

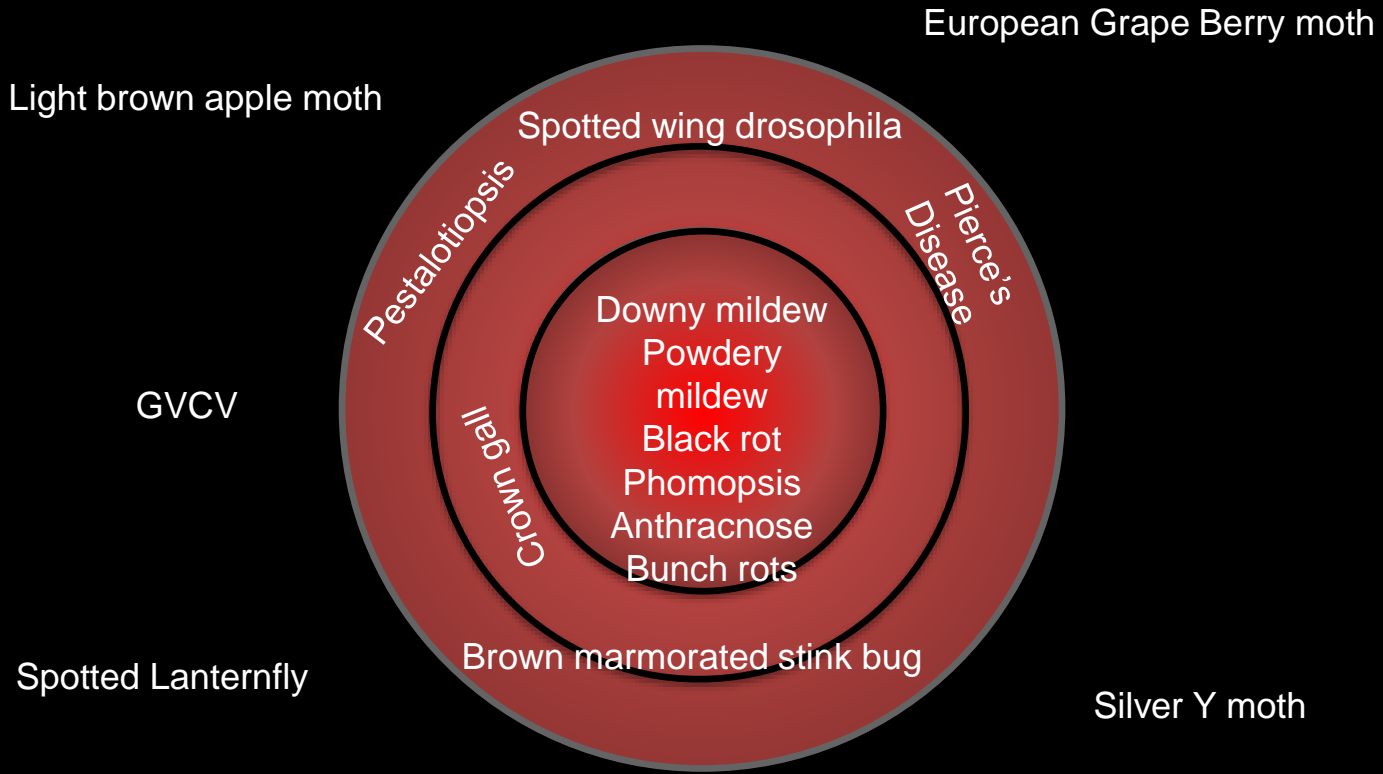
Grape insect pests and management

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Beginner Grape School 2022

March 11, 2022





Perspective - the capacity to view things in their true relations or relative importance

...In other words “keep an eye on the target but focus on the bullseye”

Light Brown Apple Moth

- Mo provides suitable habitat
- Native to Australia
- Confirmed CA 2007
- CA exempted commercially produced wine grapes from LBAM quarantine 8.14.2015



Adult female light brown apple moth
Epiphyas postvittana. Photo Credit: Department of Primary Industries and Water, Tasmania Archive, Bugwood.org



Adult male light brown apple moth
Epiphyas postvittana. Photo credit: R. Anson Eaglin, USDA-APHIS

Spotted Lanternfly

- Native to China
- First detection – Pennsylvania 9.2014
- Grapes, tree fruits, trees



Adult Spotted
Lanternfly Photo

credit: Holly Raguza,
Pennsylvania Department of
Agriculture



Immature
Spotted
Lanternfly Photo

credit: itchydogimages

Silver-Y-Moth

- Not present in US
- Often encountered at ports of entry on cut flowers
- Midwestern States at risk: MN, WI, MI, IN, OH, KY, TN, MO, IL, IA



Silver Y Moth *Autographa gamma*

Photo credit: Julieta Brambila, USDA

European Grape Berry Moth

synonymous European grapevine moth

- Present 6 counties in CA
- Damage similar to American grapevine moth



European Grape
Berry Moth *Eupoecilia
ambiguella* Photo credit:
Photozou

Pierce's Disease



- Limited reports in MO in 2015
- One positive Elisa
- Remove infected vines

Grapevine Vein Clearing Virus



James Schoelz, University of Missouri and
Wenping Qiu, Missouri State University

Cultivars	Responding to GVCV
Chambourcin	Resistant
Norton	Tolerant
Vignoles	Tolerant
Traminette	Tolerant
Cayuta White	Tolerant
Vidal Blanc	Susceptible
Chardonel	Susceptible
Chardonnay	Susceptible
Cabernet Sauvignon	Susceptible
Valvin Muscat	Susceptible
Vignette	Susceptible



NCPN Grapes



[NCPN Grapes Home](#)

[About NCPN Grapes](#)

[Grape Clean Plant Centers](#)

- [Cornell University, Geneva, New York](#)
- [Center for Viticulture & Small Fruit Research, Florida A&M University](#)
- [Foundation Plant Services, University of California, Davis](#)
- [Midwest Grape Tissue-Culture and Virus-Testing Laboratory, Center for Grapevine Biotechnology, Missouri State University](#)

Grape Clean Plant Centers

The National Clean Plant Network (NCPN) is a national program that promotes the use of healthy plant material for several important specialty crops in the United States. Healthy plant material is key to cost-effective production of specialty crops. It is easier to propagate and produce higher crop yields and better crop quality with healthy plant material, rather than common planting stock.

The most efficient approach to producing high quality plant material is through clean plant programs which screen valuable selections for viruses and other diseases that can be spread by contaminated material. This approach includes

Pestalotiopsis

- Norton 2015
- Vine defoliated quickly in late June
- Leaves had botrytis and phomopsis
- Bleached spur covered with pycnidia



Pestalotiopsis sp. Fruit Rot

Pesticide History

2 June 2105

4 lb Penncozeb 75DF

4 oz TebuStar 45 WSP

16 June 2015

7 oz Revus Top

30 June 2015

12.5 oz Pristine



Pestalotiopsis sp. Fruit Rot



Pestalotiopsis sp. trunk disease

- *Pestalotiopsis* sp. and *Pestalotiopsis uvicola*
- Pathogenic in: Vignoles, Chambourcin, Norton, and Traminette

(Urbez-Torres et al. 2012)



Pestalotiopsis sp. Fruit Rot



Pestalotiopsis sp. Fruit Rot

Pesticide History

2 June 2105

4 lb Penncozeb 75DF

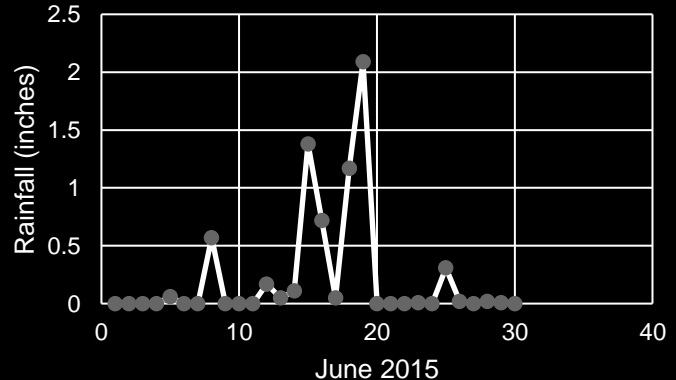
4 oz TebuStar 45 WSP

16 June 2015

7 oz Revus Top

30 June 2015

12.5 oz Pristine



Rainfall and Fungicides

Rainfall amount	Residues of Ziram removed
(inches)	(%)
0.1	25
0.5	30
1.0	65
2.0	75

MSU Annemiek Schilder



Rainfall and Fungicides

Recommendations

- 2 inches or more of rainfall on recently applied protectant fungicide – then reapply
- Protectant fungicide ≥ 7 days old and 1 inch rainfall – then reapply
- Applied fungicides must dry before a rainfall event

Black rot



Black rot

- Needs free water for infection
- Berries highly susceptible first two weeks after bloom
- Fruit becomes resistant 5 to 6 weeks after bloom
- Prune out mummy berries



Phomopsis



Phomopsis

- Needs free water for infection
- Bud break to bloom
- Infection at bloom becomes latent
- Prune out infected canes



Anthracnose



Anthracnose

- Vidal Blanc, Marquette, Frontenac, La Crescent and Swenson cultivars – Edelweiss, Spirit, Brianna, St. Pepin, Swenson White
- Prune out infected canes and infected berries
- Needs free water
- Prolonged wet warm (mid-70's to 80's)
- Mancozeb, captan, ziram



Powdery mildew



Powdery mildew

- Does not require free water except initially
- Overwinter as cleistothecia on trunks and cordons
- Colonies develop in shade
- Berries susceptible immediate pre-bloom through fruit set
- Berries become resistant 2 to 4 weeks postbloom





Downy mildew

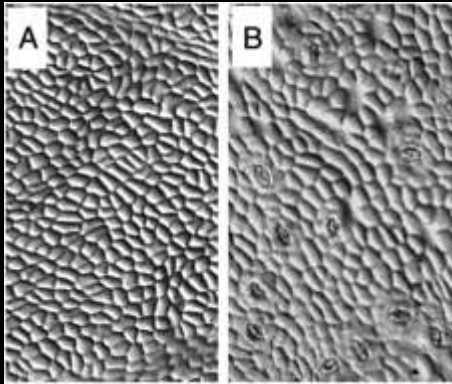


Downy mildew

- Needs free water
- Overwinters leaf debris
- All green tissue susceptible
- Berries become resistant 4 to 5 weeks after bloom



Making history: New threats, grape phylloxera and downy mildew interaction



(A) Adaxial (upper) leaf surface of grape leaf

(B) Adaxial (upper) leaf surface of phylloxera infected grape leaf



Downy mildew

- Obligate
- Sporulation only occurs on plant surfaces that have stomata
- Strobilurins Group
11:Abound, Quadris
Top, Pristine, Reason

Europe 2002
NY 2002 PM resistance
VA 2008 DM and PM

Suggest not using more than 2 applications per season

Anecdotal report of DM resistance to Pristine in MO 2015

Downy Mildew



Powdery Mildew



Rots

- Bitter rot – raisined soft berries, sooty residue when handled
 - Overwinters on leaves, berries, dead bark of 1 year old canes
 - Infection when 6 to 12 hours of wetness (72 to 77° F optimum)
 - Strobies, Captan, Topsin
- Black rot – raisined hard berries, no sooty residue

Sour Rot

- Secondary invader – bird, insect, mechanical, powdery mildew, botrytis damage
- Bacteria and various fungi including yeast
- Occurs often after rainy period (temps. High 70's)
- Vinegar fruit flies and berry pedicel juncture

Spotted Wing Drosophila (SWD) *Drosophila suzukii*

Identifying Characteristics

Males and Females

- 2-3 mm length
- Rounded abdomens
- Males
 - dark spot on wings
- Females
 - Serrated ovipositor



Male
SWD



Female
SWD

Photo credits:
Michigan State
University

SWD No-Choice Bioassay

Emma Pelton, Christelle Guédot and Claudio Gratton

University of Wisconsin-Madison

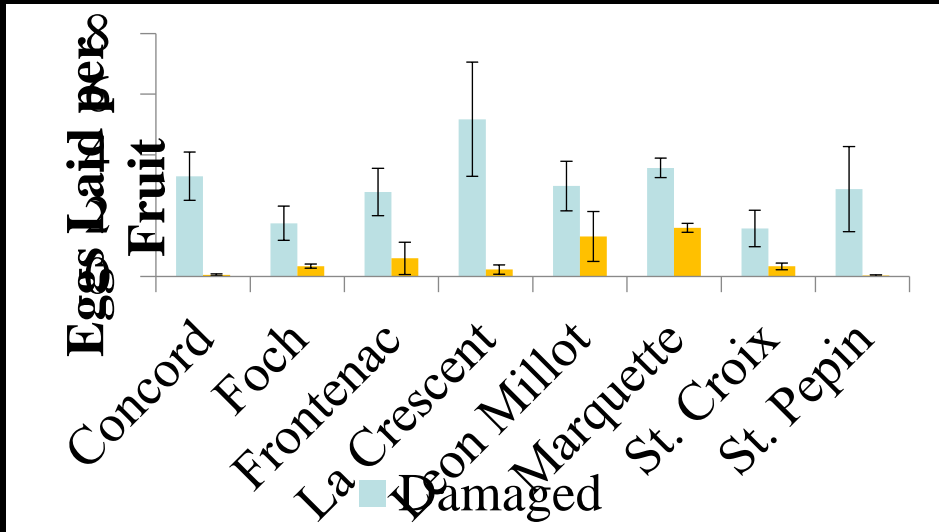
8 Grape Varieties
x 10 cups undamaged
x 10 cups damaged

Control: Raspberry
x 10 cups undamaged

1 cup = 8 fruits

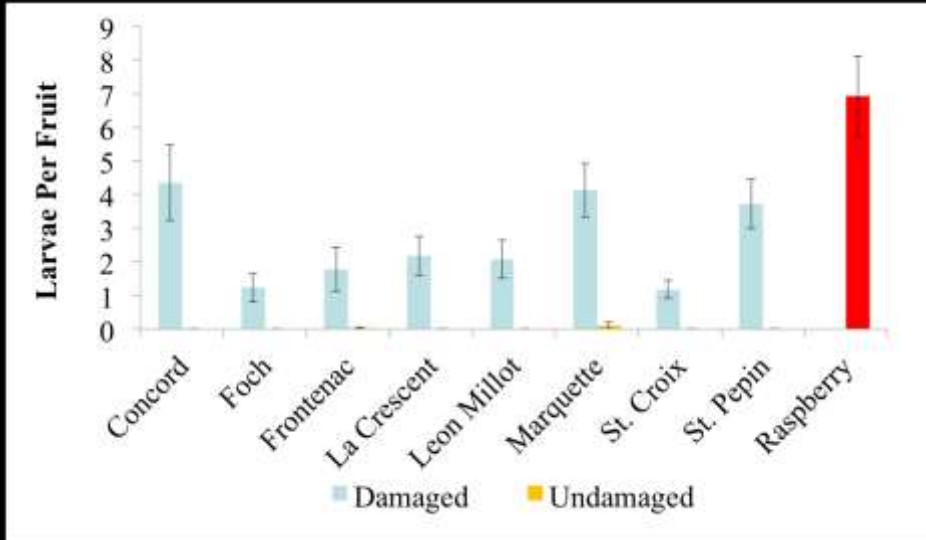


Eggs Laid



More eggs in damaged grapes
No differences between varieties

Larvae



More larvae in damaged grapes

Grape Berry Moth

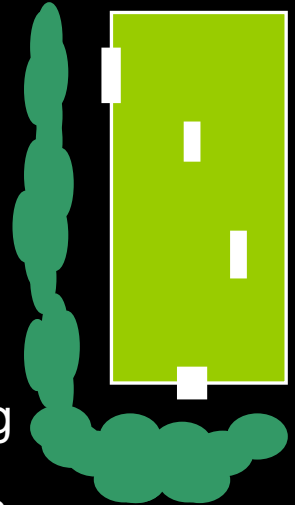
- First generation can be controlled with 10-day post bloom pesticide application
- Scout or pheromone trap monitor vineyard perimeters, especially next to wooded areas
- GBM second and third generations most destructive

GBM Model – MSU

- Record date of wild grape bloom = biofix
- 810 GDD (base 47° F) egg laying second generation
- 1620 GDD (base 47° F) egg laying third generation
- Management
 - Apply growth regulating pesticides (Intrepid) at egg laying
 - Apply broad spectrum pesticides at 1000 and 1800 GDD

GBM Model – Monitoring

- 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



GBM-Signs



Grape Flea Beetle

- Adults emerge around bud break
- Eggs laid on emerging leaves
- Monitor for buds
- Can cause significant damage



Grape Flea Beetle

- Adults damage primary and secondary buds
- Cool weather patterns that extend bud break result in more damage
- Scout at bud swell focusing on vines near wooded areas

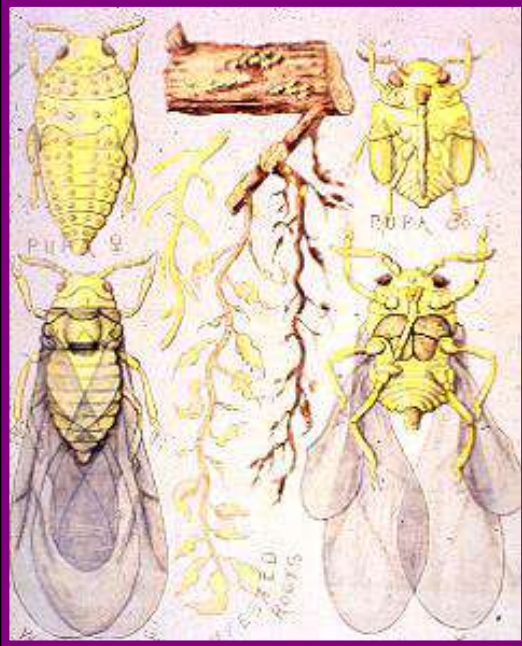


Japanese Beetle

- Wide host plant range
- Grape cultivar preference
- Scout vineyard border rows near adjacent to grass areas first



Phylloxera



leaf galls

Phylloxera – root form



Phylloxera – Leaf form



Young phylloxera settle on upper leaf surface...



... and inject saliva that starts gall formation.

Phylloxera – Leaf form



**Mature galls
contain a female
and eggs.**



Inside a mature gall with eggs.

Phylloxera – Leaf form



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



Inside a mature gall with dead female and live young.

Phylloxera – Leaf form



Light leaf infestations do not cause economic injury.



Heavy infestations can stunt foliage and reduce plant vigor, hardiness, and yield.

Phylloxera - 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
- 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

Grape Gallmakers

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



Grape Tumid Gall

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

Grape Gallmakers



Grape Filbert Gall

Is a rarely seen gall caused by the gall maker midge *Schizomyia coryloides*.



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.

Crown Gall



*Bacterium Agrobacterium
vitis*



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



Yellow jackets

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



Rodent ID Characteristics

- Often observe damage and not rodent itself
- Voles – trunk damage
- Birds – berry damage
- Raccoons – berry and vine damage
- Management – exclusion



Deer Damage



Viruses



Clusters of Vidal Blanc from grapevine plants exhibiting no leaf or berry symptoms (left) and clusters exhibiting both leaf and berry symptoms (right).

ToRSV

- Vector – American dagger (*Xiphinema americanum*) nematode





Summary

- Your past year disease pressure will define your upcoming disease management plan
- Sanitation will be important during dormant pruning this winter/spring
- Keep an eye on the target but focus on the big 5 to 6 disease pathogens

Resources

- Label database <http://www.cdms.net/Label-Database>
- Midwest Fruit Pest Management Guide 2016
https://mdc.itap.purdue.edu/item.asp?item_number=ID-465-W#.VrEdLVLQdC1
- ViNews weekly IPM updates during the growing season
– email me your contact information



Grape and Wine Institute

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Thanks to my colleagues at the Grape and Wine Institute

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