Vineyard Pest Management

Beginner Grape School

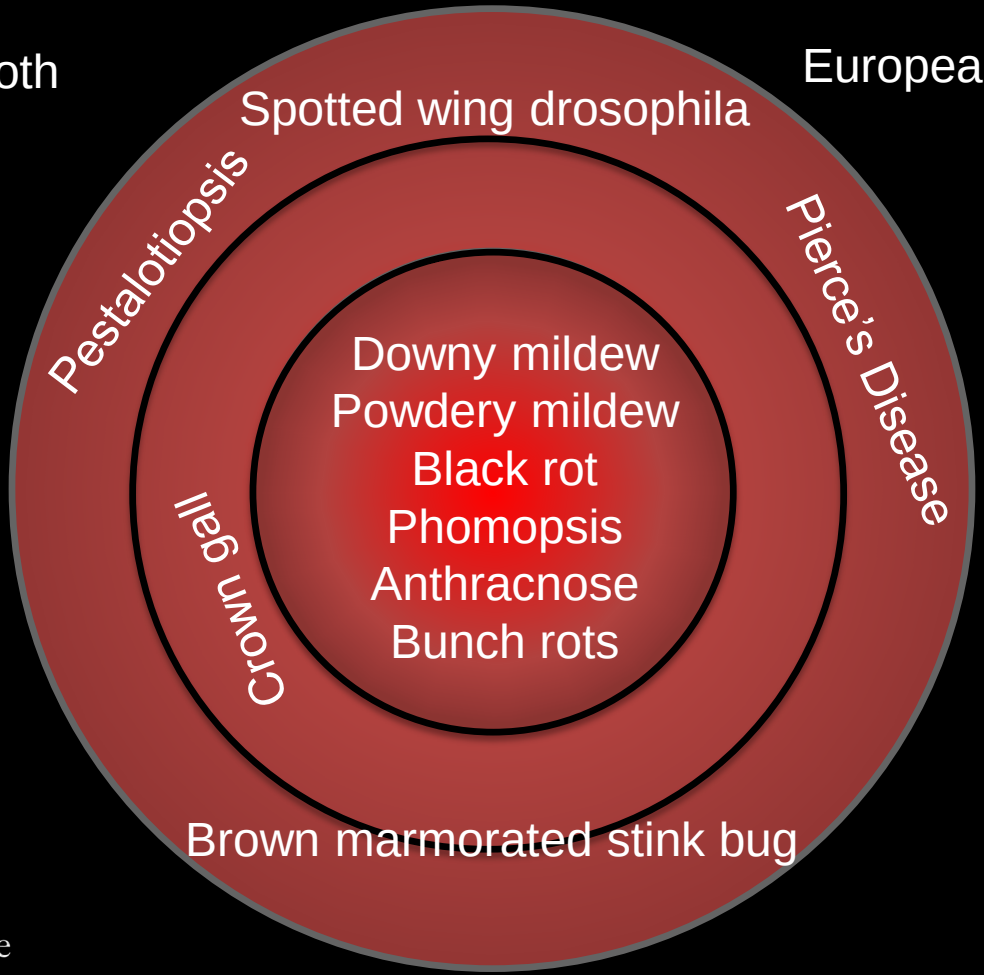
Columbia, Missouri

8 March 2019

Grape and Wine Institute
University of Missouri

Light brown apple moth

European Grape Berry moth



GVCV

Spotted Lanternfly

Silver Y moth

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”

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

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Phomopsis

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

Anthracnose

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Anthracnose

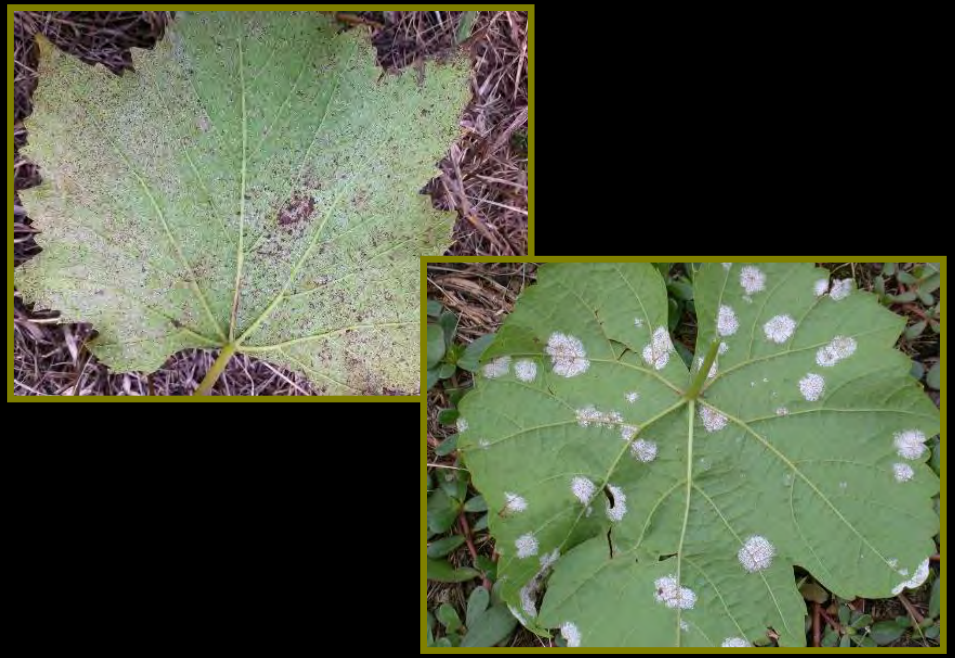
- Vidal Blanc, Marquette, Frontenac, La Crescent and Swenson cultivars – Edelweiss, Espirit, Brianna, St. Pepin, Swenson White
- Prune out infected canes and infected berries
- Needs free water
- Prolonged wet warm (mid-70’s to 80’s)
- Mancozeb, captan, ziram

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

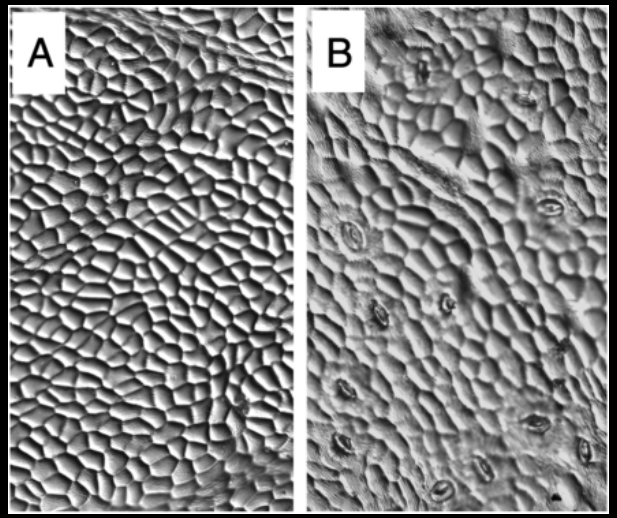
Downy mildew



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

Nabity, Paul. et al. 2013. Leaf-galling phylloxera on grapes reprograms host metabolism and morphology. Online http://www.pnas.org/content/110/41/16663.full

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

Powdery Mildew

Downy Mildew

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

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

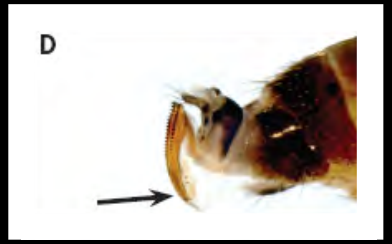


Photo credits: Michigan State University

SWD No-Choice Bioassay

Emma Pelton, Christelle Guédot and Claudio Gratton

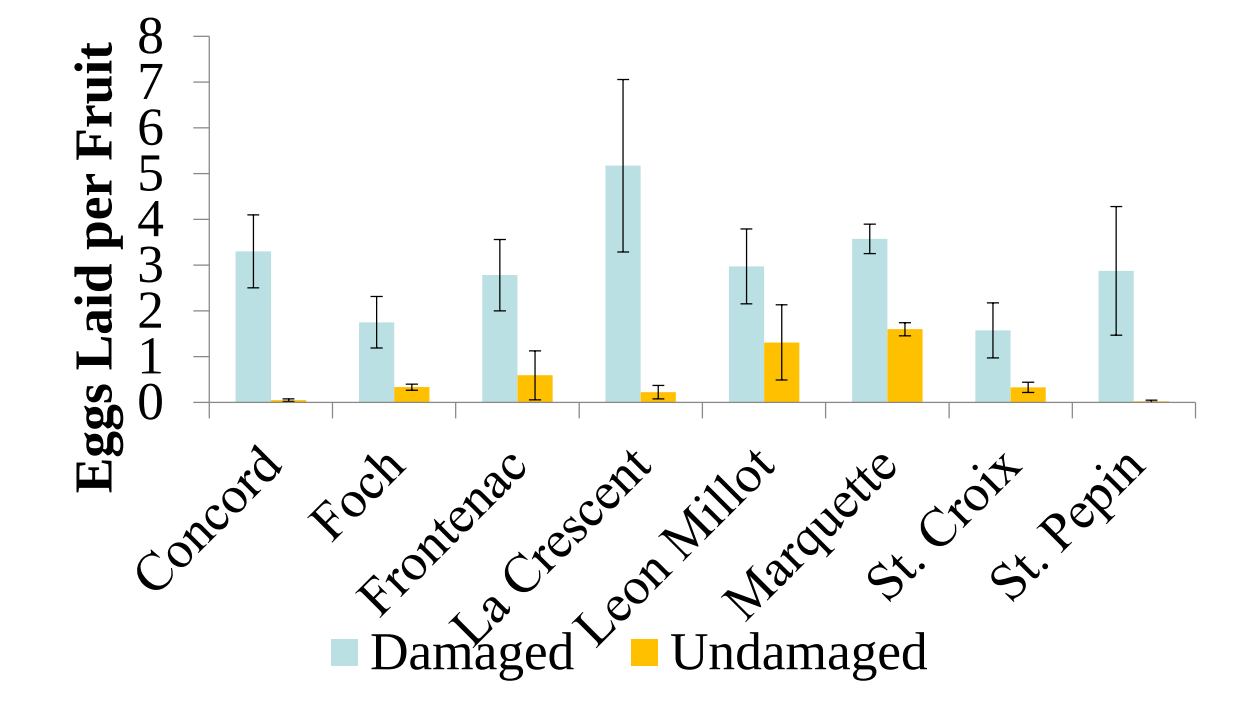
University of Wisconsin-Madison

8 Grape Varieties
x 10 cups undamaged
x 10 cups damaged

Control: Raspberry
x 10 cups undamaged

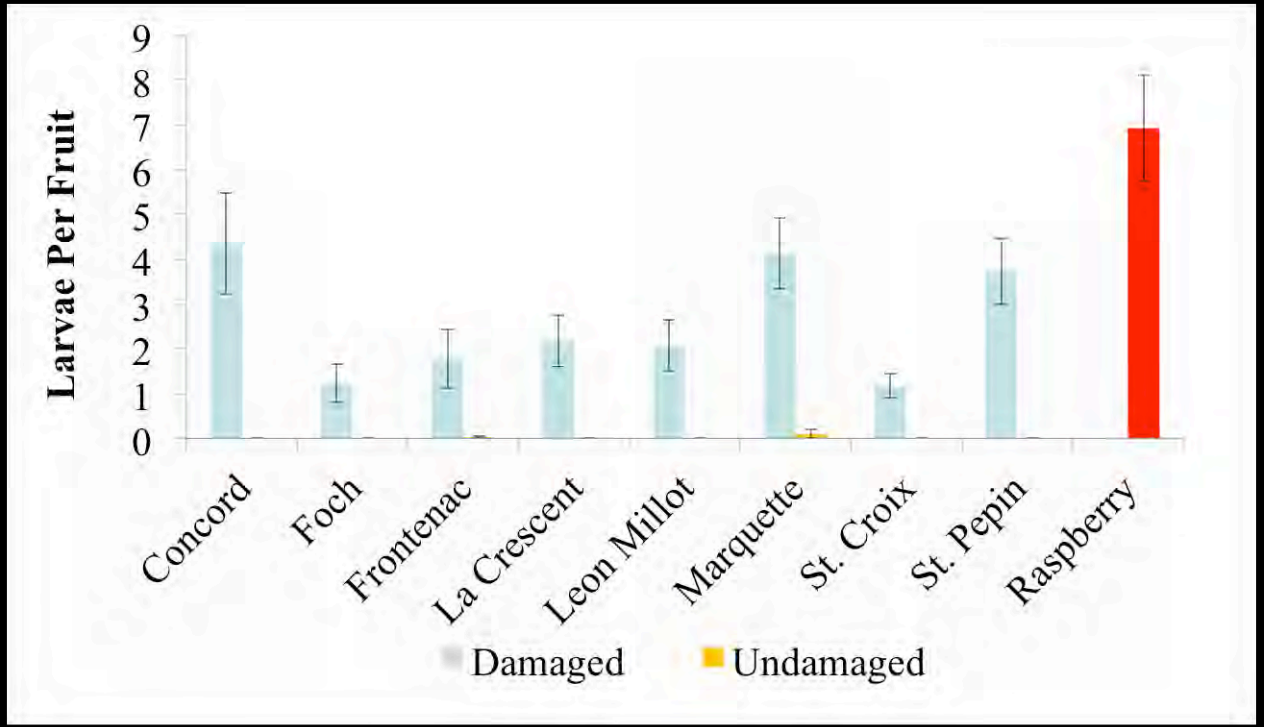
1 cup = 8 fruits

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-Signs

JB Pest Potential

- Grapevine Problem
- Can Attract Other Pests, G
- Grapevine Establishment Problem
- Potential Wine Contamination Problem

JB and the green June beetle (GJB), *Cotinis nitida*

Green June Beetle *Cotinis nitida*. Photo credit: Donna Brunet https://nature.mdc.mo.gov/discover-nature/field-guide/green-june-beetle

- JB injury to intact grape berries
- JB-associated yeasts
  - Elicit fermentation volatiles
- Volatiles attract GJB
- GJB elicit fermentation
- GJB Aggregation

Hammons, D.L., S. K. Kurtural, M. C. Newman, and D. A. Potter. 2009. Invasive Japanese beetles facilitate aggregation and injury by a ntive scarab pest of ripening fruit. Proc. Natl. Acad. Sci U S A. 106:3686 .3691.

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

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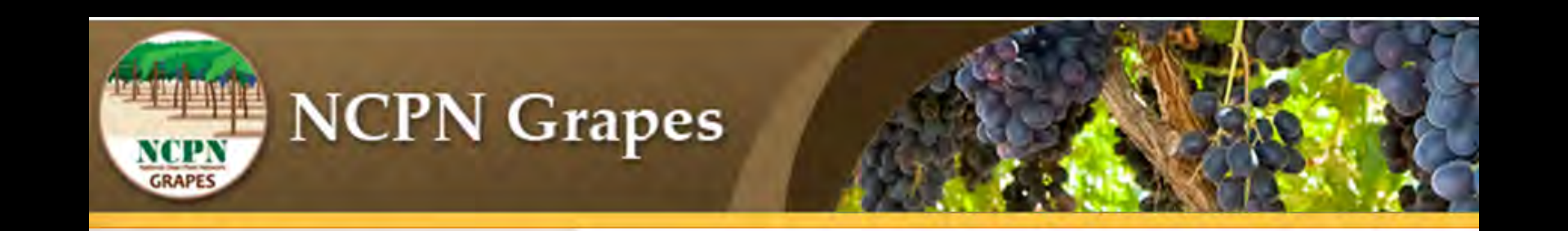
James Schoelz, University of Missouri and
Wenping Qiu, Missouri State University

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 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

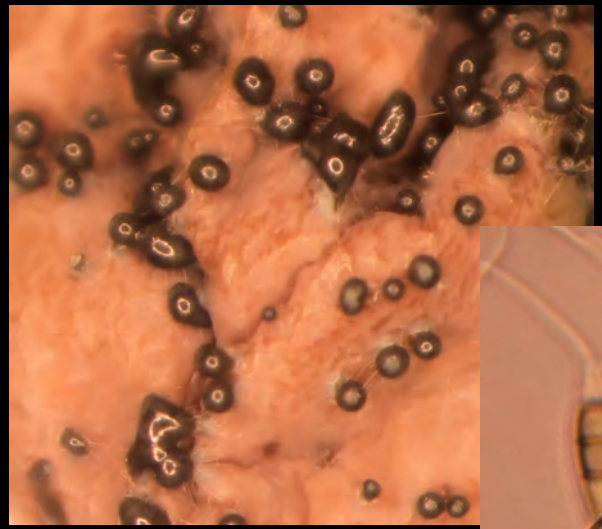
Pestalotiopsis sp. Fruit Rot

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



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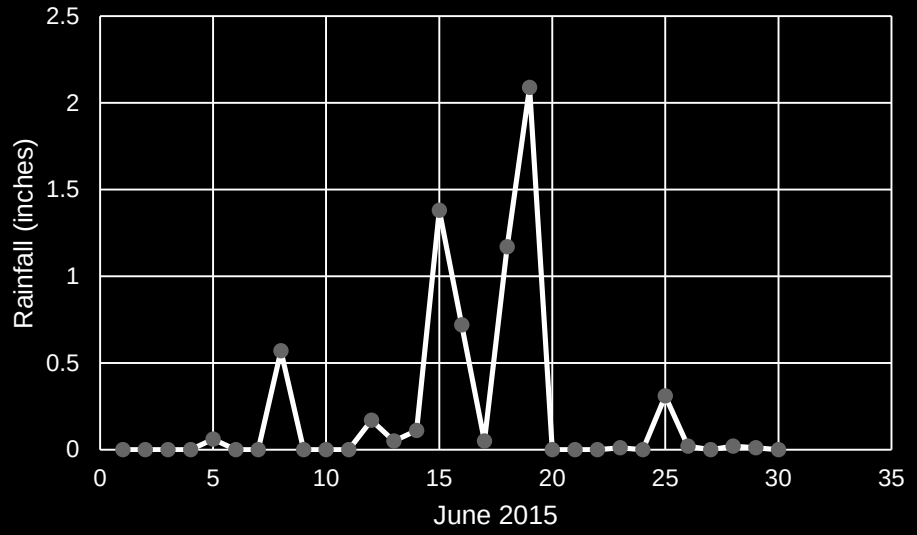

Summary

- 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
University of Missouri

Thanks to my colleagues at the Grape and Wine Institute

Misha Kwasniewski – Enology Research Leader
Megan Hall– Viticulture Research Leader

Dean Volenberg
University of Missouri Grape and Wine Institute
214 Waters Hall
Columbia, MO 65211

573-882-0476
volenbergd@Missouri.edu