Monitoring and Managing Insect Pests in Vineyards

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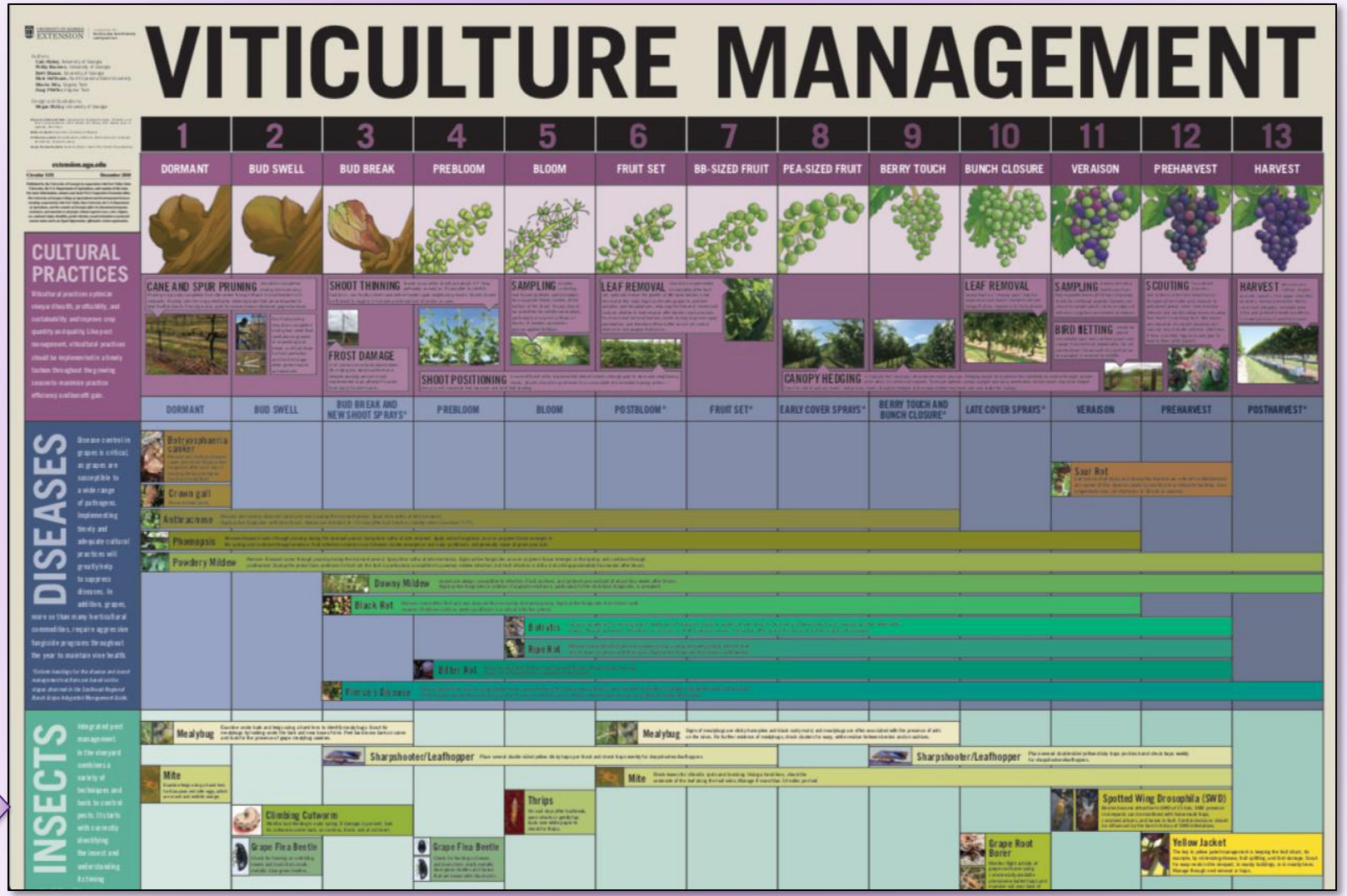
2025

Grape Spray Program Design Workshop

UNIVERSITY OF GEORGIA
EXTENSION


VITICULTURE MANAGEMENT
1 DORMANT
2 BUD SWELL
3 BUD BREAK
4 PREBLOOM
5 BLOOM
6 FRUIT SET
7 BB-SIZED FRUIT
8 PEA-SIZED FRUIT
9 BERRY TOUCH
10 BUNCH CLOSURE
11 VERAISON
12 PREHARVEST
13 HARVEST
CULTURAL PRACTICES
CANE AND SPUR PRUNING
SHOOT THINNING
FROST DAMAGE
SAMPLING
LEAF REMOVAL
SHOOT POSITIONING
CANOPY HEDGING
LEAF REMOVAL
SAMPLING
BIRD NETTING
SCOUTING
HARVEST
DORMANT
BUD SWELL
BUD BREAK AND NEW SHOOT SPRAYS*
PREBLOOM
BLOOM
POSTBLOOM*
FRUIT SET*
EARLY COVER SPRAYS*
BERRY TOUCH AND BUNCH CLOSURE*
LATE COVER SPRAYS*
VERAISON
PREHARVEST
POSTHARVEST*
DISEASES
Botryosphaeria canker
Crown gall
Anthracnose
Phomopsis
Powdery Mildew
Sour Rot
Downy Mildew
Black Rot
Botrytis
Ripe Rot
Bitter Rot
Pierce's Disease
INSECTS
Mealybug
Sharpshooter/Leafhopper
Mite
Climbing Cutworm
Grape Flea Beetle
Thrips
Grape Flea Beetle
Mealybug
Mite
Sharpshooter/Leafhopper
Spotted Wing Drosophila (SWD)
Grape Root Borer
Yellow Jacket

Common Grape Pests

1. Grape mealybugs
2. Grape flea beetle
3. Leafhoppers / sharpshooters
4. Grape phylloxera
5. Mites
6. Japanese beetles
7. Grape root borer
8. Spotted wing drosophila

Potential New Grape Pest

- Spotted lanternfly

Monitoring and biology of pests

Dormant to Budbreak & Fruitset

Grape mealybug

Grape mealybugs

- Flat, white, and oval shaped
- Become active in spring
  - Multiple generations a year
  - Populations are highest on vigorous vines
  - Generally more severe on late-ripening varieties
- Mealybugs can vector grapevine **leafroll virus**
- Honeydew supports the growth of sooty mold
- **Monitoring:**
  - Check under bark on spurs or loose bark of prunings
  - **Sooty mold** and/or **ants** indicate mealybugs
  - Pheromone traps can monitor adult males

Budswell & Pre-bloom

Grape flea beetle

Grape flea beetle

- Larvae are brown with black spots, 3/8 in
  - Larvae feed on grape leaves for 3-4 weeks
- Metallic blue-green beetle, ~1/5 in long
  - Adults feed on the unfolding leaves
  - Eat holes into the sides of buds and gouge out the contents as the buds swell
- **Monitoring:**
  - Active early in the spring on warm, sunny days
  - Shiny beetles easily spotted on buds and canes
  - Survey **25 vines** at each of the five locations
  - Bud damage **4% or more** → management needed

Budbreak & Berry Touch

Leafhoppers and Sharpshooters

Leafhoppers / sharpshooters (for Pierce’s disease)

- Small insects with piercing-sucking mouthparts
  - Feed upon xylem or phloem tissue
- 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*

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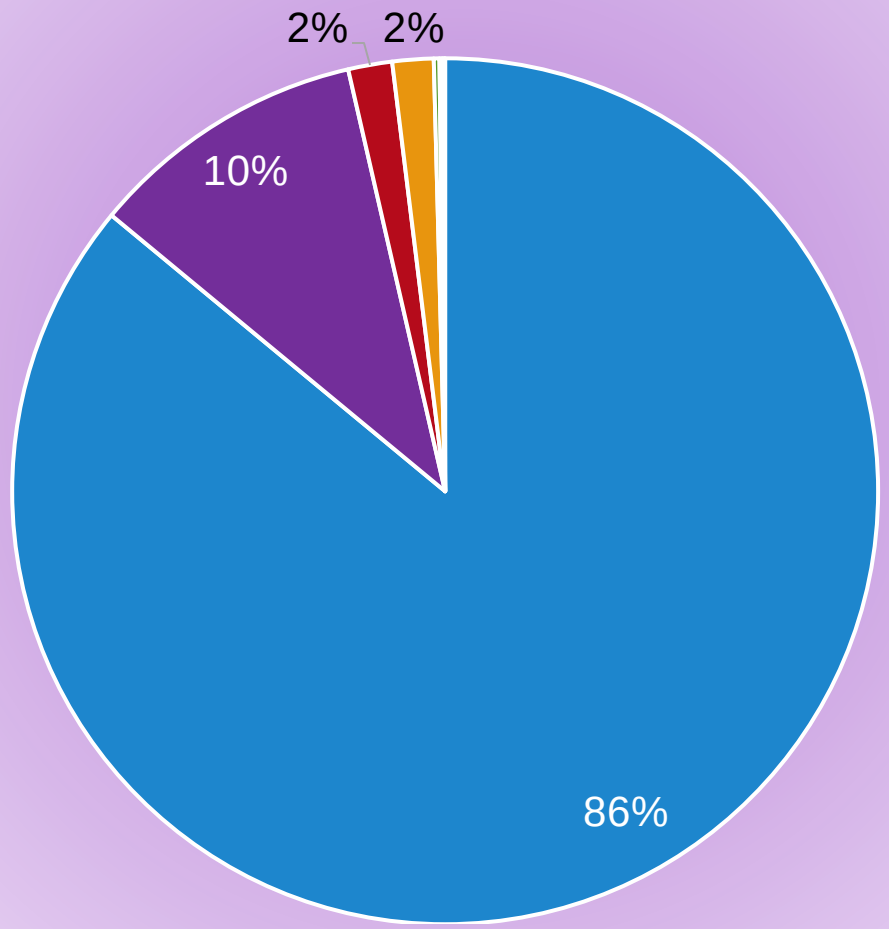
  - The causal agent is the bacterium *Xylella fastidiosa*
- **Monitoring:**
  - Begin at bud break
  - Use double-sided yellow sticky traps
  - Hang traps every 150 feet at canopy height
  - Check traps weekly

Sharpshooter/leafhopper community in GA



- Versute sharpshooter
- Red-banded leafhopper
- Broad-headed sharpshooter
- Constricted leafhopper
- Yellowheaded leafhopper
- Lateral-lined sharpshooter
- Speckled sharpshooter
- Glassy-Winged Sharpshooters

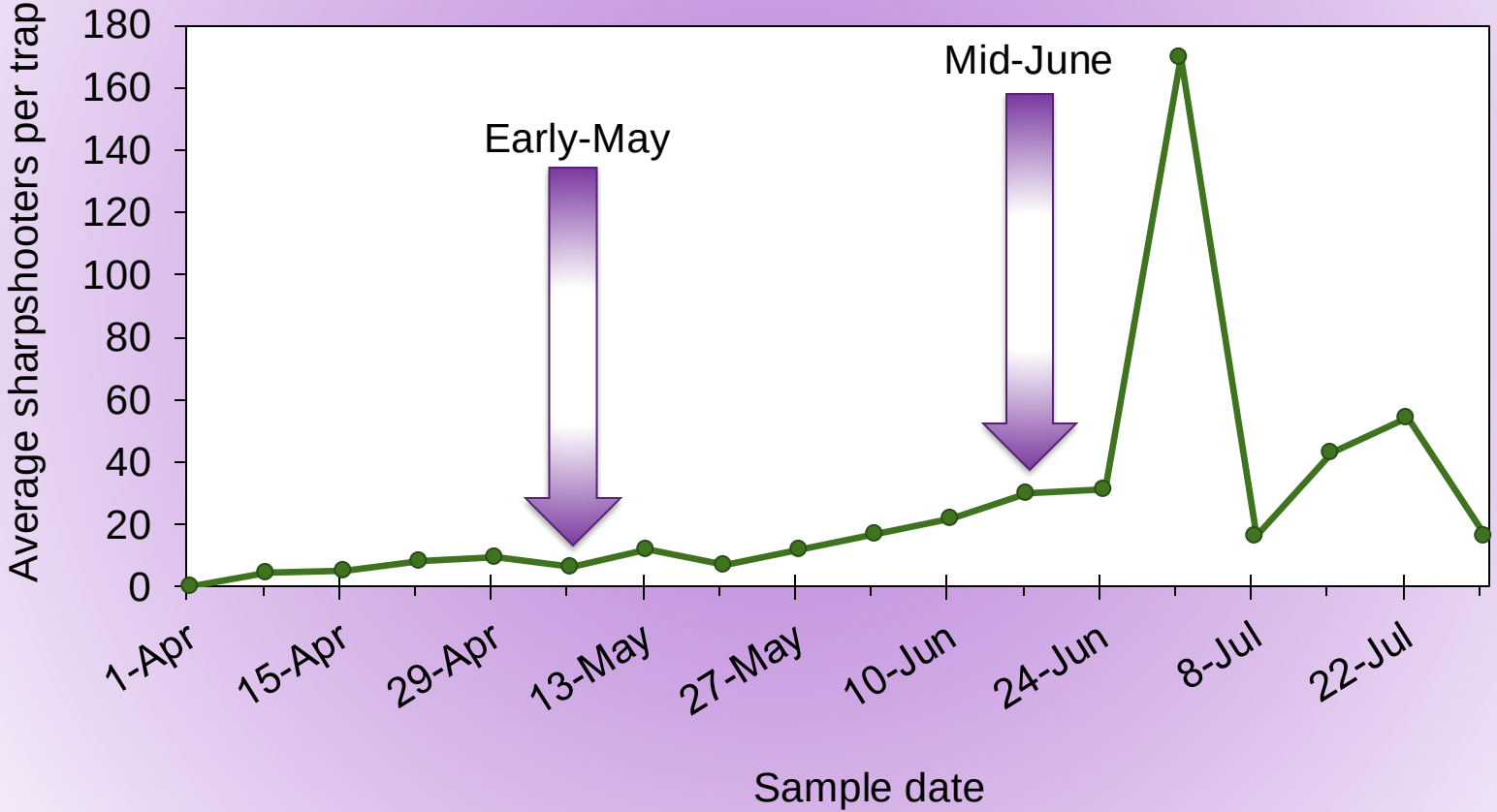
Managing sharpshooters/leafhoppers

- Foliar insecticides: Apply at time of detection
- Large sharpshooters feed on the base rather than on the tips of canes
  - More likely to lead to infections
  - Less likely to be removed through pruning
- Neonicotinoids are most effective
  - **Foliar** can **suppress** populations
  - ★**Soil applied** longer lasting, more effective

Krewer *et al.*, 2002; Byrne and Rosa 2008

Leafhopper/Sharpshooter activity in North GA

Potential timing for chemigation



Managing sharpshooters/leafhoppers

Prebloom and/or cover sprays

Trade Name	Active Ingredient; IRAC	Efficacy
Sevin XLR Plus	carbaryl; 1A	Fair
Malathion 8F	malathion; 1B	Fair
Danitol 2.4 EC	fenpropathrin; 3	Fair
Admire Pro	imidacloprid; 4A	Good Excellent (soil)
Belay	clothianidin; 4A	Good Excellent (soil)
Venom	dinotefuran; 4A	Good Excellent (soil)

Only 1-2 apps per season

Pre-bloom

Grape phylloxera

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
- The mobile crawler stage of phylloxera is susceptible to insecticide treatment
- **Resistant American root stocks are key**

Phylloxera resistant rootstocks

Rootstock	Riparia Gloire	101-14 Mgt.	3309 Couderc	1103 Paulsen	110R	5C	S04	420A
Parentage	*V. riparia*	*V. Riparia* x *V. rupestris*		*V. Berlandieri* x *V. rupestris*		*V. Berlandieri* x *V. riparia*		
Phylloxera resistance	Very high	High	High	High	High	High	High	High

Grape phylloxera monitoring

- Foliar phylloxera can cause galls on leaves of French-American hybrid cultivars
  - i.e., Vidal, Seyval, Chambourcin
- The crawler stage is susceptible to insecticide
- Scout for galls and crawlers prior to bloom
  - If found on susceptible cultivars →
  - Apply insecticide if crawlers are active or 7-10 days post-bloom

Fruitset through Pre-harvest

Mites

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 at high populations
  - 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 sheet of paper
- Chemical control should be considered **only** if mites exceed **10 ERM** and/or **5 TSM** per leaf

Berry Touch through Veraison

Japanese beetles

Japanese beetles

- Adults are shiny green with copper-colored elytra
  - Overwinter as white, C-shaped grubs
- Can be severe pest of grape during the summer
  - Skeletonize leaves, rarely feeding on berries
  - Gregarious; present in great numbers on a few vines
  - Feeding concentrated in the upper part of the canopy
  - Feeding **after veraison** may impact fruit quality
- **Monitoring:**
  - No specific threshold
    - Manage at when 15% of the leaves are damaged
    - Or damage is found below top trellis wire
    - **Young vines** are most vulnerable

Bunch Closure

Grape root borer

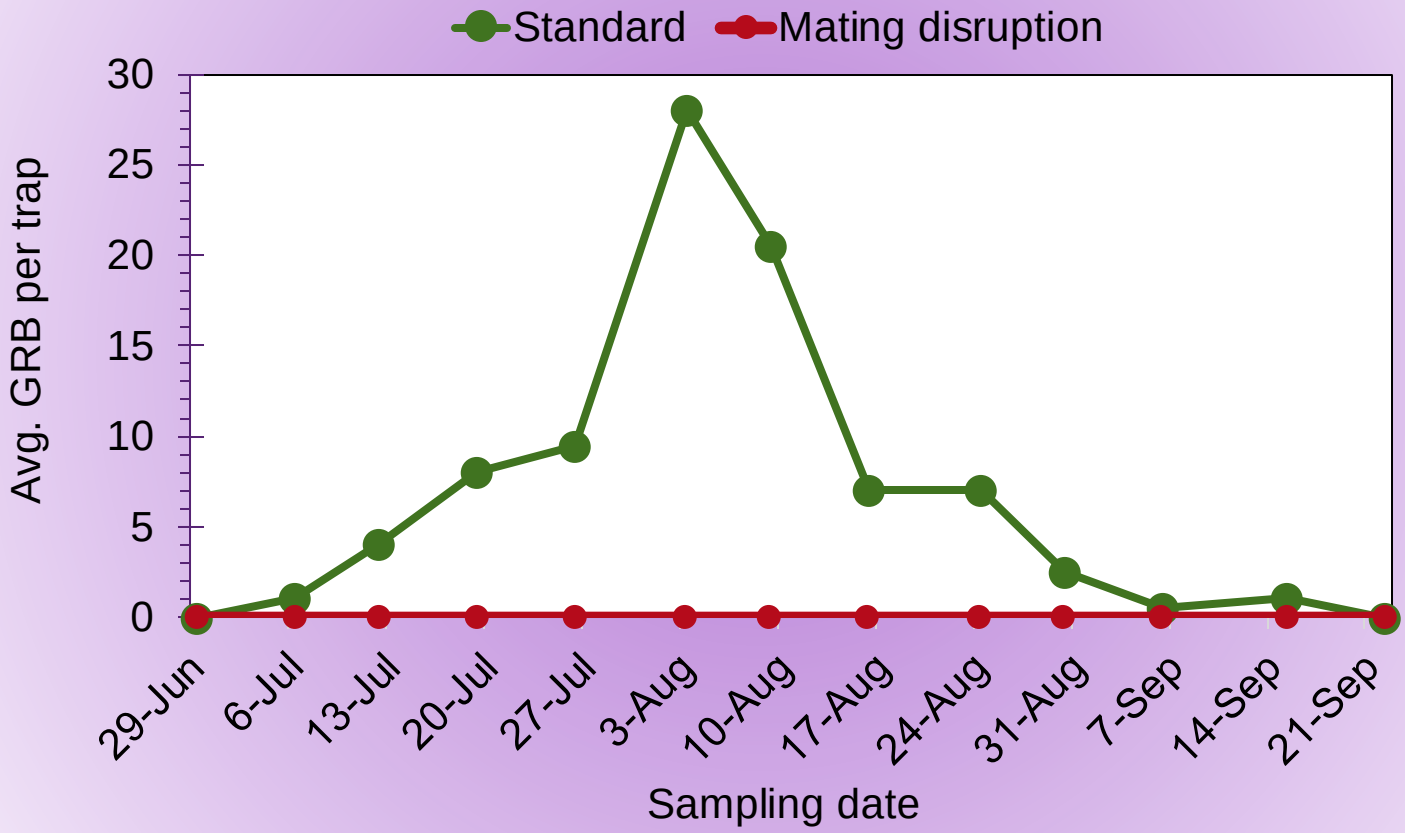
Grape root borer

- Adult moths resemble wasps
- Each female lays an average of 300 eggs
  - Larvae drop to the ground and tunnel into roots
  - The life cycle takes two years to complete
  - Full-grown larvae are about 1 in long, white, and have brown heads
  - Adults emerge from soil in early summer
- Damage reduces the productivity of the vine
  - Roots may be hollowed
  - A lack of plant vigor is usually the first sign
  - Vines eventually die

Grape root borer monitoring

- Bucket trap and pheromone
  - 1 trap per 2 acres
  - Begin mid-June
  - Check traps weekly
- Check for pupal casings at vine base

GRB activity in North GA



Grape root borer management

Mid-May to Early-June

Trade Name	Active Ingredient; IRAC	Efficacy
Isomate GRB	pheromone; mating disruption	++++

Note: new label is currently under EPA review

Entomopathogenic nematodes

- AKA beneficial nematodes or EPNs
- *Heterorhabditis bacteriophora* (*Hb*) or *Steinernema feltiae* (*Sf*)
  - Can reduce grape root borer infestations
  - As effective as chlorpyrifos (Williams et al., 2002)
- Commercially available
  - Reasonably priced
  - Can be easily applied
  - Potentially preventative **and** curative

EPNs for GRB management

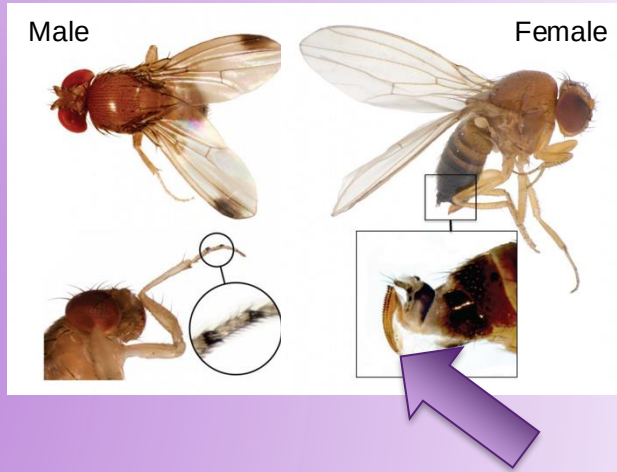
- Several commercial products available
  - Follow label for mixing and application methods
  - 500,000 infective juveniles per vine
- Apply EPNs during GRB pupal stage
  - Approximately **late May**
  - Apply to base of vines
    - Backpack spray, herbicide sprayer, etc.
    - Remove any filters from nozzle
  - Water in with irrigation or ¼ gallon of water/vine

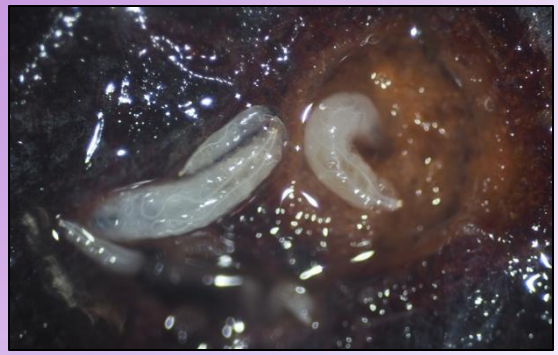
Veraison to Harvest

Spotted-wing drosophila

Spotted Wing Drosophila

- Vinegar (fruit) fly
- Adults are 0.07-0.13 in, have red eyes
  - **Males** have a characteristic black spot on wings
  - **Females** have a saw-like, ovipositor
- Fruit becomes attractive at **15ºBrix**
  - Lay eggs in ripening fruit
  - Can **transmit sour rot**
  - Full life cycle as quick as 9 days
- **Current management**
  - **Leaf pulling**
  - **Insecticides**



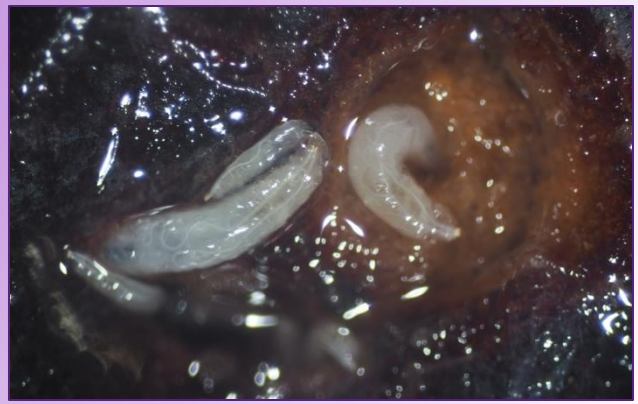


Monitoring for SWD

- SWD are 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 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 SWD
- Several other methods exist



Effective spotted wing drosophila chemicals

Veraison and pre-harvest

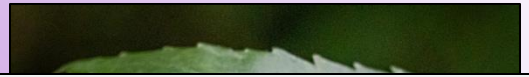
Trade Name	Active Ingredient; IRAC	Efficacy
Malathion 8F	malathion; 1B	Excellent
Imidan 70W	Phosmet; 1B	Good
Mustang Maxx	zeta-cypermethrin; 3	Excellent
Danitol 2.4 EC	fenpropathrin; 3	Good
Delegate	spinetoram; 5	Good
Entrust 80W (organic)	spinosad; 5	Good

Rotating active ingredients is highly recommended

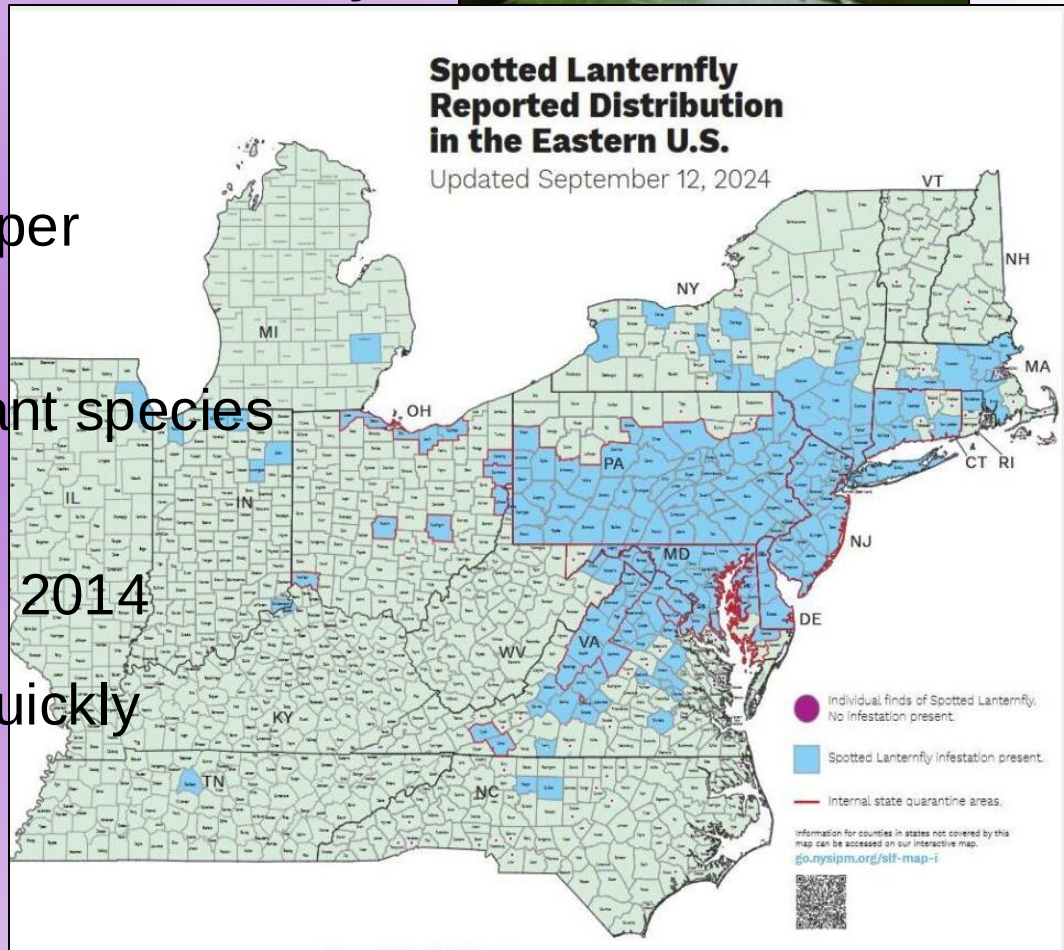
Veraison to Harvest

Spotted lanternfly

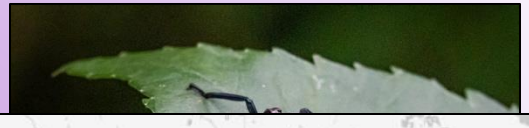
Spotted lanternfly



- *Lycorma delicatula*
- Non-native, invasive leaf-hopper
  - Relatively large → ~1 inch long
- Feeds on the sap of many plant species
  - As nymphs and adults
- First found in Pennsylvania in 2014
- Their population has grown quickly
  - Spreading across the country
  - Found in Fulton county



Spotted lanternfly



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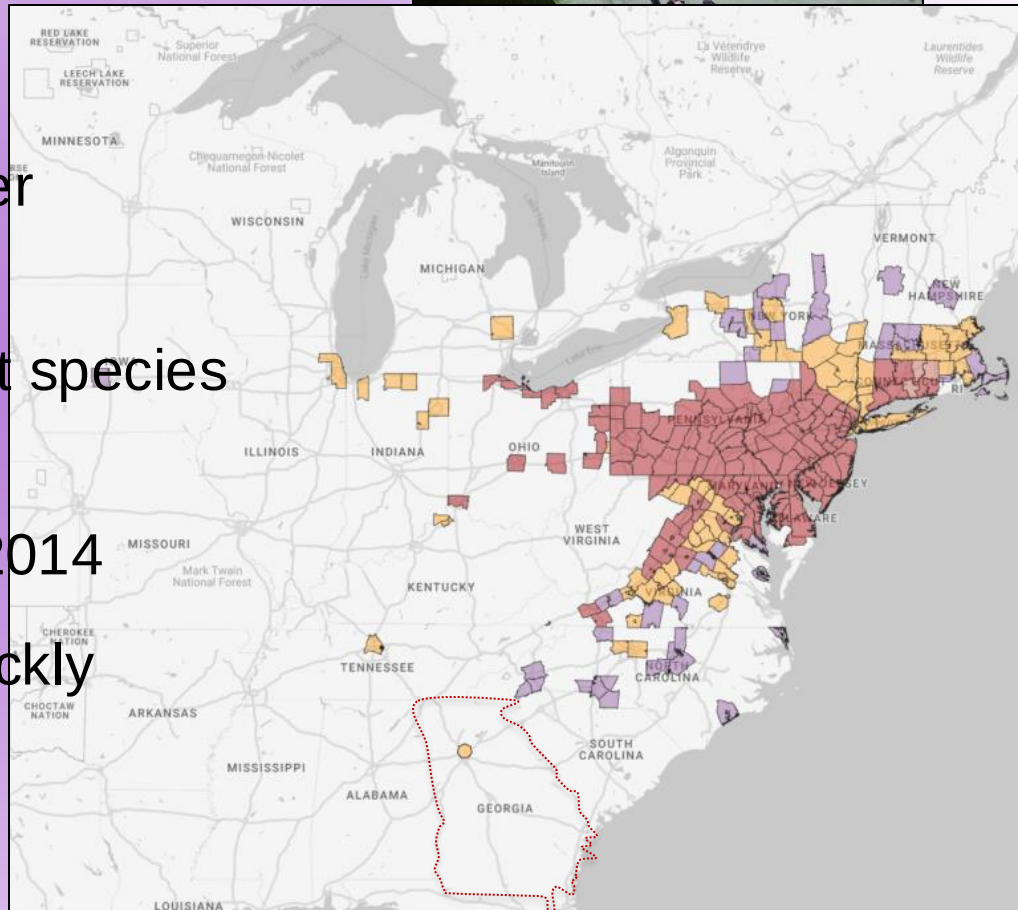

Spotted lanternfly hosts

- Broad host range of ornamental and woody plants
  - Roses
  - Black walnut
  - River birch
  - Willow
  - Sumac
  - Red/silver maple





Spotted lanternfly hosts

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  - Roses
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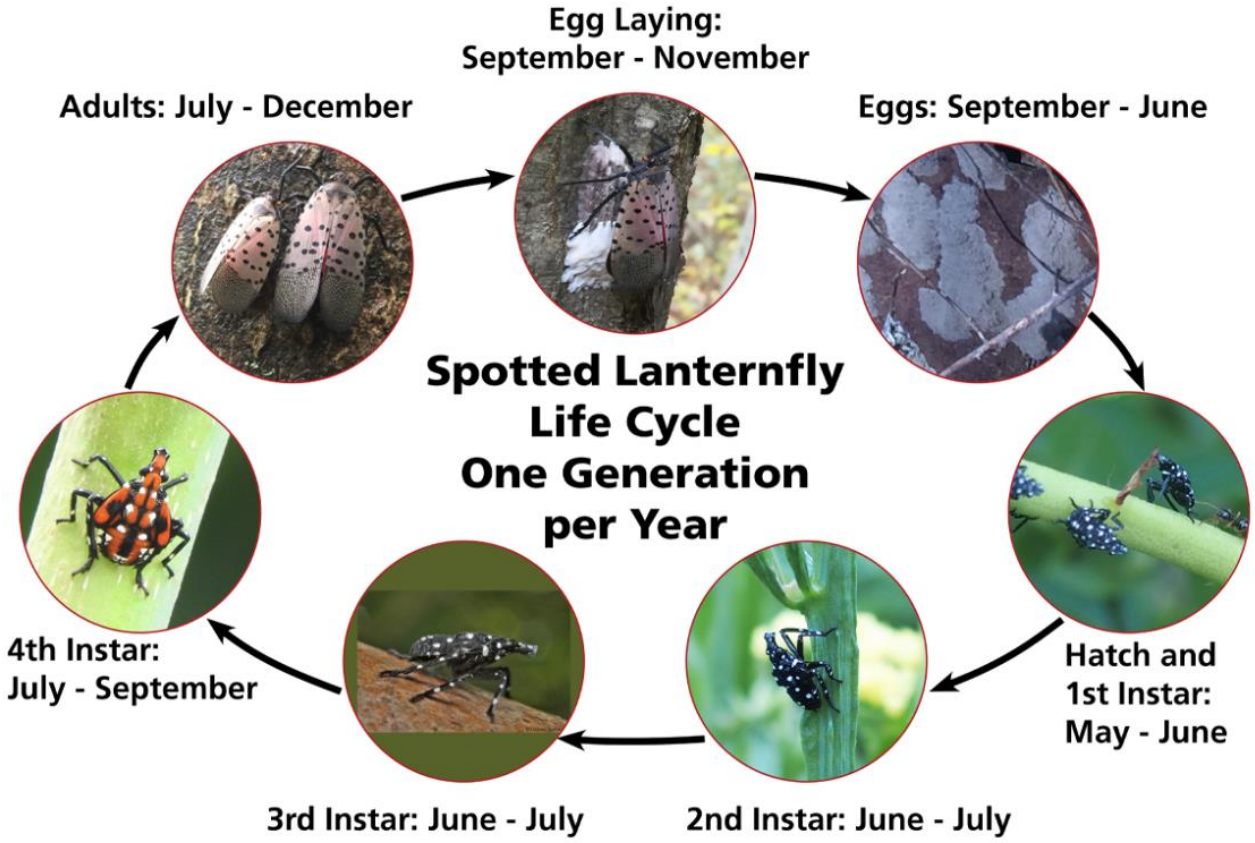
  - River birch
  - Willow
  - Sumac
  - Red/silver maple
- Preferred hosts
  - Tree-of-heaven (*Ailanthus altissima*)
  - **Grapes**

Spotted lanternfly damage

- Feed on the phloem and xylem of plants → can cause considerable stress
- Rarely associated with plant death, except:
  - Tree of heaven
  - Black walnut saplings
  - Grape vines
- Significant issue for grape vines:
  - Reduced crop yield
  - Reduced fruit quality
  - Potentially tainting the wine
- Honeydew can also lead to sooty mold growth
  - Unsightly
  - Can reduce photosynthetic ability of leaves
  - Has the potential to kill groundcover plants

Spotted lanternfly life cycle



When to monitor for spotted lanternfly

HOST	NYMPHS			ADULTS		
	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
Rose (cultivated, multiflora, etc.)						
Perennials						
Grape (wild and cultivated)						
Tree-of-heaven						
Black walnut, butternut						
River birch						
Willow						
Sumac						
Red/silver maple						

From Penn State
https://extension.psu.edu/spotted-lanternfly-management-guide

Management options

MANAGEMENT OPTIONS	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Don't move any life stage of SLF	■	■	■	■	■	■	■	■	■	■	■	■
Scrape and destroy eggs	■	■	■	■	■				■	■	■	■
Spray eggs with dormant rate of horticultural spray oil		■	■	■								
Use circle traps					■	■	■	■	■	■		
Contact insecticide applications (after hatch and avoid bloom)					■	■	■	■	■	■		
Systemic application of imidacloprid (after bloom, varies by method)					■	■	■	▨	▨			
Systemic application of dinotefuran (after bloom)							■	■	■			

From Penn State
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Insecticide options for Spotted lanternfly

Active Ingredient	Activity Against SLF	Residual Activity	Type of Activity
Beta-cyfluthrin	Excellent	Excellent	Contact
Bifenthrin	Excellent	Excellent	Contact
Carbaryl	Excellent	Poor	Contact
Zeta-cypermethrin	Excellent	Poor	Contact
Malathion	Excellent	Poor	Contact
Natural pyrethrins	Excellent	Poor	Contact
Neem oil	Good	Poor	Contact
Insecticidal soaps	Good	Poor	Contact
Horticultural spray oil	Good	Poor	Contact
Dinotefuran	Excellent	Excellent	Systemic
Imidacloprid	Good	Good	Systemic


Questions?