

Vineyard Insect Pest Management

Brett Blaauw

March 19, 2019



UNIVERSITY OF
GEORGIA



UNIVERSITY OF GEORGIA
EXTENSION

Outline

- Common grape insect pests
 - Basic biology
 - Timing in field



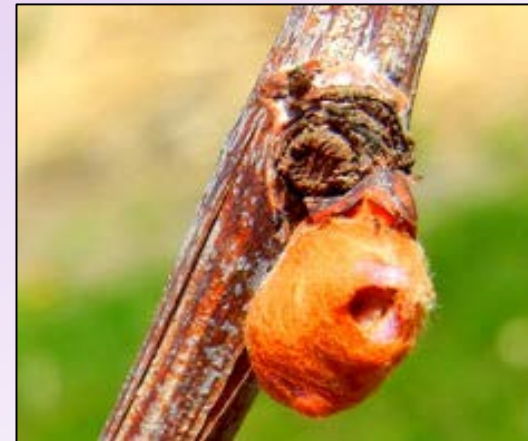
Outline

- Common grape insect pests
 - **Basic biology**
 - Timing in field



Grape flea beetle

- Metallic blue-green beetle, ~1/5 in long
- Overwinter in debris in and near the vineyard
 - They become active early in the spring
 - Lay eggs in crevices on vines
- Larvae are brown with black spots, 3/8 in
 - Larvae feed on grape leaves for 3-4 weeks
- Damage by adult flea beetles is more important
 - Adults feed on the unfolding leaves
 - Eat holes into the sides of buds and gouge out the contents as the buds swell
 - Similar damage to climbing cutworms



Grape phylloxera

- Native to eastern US
- Tiny, pale yellow sap-sucking insects
- Feed on the leaves and roots
 - Create galls on leaves and roots
 - Stunting and/or death of European varieties
- Complex life-cycle – above ground and below ground stages
 - The mobile crawler stage of phylloxera is susceptible to insecticide treatment
 - Resistant American root stocks are key



Climbing cutworms

- Group of 10 species
 - Feed on a variety of crops
 - Larvae cause similar kinds of injury
 - Adult moths are similar in appearance
- Sporadic pests
 - Generally in sites with sandy soils
- Feed on the buds and young foliage
 - Primarily in the spring
 - In severe cases, all buds may be killed
 - Reduction in growth and yield



Grape mealybugs

- Flat, white, and oval shaped
 - Filaments protrude along the perimeter of the body
 - Two especially long protruding from rear
- Overwinter as first instar nymphs and become active in spring
 - Adults appear in early summer and deposit eggs beneath loose bark
 - Multiple generations a year
- Populations are most likely to develop on vigorous vines
 - Heavy foliage supplies greater shade and nutrition
 - It is generally more severe on late-ripening varieties
- Mealybugs can vector grapevine **leafroll virus**
- Honeydew supports the growth of dark sooty mold fungus
 - Can cause clusters to drop before harvest
- Natural enemies generally provide control



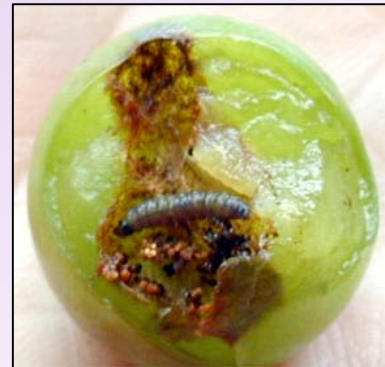
Leafhoppers / sharpshooters (for Pierce's disease)

- Small insects with piercing-sucking mouthparts
 - Feed upon xylem or phloem tissue
 - Often cryptic in coloration – hard to visually monitor
 - Adults are expert jumpers and are strong flyers
- Potential to vector Pierce's disease of grapevines
 - Several culprits, including **glassy-winged sharpshooter**, **blue sharpshooter**, and **versute sharpshooter**
 - The causal agent is the bacterium *Xylella fastidiosa*
- Symptoms of Pierce's disease include:
 - Yellowing/reddening of leaves leading to drying along margins
 - Fruit clusters shrivel
 - Dried leaves fall leaving the petiole attached to the cane
 - Wood on new canes matures irregularly
 - Not all symptoms are necessarily present in infected vines



Grape berry moth

- Adult moths, irregular markings of different shades of brown
 - Eggs laid singly on grape stems, blossom clusters, or berries
 - Larvae are cream color at first, turning gray-green and eventually purple when mature, 3/8 in long
 - Overwinters as pupae in grayish silken cocoons in fallen leaves
- The female sex pheromone available for monitoring
 - A prebloom generation may exist in some regions
 - 2nd generation near bloom time, with 3rd or 4th gens later
 - 50% emergence at 187, 869, and 1094 DD after first male catch
- Economic damage is primarily to the berries
 - Larvae enter berries, creating tunnels (dark surface)
 - Create webbed clusters



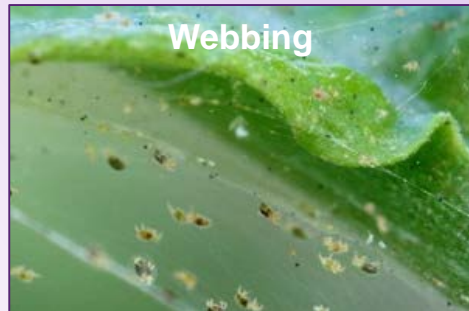
Mites

- **European red mite (ERM)**, *Panonychus ulmi*,
- **Two-spotted spider mite (TSM)**, *Tetranychus urticae*,
- Can be a major pest within vineyards
 - Leaves have mild chlorotic spots and become bronzed if populations are sufficiently high
 - Severe infestations may result in defoliation
 - No direct fruit injury → reduction in photosynthesis negatively affects fruit quality
 - May lead to reduced shoot growth and fruit bud in the following year



Mites

Two-spotted Spider Mite



European Red Mite



Monitoring for Mites

- During the dormant period:
 - Inspect vines for overwintering ERM eggs
 - Clusters of of tiny (less than 1/50 inch), red spheres
- Post-bloom:
 - Assess leaves for adult ERM and TSM mites
 - Use hand lens to inspect leaves
 - Tap branch and collect mites onto white sheet of paper
- Chemical control should be considered only if ERM exceed **10 ERM** and/or **5 TSM** per leaf



Biological Control

- Insecticides and miticides can also impact beneficials (natural enemies)
 - Not all mites are bad!
 - Other predators, like lady beetles, feed on mites
- Avoid pesticides that are toxic to the natural enemies
- Use insecticides and miticides more selectively
- Encourage alternative resources, such as flowering plants
- May want to monitor for natural enemy populations before applying chemicals



Thrips

- Small, 0.04 inch long, with distinctive feathery wings
- **Western flower thrips** and **grape thrips** are the most important species
 - Western flower thrips populations peak in spring
 - Coinciding with grape bloom
 - Grape thrips populations peak in early summer
 - Coincides with peak vine growth
 - As growth slows, the numbers of thrips decreases
- Damage includes:
 - Stunted shoots and leaf stippling/necrosis
 - Halo-spotting on the fruit when they oviposit in berries
 - Scarring of berries with their feeding
- Generally not a problem in wine grapes



Japanese and June beetles

Japanese beetles

- Adults are shiny green with copper-colored front wings
 - Overwinter as white, C-shaped larvae (grubs) below the soil surface
 - Eggs are laid in the soil
- Can be severe pest of grape during the summer
 - Adults skeletonize or eat complete leaves rarely feeding on berries
 - Adults are gregarious; present in great numbers on only a few vines
 - Feeding is concentrated in the upper part of the vine canopy
 - Intensive feeding after veraison may severely impact fruit quality and yield



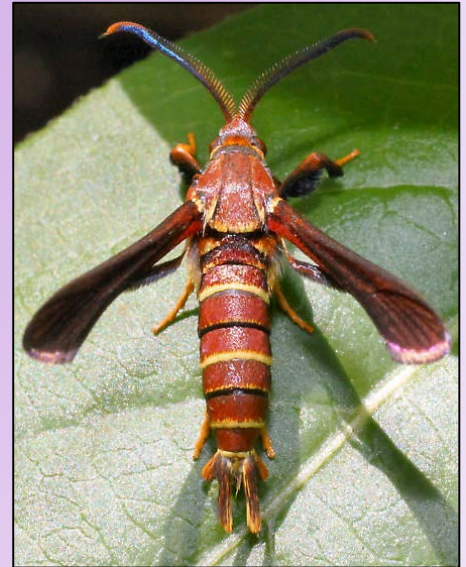
Green June beetles

- Adults are about 1 inch long, 1/2 inch wide
 - Dull velvety green with bronze margins
 - Overwinter as grayish-white grubs in the soil (larger than JB grubs)
- Adults feed on petioles, leaves, and fruit
 - Can feed on both green and ripening fruit
 - A single adult can cause significant damage
 - Adults are often found in groups



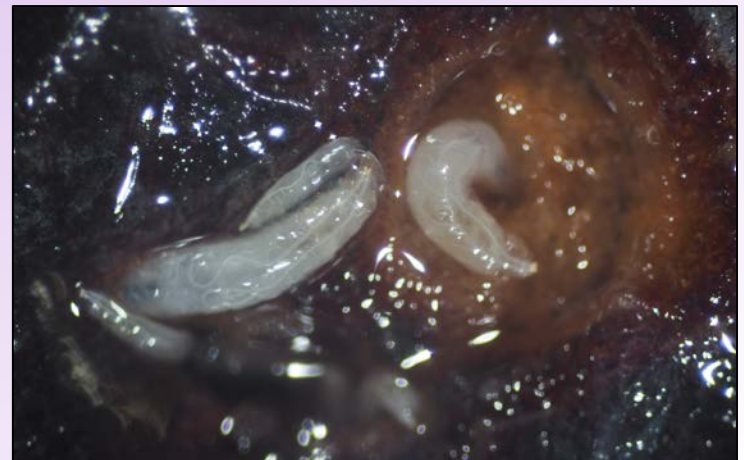
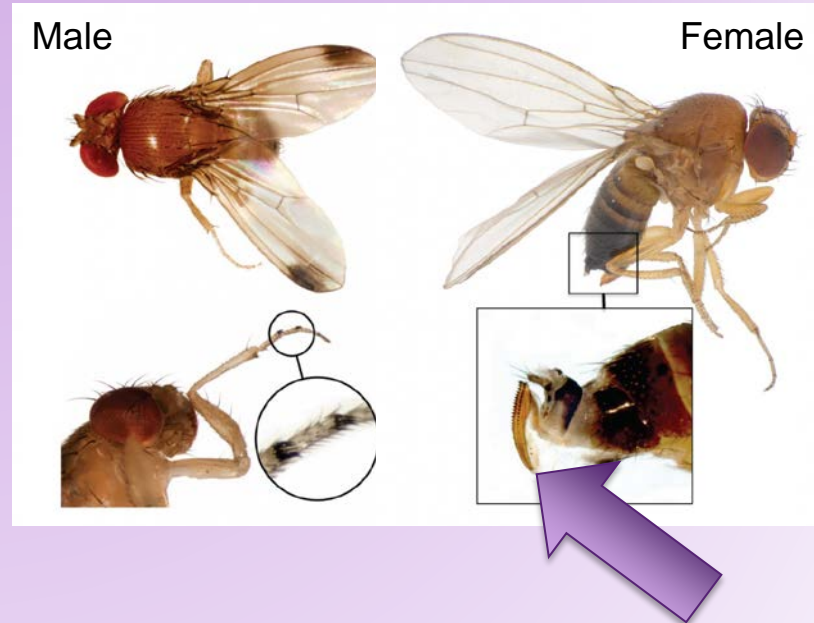
Grape root borer

- Adult moths resemble wasps
 - The forewings are dark and the hind wings are more transparent
 - Male moths are about 5/8 in and females about 3/4 in
 - Female sex pheromone available for adult monitoring purposes



Spotted Wing Drosophila

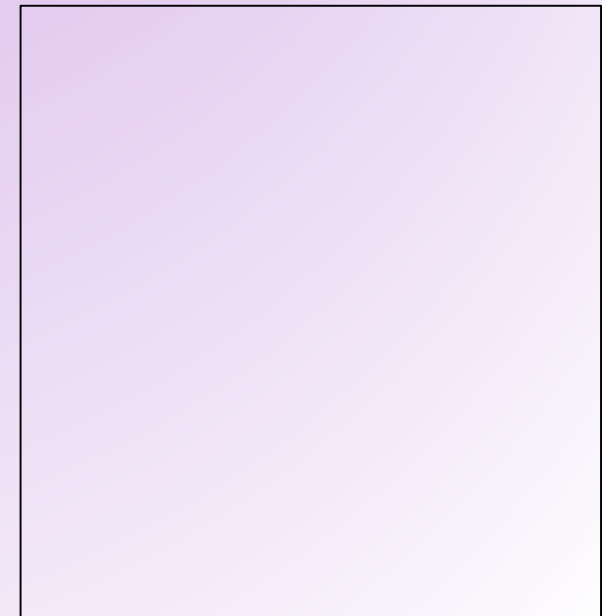
- Vinegar (fruit) fly
- Adults are 0.07-0.13 in long, have red eyes
 - **Males** have a characteristic black spot on the tip of each wing
 - **Females** have a saw-like, ovipositor
- Hosts include blackberries, blueberries, cherries, peaches, pears, plums, strawberries, raspberries, and **grapes**
- Lay eggs in ripening fruit
 - Can transmit sour rot
 - Larvae feed and pupate within fruit
 - Full life cycle as quick as 9 days
- Larvae may infest fruit at harvest
- Monitoring and management are crucial



Monitoring for SWD



- SWD is attracted to many volatiles
 - Including vinegar, wine, yeast, and fruit
- Bait for traps
 - 1 tbsp dry yeast, 4 tbsp white sugar, and 2 cups of water + unscented dish soap
 - Solution should be 1–2 inches in trap
 - Traps can be made from plastic containers with 6 to 12, 3/16-inch-diameter holes about 2/3 around
- Commercial lures and traps are available
- Deploy traps 2 weeks before fruit begins to color
- Place traps on the north side of rows at fruit level



Checking Fruit for Larvae

- Larvae may be present in fruit before adults are caught in traps
 - Also indicates whether sprays are effective
- Collect intact, ripening grapes
 - Place fruit in a flat, dark pan or zip-lock bag
 - Add a salt solution (**1/4 cup salt to 4 cups water**)
 - Wait ~15 minutes for larvae to exit the fruit
 - Larvae found in recently ripened fruit are likely to be SWD



Outline

- Common grape insect pests
 - Basic biology
 - **Timing in field**



Bud swell through budbreak

- Grape flea beetle



- Climbing cutworms



- Mealybugs



- Leafhoppers/sharpshooters
(for Pierce's disease suppression)





Bud swell through budbreak

Pest	Trade Name	Active Ingredient; IRAC	Rate	Efficacy
Grape flea beetle	Sevin	carbaryl; 1A	2.5 lb	+++
	Imidan 70W	Phosmet; 1B	1.33-2.125 lb	+++
	Baythroid 2EC	cyfluthrin; 3A	2.4-3.2 fl oz	+++
Climbing cutworms	Sevin	carbaryl; 1A	2.5 lb	+++
	Baythroid 2EC	cyfluthrin; 3A	2.4-3.2 fl oz	+++
	Intrepid	methoxyfenozide; 18	12-16 fl oz	+++
	Delegate	spinetoram; 5	3-5 oz	+++
	Entrust 80W (organic)	spinosad; 5	1.25-2.5 oz	+++
Mealy bugs	Superior spray oil	mineral oil; NA	2% solution	+++
	Belay	clothianidin; 4A	6 fl oz (foliar) 12 fl oz (soil)	+++ ++++
	Applaud 70DF	buprofezin; 16	9-12 oz	+++
	Baythroid 2EC	cyfluthrin; 3A	2.4-3.2 fl oz	+++
Leafhoppers/ Sharpshooters	Admire Pro	imidacloprid; 4A	1.4 fl oz (foliar) 7-14 fl oz (soil)	+++ ++++
	Belay	clothianidin; 4A	6 fl oz (foliar) 12 fl oz (soil)	+++ ++++



Prebloom

- Grape flea beetle
- Leafhopper/ sharpshooters
- Grape berry moth





Prebloom

Pest	Trade Name	Active Ingredient; IRAC	Rate/acre	Efficacy
Grape flea beetle	Sevin	carbaryl; 1A	2.5 lb	++
	Imidan 70W	Phosmet; 1B	1.33-2.125 lb	+++
Leafhoppers/ Sharpshooters	Sevin	carbaryl; 1A	2.5 lb	++
	Malathion 8F	malathion; 1B	1.88 pt	++
	Danitol 2.4 EC	fenpropathrin; 3	5.33-10.66 fl oz	++
	Admire Pro	imidacloprid; 4A	1.4 fl oz (foliar) 7-14 fl oz (soil)	+++ ++++
Grape berry moth	Imidan 70W	Phosmet; 1B	1.33-2.125 lb	+++
	Danitol 2.4 EC	fenpropathrin; 3	5.33-10.66 fl oz	++
	Belay	clothianidin; 4A	6 fl oz (foliar)	++
	Delegate	spinetoram; 5	3-5 oz	+++
	Entrust 80W (organic)	spinosad; 5	1.25-2.5 oz	+++
	Intrepid	methoxyfenozide; 18	12-16 fl oz	+++
	Avaunt	indoxacarb; 22	5-6 oz	+++
	Altacor	rynaxypyr; 28	2.0-4.5 oz	+++



Bloom

- Thrips





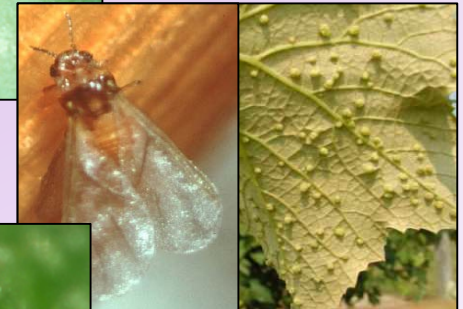
Bloom

Pest	Trade Name	Active Ingredient; IRAC	Rate/acre	Efficacy
Thrips	Aza-direct	azadirachtin ; UN	1-2 pt	++
	PyGanic 1.4EC	pyrethrins; 3	16-64 fl oz	++
	Venom	dinotefuran; 4A	1-3 oz	+++
	Delegate	spinetoram; 5	3-5 oz	+++
	Entrust 80W (organic)	spinosad; 5	1.25-2.5 oz	+++



Fruit set

- Leafhopper/ sharpshooters
- Grape berry moth
- Grape phylloxera
- Mites





Fruit set

Pest	Trade Name	Active Ingredient; IRAC	Rate	Efficacy
Leafhoppers/ Sharpshooters	Sevin	carbaryl; 1A	2.5 lb	++
	Malathion 8F	malathion; 1B	1.88 pt	++
	Danitol 2.4 EC	fenpropathrin; 3	5.33-10.66 fl oz	++
Grape berry moth	Admire Pro	imidacloprid; 4A	1.4 fl oz (foliar) 7-14 fl oz (soil)	+++ ++++
	Imidan 70W	Phosmet; 1B	1.33-2.125 lb	+++
	Danitol 2.4 EC	fenpropathrin; 3	5.33-10.66 fl oz	++
	Belay	clothianidin; 4A	6 fl oz (foliar)	++
	Delegate	spinetoram; 5	3-5 oz	+++
	Entrust 80W (organic)	spinosad; 5	1.25-2.5 oz	+++
	Intrepid	methoxyfenozide; 18	12-16 fl oz	+++
	Avaunt	indoxacarb; 22	5-6 oz	+++
	Altacor	rynaxypyr; 28	2.0-4.5 oz	+++



Fruit set (continued)

Pest	Trade Name	Active Ingredient; IRAC	Rate	Efficacy
Grape phylloxera	Assail 30SG	acetamiprid; 4A	2.5 oz	+++
	Movento	spirotetramat; 23	6-8 fl oz	+++
Mites	Acramite 50WS	bifenazate; UN	1 lb	+++++
	Zeal	etoxazole; 10B	3 oz	++++
	Portal 5EC	fenpyroximate; 21A	2 pt	++++
	Agri-Mek 0.15EC	abamectin; 6	16 fl oz	++++
	Nexter 75WP	pyridaben; 21A	10.67 oz	+++
	Vendex 50WP	fenbutatin-oxide; 12B	2.5 lb	+++
	Envidor 2SC	spirodiclofen; 23	18 fl oz	++++
	Onager 11.8EC	hexythiazox; 10A	12-24 fl oz	+++
	TriTek	horticultural oil; UN	1-2% solution	+++



Cover sprays

Peppercorn to veraison

- Leafhopper/ sharpshooters
- Grape berry moth
- Grape phylloxera
- Mites
- Japanese and June beetles





Cover sprays

Peppercorn to veraison

Pest	Trade Name	Active Ingredient; IRAC	Rate	Efficacy
Leafhoppers/ Sharpshooters	Sevin	carbaryl; 1A	2.5 lb	++
	Malathion 8F	malathion; 1B	1.88 pt	++
	Danitol 2.4 EC	fenpropathrin; 3	5.33-10.66 fl oz	++
	Admire Pro	imidacloprid; 4A	1.4 fl oz (foliar) 7-14 fl oz (soil)	+++ ++++
Grape berry moth	Imidan 70W	Phosmet; 1B	1.33-2.125 lb	+++
	Danitol 2.4 EC	fenpropathrin; 3	5.33-10.66 fl oz	++
	Belay	clothianidin; 4A	6 fl oz (foliar)	++
	Delegate	spinetoram; 5	3-5 oz	+++
	Entrust 80W (organic)	spinosad; 5	1.25-2.5 oz	+++
	Intrepid	methoxyfenozide; 18	12-16 fl oz	+++
	Avaunt	indoxacarb; 22	5-6 oz	+++
	Altacor	rynaxypyr; 28	2.0-4.5 oz	+++
Grape phylloxera	Assail 30SG	acetamiprid; 4A	2.5 oz	+++
	Movento	spirotetramat; 23	6-8 fl oz	+++



Cover sprays (continued)

Peppercorn to veraison

Pest	Trade Name	Active Ingredient; IRAC	Rate	Efficacy
Mites	Acramite 50WS	bifenazate; UN	1 lb	+++++
	Zeal	etoxazole; 10B	3 oz	++++
	Portal 5EC	fenpyroximate; 21A	2 pt	++++
	Agri-Mek 0.15EC	abamectin; 6	16 fl oz	++++
	Envidor 2SC	spirodiclofen; 23	18 fl oz	++++
	Onager 11.8EC	hexythiazox; 10A	12-24 fl oz	+++
	TriTek	horticultural oil; UN	1-2% solution	+++
Japanese and June beetles	Sevin	carbaryl; 1A	2.5 lb	++++
	Imidan 70W	Phosmet; 1B	1.33-2.125 lb	+++
	Malathion 8F	malathion; 1B	1.88 pt	++
	Assail 70WP	acetamiprid; 4A	1.1 oz	+++
	Avaunt	indoxacarb; 22	5-6 oz	+++
	Neemix 4.5 + Trilogy	azadirachtin + neem oil	16 fl oz + 2%	+++



Mid-May to Early-June

- Grape root borer
(mating disruption)





Mid-May to Early-June

Pest	Trade Name	Active Ingredient; IRAC	Rate	Efficacy
Grape root borer	Isomate GRB	pheromone; mating disruption	100 dispensers	++++



Veraison – 15° brix

- Spotted wing drosophila

Plus:

- Leafhopper/ sharpshooters
- Grape berry moth
- Mites
- Japanese and June beetles





Veraison – 15° brix

Pest	Trade Name	Active Ingredient; IRAC	Rate	Efficacy
Spotted wing drosophila	Imidan 70W	Phosmet; 1B	1.33-2.12 lb	+++
	Malathion 8F	malathion; 1B	1.88 pt	++++
	Danitol 2.4 EC	fenpropathrin; 3	10.66 fl oz	+++
	Mustang Maxx	zeta-cypermethrin; 3	2-4 oz	++++
	Delegate	spinetoram; 5	3-5 oz	+++
	Entrust 80W (organic)	spinosad; 5	1.25-2.5 oz	+++

Follow cover spray recommendations for:

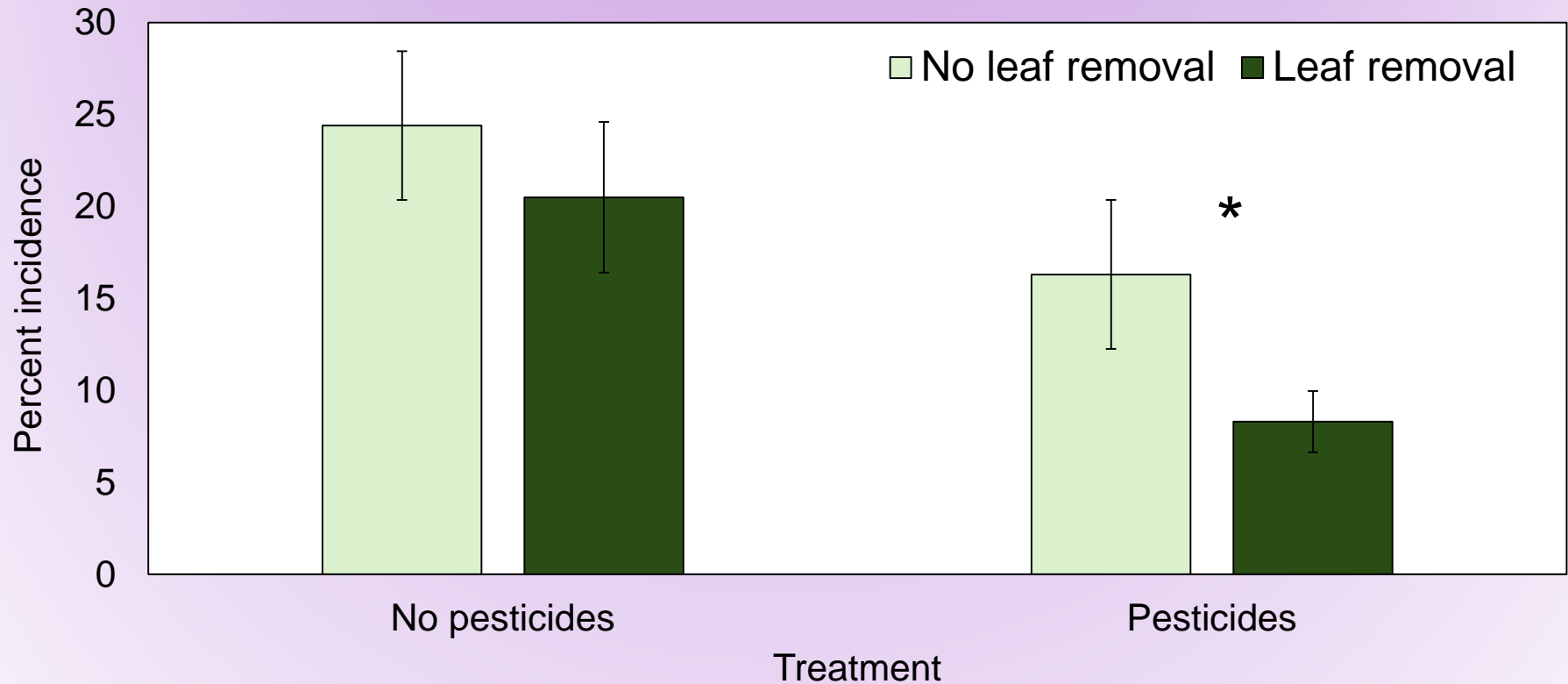
- Leafhopper/ sharpshooters
- Grape berry moth
- Mites
- Japanese and June beetles

Leaf Pulling + Oxidate 2.0 + Insecticide



In collaboration with Cain Hickey and Phil Brannen

Sour rot + Botrytis *incidence*



Combining leaf pulling and pesticides provided the lowest disease pressure

$P = 0.0203$

In collaboration with Cain Hickey and Phil Brannen



Pre-harvest – at least 35 days

- Grape root borer



Plus:

- Leafhopper/ sharpshooters
- Grape berry moth
- Mites
- Japanese and June beetles



Pre-harvest – at least 35 days

Pest	Trade Name	Active Ingredient; IRAC	Rate	Efficacy
Grape root borer	Lorsban	chlorpyrifos; 1B	4.5 pt	++

Follow cover spray recommendations for:

- Leafhopper/ sharpshooters
- Grape berry moth
- Mites
- Japanese and June beetles



SRSFC Activities ▾

Crops ▾

Regional Experts

IPM/Production Guides

County Agent Training

Weather



IPM/Production Guides

Last updated Friday 5 January 2018 8:9 GMT

Blueberries

- [Southeast Regional Blueberry Integrated Management Guide](#)
- [Southeast Regional Blueberry Horticulture and Growth Regulator Guide](#)
- [Southeast Regional Organic Blueberry Pest Management Guide](#)

Bunch Grapes

- [Southeast Regional Bunch Grape Integrated Management Guide](#)



Caneberries

- [Southeast Regional Caneberries Integrated Management Guide](#)
- [Southeast Regional Caneberry Production Guide \(PDF\)](#)
- [Southeast Regional Caneberry Production Guide \(Online Version\)](#)

Muscadines

- [Southeast Regional Muscadine Grape Integrated Management Guide](#)



Strawberries

- [Southeast Regional Strawberry Integrated Pest Management Guide](#)
- [Southeast Regional Strawberry Plasticulture Production Guide](#)
- [Fungicide Selection for Botrytis and Anthracnose Fruit Rot Management 2017](#)

Questions?



Contact Me

Brett Blaauw

Department of Entomology

University of Georgia

353 Biological Sciences Bldg.

Athens, GA 30602

e-mail: bblaauw@uga.edu