Grape Insects and Management

• Primary Insect Pests

• Primary Fruit Pests

• Secondary Insect Pests

Dean Volenberg
Viticulture and Winery Operations Extension Specialist
Grape Insects and Management

• Primary Foliar Pests
  – Grape Flea Beetle
  – Cutworm spp.
  – Rose chafer
  – Leafhopper spp.
  – Japanese beetle
  – Grape berry moth

• Primary Fruit Pests
  – Grape berry moth
  – Multicolored Asian Lady beetle
  – Yellow jackets

• Sporadic Pests
  – Phylloxera
  – Gallmakers
  – Mites
Grape Flea Beetle

- Emerge in Spring
  - Adults feed on swelling buds
- Lay eggs on emerging leaves
- Hatching larvae feed on leaves
- Monitor on warm spring days
  - Can cause significant damage
Grape Flea Beetle

Adult Damage

Larva Damage
Grape Flea Beetle
Grape Flea Beetle

- Damage by adults to primary and secondary buds
- Cool weather patterns that prolong swollen bud stage can result in longer window of attack
- Scout at bud swell
- Scout vineyard closest to wooded areas first
- Broad spectrum insecticide if present
Cutworm spp.

- Emerge in spring
  - Larvae feed on swollen buds
- Present throughout growing season
- Injury similar to grape flea beetle
Cutworm spp.
Cutworm spp.

- Injury to primary and secondary buds and young leaf tissue
- Vineyards on sandy soils more prone to injury
- Scout at bud swell
- Damage occurs at night
- Injury to buds – whole bud bud missing
- Damage in vineyard spotty
- Damage threshold 1 to 2% of primary buds
Rose Chafer

- Larvae overwinter in soil
- Adults emerge at bloom
- Adults feed on blossoms developing, fruit, and leaves
- Common pest in light sandy soils
Rose Chafer
Rose Chafer

- Damage to young non-bearing vines can set back vines
- Vineyards on sandy soils more prone to damage
- Scout late May through flowering
- Threshold 2 per vine
- Monitoring 125 vines
  - 25 @ each corner
  - 25 in center
- Rose Chafer traps may be alternative to insecticide
Leafhoppers

Overwinters near vineyards and moves to grapes in late May-June.

Affects labrusca vineyards more

Comes with the wind in spring, washed onto crops by rain showers. Probably dies in winter.

Affects vinifera and hybrids more
Leafhoppers

- Grape and Potato LH
- Feeding speckles leaves
- Examine leaf undersides
  - Can Stunt Vines
  - Fruit Quality Affected

Leafhoppers

Grape

Potato

Three-banded

Photo credit
Leafhoppers

- GLH overwinters in non-cultivated areas
- GLH prefers sheltered area with plant debris
- GLH will feed on alternative hosts Virginia creeper, burdock, sugar maple
- Yellow sticky cards to monitor LH
- LH populations fluctuate May through July - migration into vineyard
- 15 LH per leaf without injury (Cornell)
- Honeydew can result in sooty mold on grape clusters
Japanese Beetle

EGGS
1-2 mm eggs laid in grassy areas
Eggs laid in batches of ~5
Require moisture to hatch

LARVAE
White and C-shaped
Develop in moist soil
Feed on roots, organic matter
Overwintering stage

PUPAE
Develop in soil in late spring

ADULTS
Adult beetles emerge in mid-summer
Highly mobile
Females lay ~50 eggs
Japanese Beetle Lifecycle

1In Michigan
Japanese Beetle

Official distribution in the United States
USDA Report, 2008

Original detection in 1912
Japanese Beetle

Larval density maps from blueberry

80 soil samples per field and per perimeter
Dot = 1 or more beetles
Darker brown = more beetles

Similar for vineyards
More abundant in grass around fields
Neighboring land can harbor populations
Japanese Beetle

- **Preferred plants**
  - Grape, linden, Japanese / Norway maple, birch, pin oak, horse chestnut, Rose-of-Sharon, ornament apple, plum, cherry, rose, mountain ash, willow, elm, Virginia creeper

- **Rarely attacked plants**
  - Red / silver maple, tuliptree, magnolias, red mulberry, forsythia, ash, privet, lilac, spruce, hydrangea, taxus (yew)

- Remove attractive non-crop host plants to reduce beetle attraction to vineyards
Japanese Beetle

**SCOUTING**
- Beetles and their damage are easy to see
- Look on upper canopy

**MONITORING TRAPS**
- Baited with floral lure (for female) and sex pheromone (for male)
  - Highly efficient at attracting beetles, and may be effective in reducing isolated populations
  - But, these will attract beetles to your vines, so do not place in vineyards.
Japanese Beetle

How much leaf injury can vines tolerate?

Tolerance = Ability to withstand a certain level of injury without a reduction in fruit quality and vine productivity

Virginia study
In mature Seyval vines, natural levels of Japanese beetle feeding (6.5% leaf area loss) had no effect on vine growth or fruit quality. Intensive feeding after veraison inside cages (11% leaf area loss) reduced fruit quality (Boucher & Pfeiffer, 1988)

Michigan study
In young Niagara vines without crop, 30% leaf area loss affected vines only when they were damaged at bloom and veraison (Mercader & Isaacs, 2004)
Table 1. Foliage feeding incidence and severity of Japanese beetles to grapes in cages.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Vitis' group</th>
<th>Incidence (% leaves damaged)</th>
<th>Leaf area lost (1-10)</th>
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Incidence data are reported as percent leaves damaged; however, mean separation was performed on data that was subjected to arcsine square root transformation. Severity of leaf damage was rated as 0 pt, 0%; 1 pt, 1% to 10%; 2 pt, 11% to 20%; 3 pt, 21% to 30%; 4 pt, 31% to 40%; 5 pt, 41% to 50%; 6 pt, 51% to 60%; and 7 pt, more than 60% of estimated leaf area loss (Molchower and Pfeffer, 1989). A, American cultivar; AL, American cultivar with Vitis labrusca background; AM, American cultivar with Muscadine background; E, European cultivar; H, French hybrid cultivar; HL, French hybrid with F. labrusca background. Denomination of 1 to 10 refers to the leaf number on a shoot, with 1 being the youngest and 10 being the oldest. Any two means of incidence not followed by a same letter are significantly different at P ≤ 0.05. Pr, classified as preferred by Langford and Cory (1948); At, classified as attractive by Langford and Cory (1948).
Grape Berry Moth

- Overwinters in cocoon on ground
- Adults emerge May 15-June 15
- Eggs laid near/on grape clusters
- Look for webs on clusters
- 1\textsuperscript{st} Generation pupate in leaf
- 2\textsuperscript{nd} Generation larva enter fruit
- Larvae leave fruit to pupate in leaves and debris on ground
Grape Berry Moth
Grape Berry Moth
Grape Berry Moth

Monitoring and scouting for grape berry moth

• Use trap with insect sex pheromone lure
• Place at vineyard borders and interiors
• Include borders with wooded edges
• Check traps weekly or more often
• Check clusters for eggs, larvae, and webbing
• Check 100 clusters to calculate % infestation
• Track infestation over time
Sporadic Pests

- **Phylloxera**
  - Aphid-like insect
  - Foliar most important to Midwest
  - Root feeding important to *Vinifera* hybrids
  - Produces galls on leaves
  - French Hybrid varietal differences
Phylloxera

leaf galls
Phylloxera

Root galls
Phylloxera

Mature galls contain a female and eggs.

Inside a mature gall with eggs.
Phylloxera

When eggs begin to hatch, gall splits open so young can emerge.

Inside a mature gall with dead female and live young.
Young phylloxera settle on upper leaf surface…

… and inject saliva that starts gall formation.
Phylloxera

Young galls start to become apparent on lower leaf surface.
Phylloxera

Light leaf infestations do not cause economic injury.

Heavy infestations can stunt foliage and reduce plant vigor, hardiness, and yield.
Phylloxera
Life Cycle Summary

Sap-sucking insects related to aphids.
Leaf galls are not damaging unless they reduce leaf size. Young plants may be stressed.
✓ Exceptions are some French-American hybrids, which are highly susceptible to the leaf form.

Root form not damaging to labrusca grapes.
✓ French-American hybrids tend to be resistant.

Overwinters as eggs on stems and immatures on roots.
Go through multiple generations both above and below ground.
Phylloxera

Control

Leaf galls are usually not damaging.
✓ Except hybrids.
✓ Young plants should be protected.
Vinifera varieties should be grafted onto labrusca root stock for resistance to root form.

If necessary, monitor early and spray at first sign of gall formation; again if necessary.

No chemical controls for root infestations.
Correctly Identify Pests
Correctly Identify Pests
Correctly Identify Pests

5/26/2009

7/6/2009
Correctly Identify Pests

5/26/2009

7/6/2009
Correctly Identify Pests

Grape Tumid Gallmaker

5/26/2009

Grape Phylloxera

7/6/2009
Grape Gallmakers

Grape Tumid Gall
Also called grape tomato gall. The gall is caused by the fly *Janetiella brevicauda*.

Midge galls
These galls are caused by a small fly. These galls were found on Foch and La Crosse grape leaves in early June, 2010 in Northeastern Wisconsin.
Grape Gallmakers

- Galls formed by larvae of ceciomyiid flies
- Galls can occur on leaves, tendrils, blossoms, buds, and shoots.
- Rarely cause economic damage

Grape Filbert Gall
Is a rarely seen gall caused by the gall maker midge *Schizomyia coryloides.*
Primary Fruit Pests

Grape berry moth
Multicolored Asian Lady bug
Yellow jackets
Multicolored Asian Lady Beetle

- Attracted to ripe fruit and other sugar sources.
- Gives off-flavor to wine.
- Physically remove as many as possible at harvest.
- Insecticides near harvest if needed, but observe PHI.
Multicolored Asian Lady Beetle

- **Friend**
  - Generalist feeder
  - Multiple plant hosts
    - soybean

- **Foe**
  - 0.27 beetles/Frontenac cluster = LBT
  - Negatively impacts grape quality
Multicolored Asian Lady Beetle

- Harvest pests are easy to see, but only if you keep scouting
- Harvest insect pests are the result of berry damage from:
  - Birds
  - Hail
  - Mechanical damage
Yellow jackets

- Attracted to ripe fruit and other food odors.
- Remove colonies early in the year if possible.
- Use vineyard sanitation near harvest.
- Trapping may lower numbers.
- Wear protective clothing.
Mite pests in vineyards

- Two-spotted spider mite
- European red mite
- Overwinter as eggs
- High reproductive potential
- Feed on leaf tissues
- Cause webbing on underside of leaf
Mite pests in vineyards

Two-spotted spider mite (rare)
European red mite (very rare)

Symptoms start as light bronzing

Need a hand lens to see mites

Include in your regular scouting, and look for predatory mites

Rarely an issue in IPM-managed vineyards
Mite pests in vineyards

Predatory mites usually keep plant-feeding mites in check, if they are not disrupted.

10:1 ratio of pest to predator mites provides effective biological control.
# Grape Pests and Phenology

<table>
<thead>
<tr>
<th>Growth stage Visual</th>
<th>Bud swell</th>
<th>Shoot 1-5”</th>
<th>Shoot 8-12”</th>
<th>Pre-bloom</th>
<th>Bloom</th>
<th>Pea-sized</th>
<th>Berry touch</th>
<th>Bunch closing</th>
<th>Veraison</th>
<th>Pre-harvest</th>
<th>Harvest</th>
<th>Post-harvest</th>
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## Insects

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## Diseases

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Grape Pests and Phenology

- Dormant
- Early bud swell
- Late bud swell
- Bud burst
- 1- to 3-inch shoots
- 4- to 8-inch shoots
- 10- to 16-inch shoots
- Immediate prebloom
- First Bloom
- Full bloom
- Buckshot berries
- Bunch closure
- Veraison
- Ripe for harvest
Questions