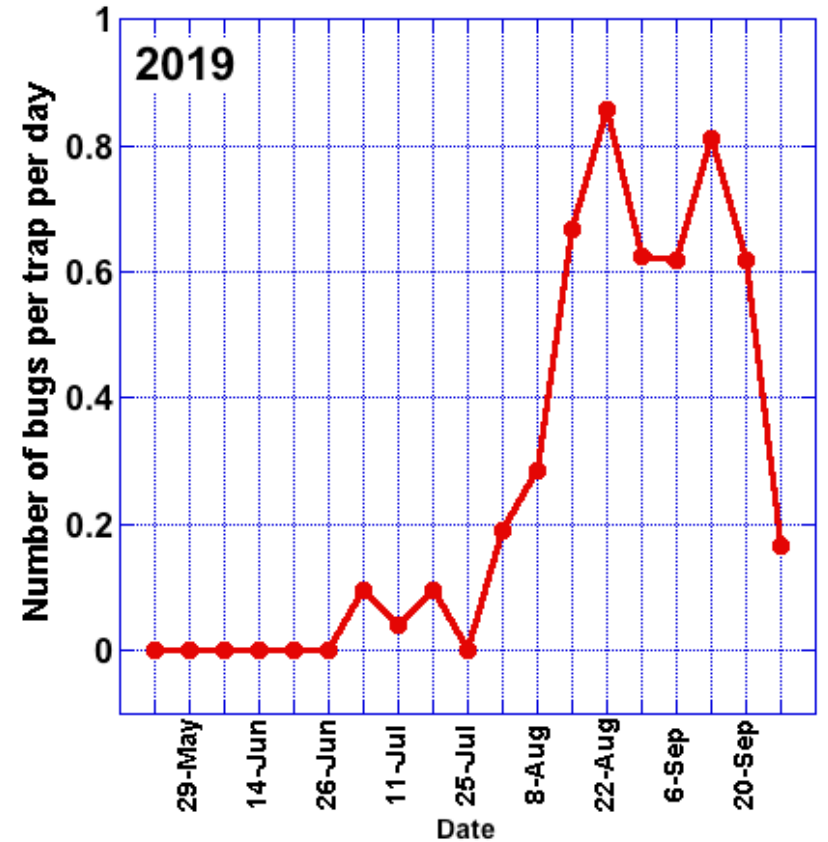
# Results: stink bugs in traps by sweet corn



**Set up 7/3**



**Set up earlier: 6/11**



**Set up even earlier: 5/15**

# Timing of insecticides for stink bug control: Trials 2019 & 2020

- Hero, 9.13 fl oz/A = 1/3 of season limit
- 1 spray at first silk (day 0)
- 1 spray 7 days after first silk (day 7)
- 1 spray 14 days after first silk (day 14)
- 3 sprays at days 0, 7, & 14

# Timing of insecticides for stink bug control: Trials 2019 & 2020

- Hero, 9.13 fl oz/A = 1/3 of season limit
- 1 spray at first silk (day 0) \* *best in 2020*
- 1 spray 7 days after first silk (day 7)
- 1 spray 14 days after first silk (day 14)
- 3 sprays at days 0, 7, & 14 \* *best in 2019*
- Results inconclusive



# Contact Information

Questions?

Jim Jasinski

[Jasinski.4@osu.edu](mailto:Jasinski.4@osu.edu)

937-484-1526

