Mid- to late-season vineyard insect management

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Mid-Season Grape Workshop
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UNIVERSITY OF GEORGIA

UGA extension

Outline

Key grape pests to target

- Japanese beetles
- Leafhoppers/sharpshooters
- Grape berry moth
- Grape root borer
- Mites
- Spotted wing drosophila

Japanese beetles

- Adults are shiny green and copper-colored
  - Eggs are laid in the soil
  - Overwinter as white, C-shaped grubs in soil
- Potential pest of grape during the summer
  - Adults skeletonize leaves
  - Adults are gregarious; present in great numbers on only a few vines
  - Feeding is concentrated near top of canopy
  - Intensive feeding after veraison may impact fruit quality and yield

Managing Japanese beetles

- Remove attractive non-crop host plants
  - Preferred plants
    - **Grape**, linden, Japanese maple, birch, pin oak, horse chestnut, apple, plum, cherry, rose, mountain ash, elm, Virginia creeper, crape myrtle
  - Rarely attacked plants
    - Red maple, tuliptree, magnolias, red mulberry, forsythia, ash, privet, lilac, spruce, hydrangea, yew
- Grow less attractive grape cultivars/species
  - Juice grape < hybrids < vinifera
- Milky spore may provide as long-term control

Chemical management of Japanese beetles

- Scout mid-June, early July
  - Look for beetles/damage
  - **Do not use monitoring traps!**
- Rotate chemicals
  - Note Assail is systemic
- Abundance is often higher at vineyard borders
  - Targeted management may minimize cost

IRAC	Active Ingredient	Trade Name	Efficacy
1A	Carbaryl	Sevin XLR	++++
1B	Phosmet	Imidan 70W	+++
1B	Malathion	Malathion 8F	++
22A	Indoxacarb	Avaunt 30DG	+++
3	Zeta-cypermethrin	Mustang Maxx	+++
4A	Acetamiprid	Assail 70WP	+++
UN	Azadirachtin	Neemix	+++

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

Managing leafhoppers / sharpshooters

- Remove alternative hosts from vineyard
  - Bermudagrass, perennial rye, fescue grass, blackberry, willow, and elderberry
- Monitor using yellow sticky cards in canopy
- Cover sprays to suppress populations
  - Rotate chemical classes

IRAC	Active Ingredient	Trade Name	Efficacy
1A	carbaryl	Sevin 80S	++
1B	malathion	Malathion 8F	++
3A	bifenthrin	Brigade 10 WSB	++
3A	cyfluthrin	Baythroid	++
3A	fenpropathrin	Danitol 2.4 EC	++
4A	acetamiprid	Assail 30SG	+++
4A	clothianidin	Clutch 50WDG	+++
4A	dinotefuran	Scorpion 35 SL	+++
4A	imidacloprid	Admire Pro	+++

Grape berry moth

- Adults moths have irregular brown and gray coloring
- Overwinters as pupae in grayish silken cocoons in leaf litter
- The female sex pheromone available for monitoring purposes
  - A prebloom generation may exist in some regions
  - A second generation begins flying near bloom time
  - Potentially 4 generations

- Females lay an average of 20 eggs
  - 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

- Economic damage is primarily to the berries
  - Larvae enter berries, creating tunnels
  - Leave silken strands, resulting in webbed clusters

Grape berry moth management

- Begin monitoring early in the season
  - Target high-risk areas
  - Pheromone traps to detect males
  - 3 traps per site
- After first capture, start accumulating DD (base 50ºF)
- Check fruit around 400-700 DD (May)
  - Treat perimeter vines if damage is observed
- Monitor again at
  - 1,200 - 1,600 DD (mid-June)
  - 2,400 - 2,700 DD (early-Aug.)
  - Treat vineyard

IRAC	Active Ingredient	Trade Name	Efficacy
4A	Clothianidin	Belay	++
4A	Clothianidin	Clutch 50WDG	+++
3A	Fenpropathrin	Danitol 2.4 EC	++
22	Indoxacarb	Avaunt 30DG	+++
18	Methoxyfenozide	Intrepid 2F	++++
1B	Phosmet	Imidan 70-W	+++
28	Rynaxypyr	Altacor	+++
5	Spinetoram	Delegate	+++
5	Spinosad	Entrust	+++

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 inches
- Each female lays an average of 300 eggs
  - Only 1.5-2.7% survive
  - First instar larvae drop to the ground and tunnel to roots
- The life cycle takes two years to complete
  - They bore into the roots and crown below the soil surface
  - Full-grown larvae are about 1 in long, white, with brown heads
  - Adults emerge from soil in early summer (July)
- Damage reduces the productivity of the vine
  - Loss of vine vigor is often the first sign of this pest
  - Vines eventually die

Monitoring for grape root borer

- Traps baited with mating pheromone and an insecticidal strip
  - Deploy traps in June and monitor until no moths are caught
  - One trap per acre
  - Place trap along border row of vines
  - Hang from bottom trellis wire
- Peak captures signals chemical intervention

Monitoring for grape root borer

Grape root borer

Squash vine borer

Red oak clearwing moth

Yellow jacket

Managing grape root borer

- Cultural control
  - Weed management beneath vines can reduce the number of eggs laid
  - Improved air flow can increase desiccation of eggs
  - Mounding of soil at base can reduce adult emergence

- Mating disruption
  - Isomate-GRB
  - 100 dispensers per acre

- Chemical control
  - Applied when moths are first caught in traps
  - Lorsban applied to base of vine
  - Not within 35 days of harvest

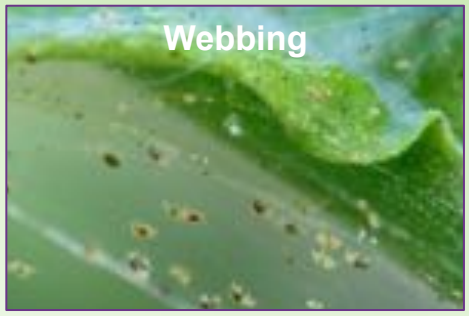
IRAC	Active Ingredient	Trade Name	Efficacy
1B	Chlorpyrifos	Lorsban	++
UN	Mating disruption	Isomate-GRB	++++

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 of mites

- Insecticides and miticides can also impact beneficials (natural enemies)
  - Not all mites are bad!
  - Predators, like lady beetles, feed on mites
- Use insecticides and miticides selectively
  - When possible - avoid pesticides that are toxic to the natural enemies (e.g. pyrethroids)
  - Monitor for natural enemy populations before applying chemicals
- Encourage alternative resources, such as flowering plants

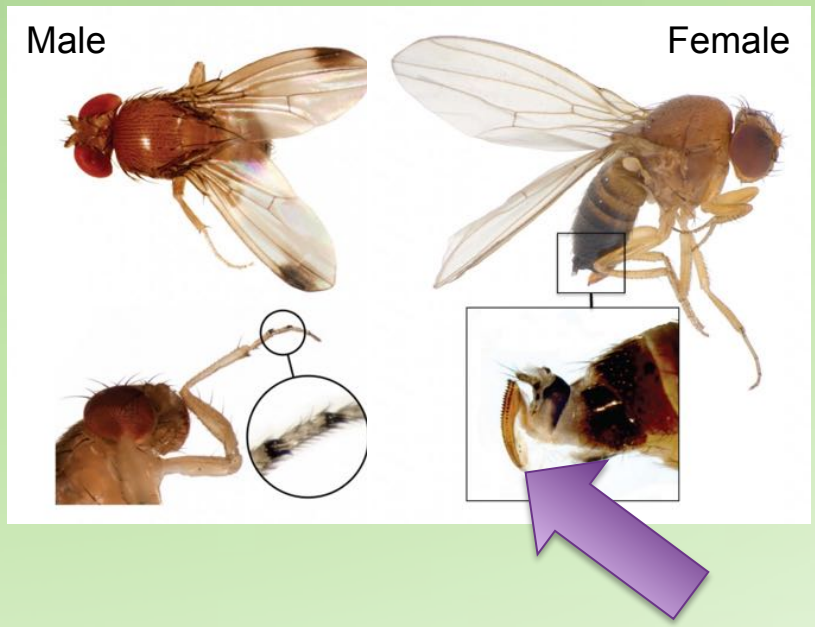
Chemical management of mites

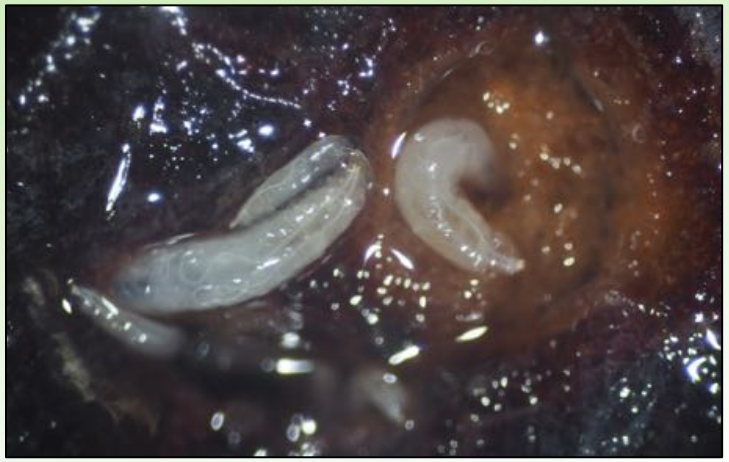
- **Dormant:** If ERM are found, a dormant oil application may be justified at bud swell
  - Horticultural oil
  - High spray volume (100 gallons per acre)
- **Post-bloom:** apply miticides as needed before serious plant damage occurs
  - Based on thresholds
  - Necessary to rotate modes of action for miticides

IRAC	Active Ingredient	Trade Name	Efficacy
6	Abamectin	Agri-Mek 0.15EC	+++
23	Spirodiclofen	Envidor 2SC	+++
10A	Hexythiazox	Onager 11.8EC	++
10B	Etoxazole	Zeal WP	+++
12B	Fenbutatin oxide	Vendex 50WP	++
20D	Bifenazate	Acramite 50WS	++++
21A	Pyridaben	Nexter 75 WP	++
21A	Fenpyroximate	Portal 5EC	+++
25A	Cyflumetofen	Nealta 1.67WSP	+++
UN	Horticultural oil	Superior oil	++
UN	Horticultural oil	TriTek	++

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
- Early season yeast bait
  - 1 tablespoon dry yeast, 4 tablespoons white sugar, and 2 cups of water
- Late in the season bait
  - Red wine + apple cider vineger mixture (60:40 wine:vineger)
- The solution in the trap should 1–2 inches deep and contain one drop of unscented soap
- Traps can be made from plastic containers with six to twelve 3/16-inch-diameter holes about 2/3 around
- Additionally, commercial lures and traps are available

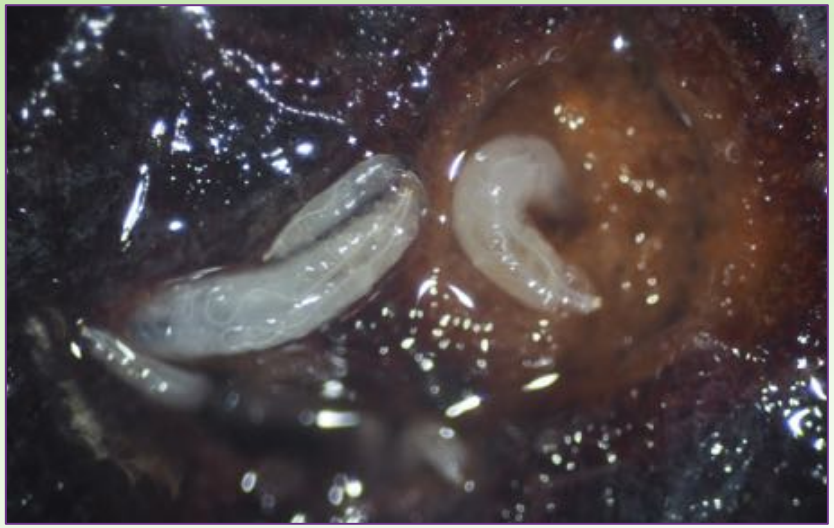
SWD trap placement

- Deploy traps in the field 2 weeks before fruit begins to color
- Place traps on the north side of rows at fruit level
- Females may be caught first → difficult to identify without 16x magnification
- Monitor any field where you suspect SWD may be present
- SWD is more likely to be in the shady side and where humidity is highest

Checking fruit for larvae

Indicates whether sprays are effective

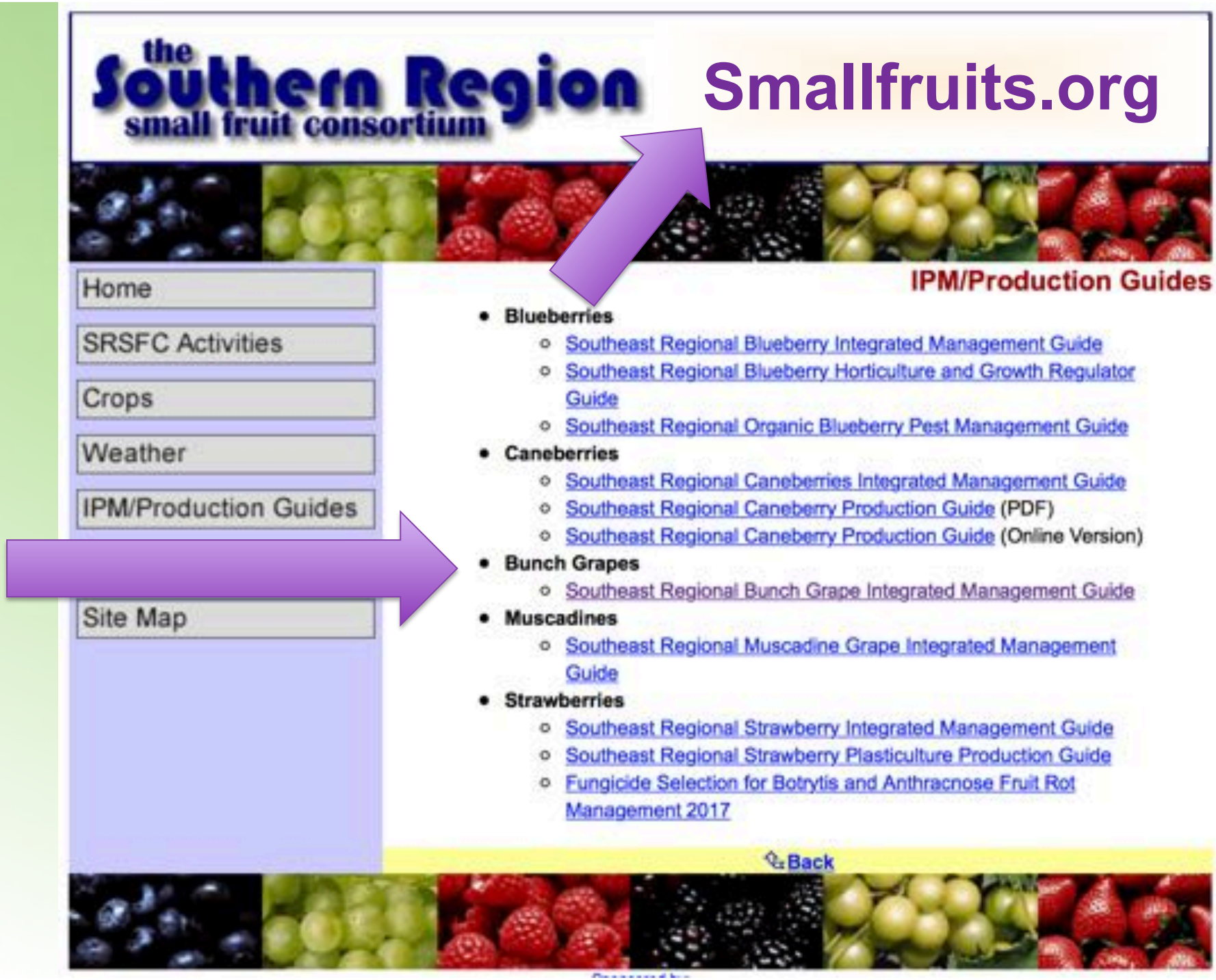
- Collect intact, ripening grapes
- Place fruit in a flat, dark pan or zip-lock bag
- Add a salt solution (**1⁄4 cup salt to 4 cups water**)
- Wait ~15 minutes for larvae to exit fruit
- Larvae found in recently ripened fruit are likely to be SWD



Management of SWD

- SWD attack and infest fruit as berries ripen
- Risk significantly increases when fruit reach **15 degrees Brix**
- Applying sprays before SWD is present may needlessly decimate beneficial insects
  - Monitoring is crucial → initiate sprays only if flies are captured
  - It is critical to rotate among differing modes of action
- Good canopy management is important
  - Better visual inspection of the fruit
  - Reduces cluster rots after SWD injury,
  - Better coverage of insecticides
- Practice proper sanitation → flies will re-infest fallen fruit, so waste disposal is important

IRAC	Active Ingredient	Trade Name	Efficacy	Special Permit
1B	Malathion	Malathion 8F	+++	
1B	Phosmet	Imidan 70WSB	++++	
3A	Fenpropathrin	Danitol 2.4EC	++++	
3A	Bifenthrin	Brigade WSB	++++	2(ee)
3A	Zeta-cypermethrin	Mustang Maxx 0.8E	++++	2(ee)
5	Spinetoram	Delegate 25W	++++	2(ee)
5	Spinosad	Entrust 2SC	+++	2(ee)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Questions?

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