



Grape and Wine Institute
University of Missouri

Viticulture Extension Leader Updates



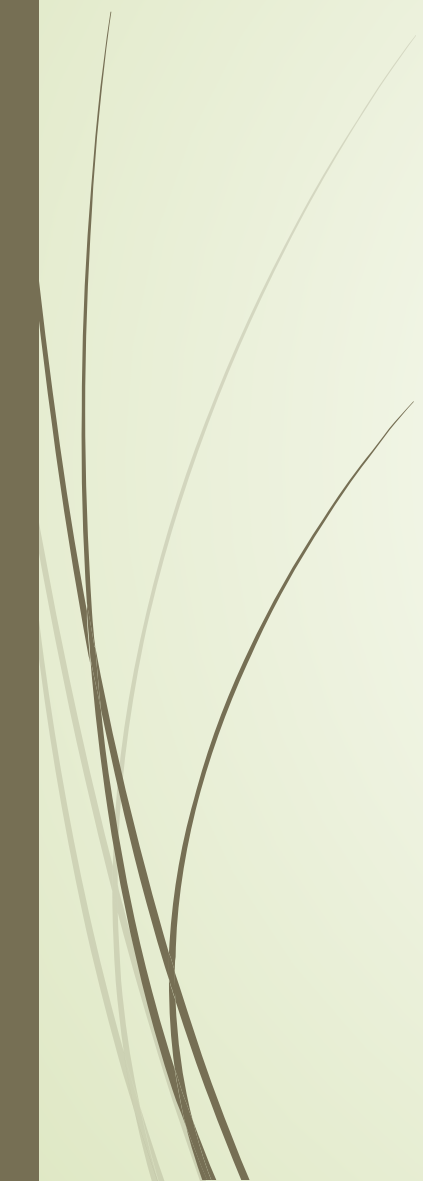
Missouri Grape Growers Association-
Viticulture Field Day

21 June 2022

Dean S. Volenberg



Overlooked Grape Insect Pests

- Grapevine root borer
 - Grape mealybug
 - Grape scale
- 



Grapevine root borer

Vitacea polistiformis

- Larvae feed on grape roots ~22 months
- Multiple larvae per plant can cause fruit and vine decline
- Can be problem in older mature vineyards
- Adult moths resemble some species of paper wasps
 - Active July through August
- Monitoring with pheromone traps (Great Lakes IPM)
- Management
 - Mating disruption (Isomate GRB)
 - Weed control removes oviposition sites of adult moths





Grape scale *Diaspidiotus uvae*







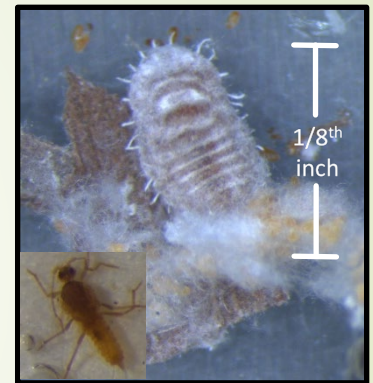
Grape scale

- Monitor older vines showing decline
- Management
 - Dormant 2% solution of Superior oil spray prior to bud break
 - Target crawlers at 274 emergence, peak 356 and 1166 emergence, peak 1541 GDD base 50 since April 1
 - Carbaryl
 - Malathion 57EC at 1.5 pints/acre
- Scale insect virus vector
 - Grapevine Leafroll virus-3

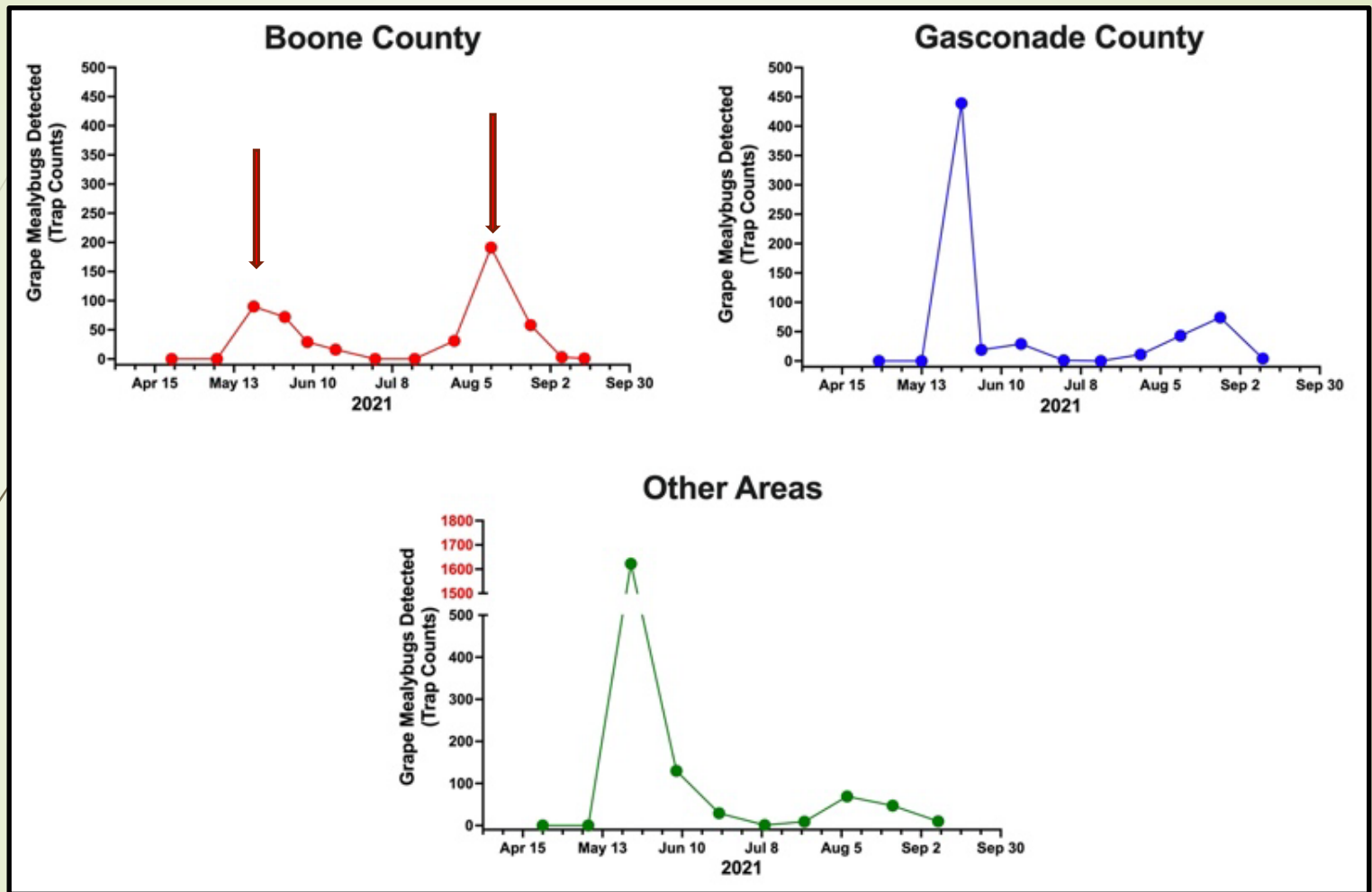
Grape mealybug

Pseudococcus maritimus

- Females feed
 - Under bark
- Males fly
- Virus vectors of GLRV-3



**Male (inlay)
and female
grape
mealybug with
eggs (orange
ovals). Photo
credit: Jacob
Cocoran**



Graph credit: Jacob Corcoran

Insecticides for mealybug control in 2022

Trade Name	Chemical Name	IRAC	Target Pest	Efficacy ¹
Applaud	Buprofezin	16	Mealybugs and Lecanium scale	? ²
Imidan 70-W	phosmet	1B	Grape mealybug	Fair
Tombstone	cyfluthrin	3A	Grape mealybug	Good
Baythroid XL	beta-Cyfluthrin	3A	Grape mealybug	Good
Assail 30G	acetamiprid	4A	Grape, Obscure, and Vine mealybug	Good
Belay	clothianidin	4A	Grape, Longtailed, Obscure and Vine mealybug	Excellent
Scorpion 35SL	dinotefuran	4A	Mealybug	Good
Wrangler	imidacloprid	4A	Mealybug	Good
Swagger	imidacloprid + bifenthrin	4a & 3A	Mealybug	Good
Leverage 360	imidacloprid +beta-cyfluthrin	4A & 3A	Mealybug	Good
Actara	thiamethoxam	4A	Mealybug	Excellent
Platinum	thiamethoxam	4A	Mealybug	Excellent
Voliam flexi	thiamethoxam + chlorantraniliprole	4A & 28	Mealybug	Excellent
Movento	spirotetramat	23	Mealybug	Excellent
Biocover MLT	mineral oil	NC	Mealybug	Good

¹Efficacy ratings based on VineSmith 2022 Winegrape Insecticide Guide.
vinesmith.com

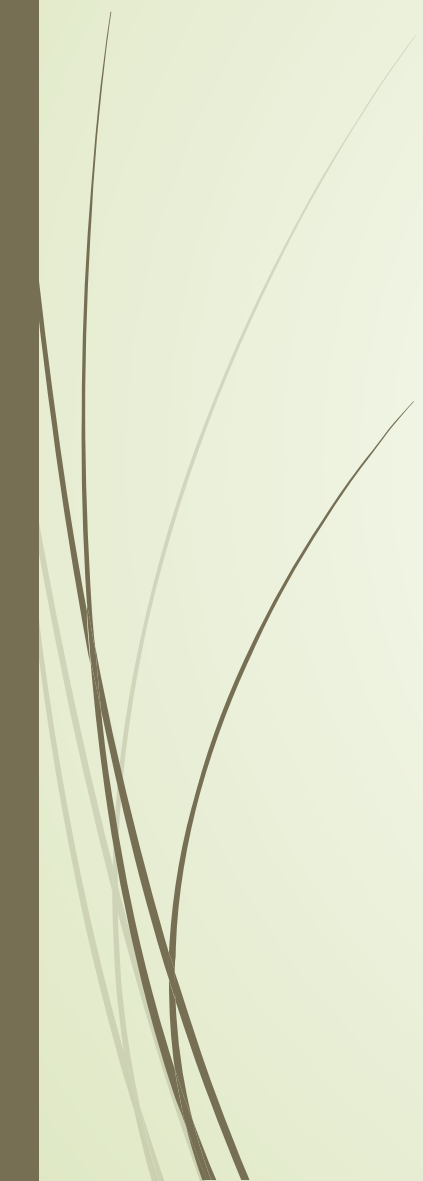
²No rating available.



The Beetles are coming!

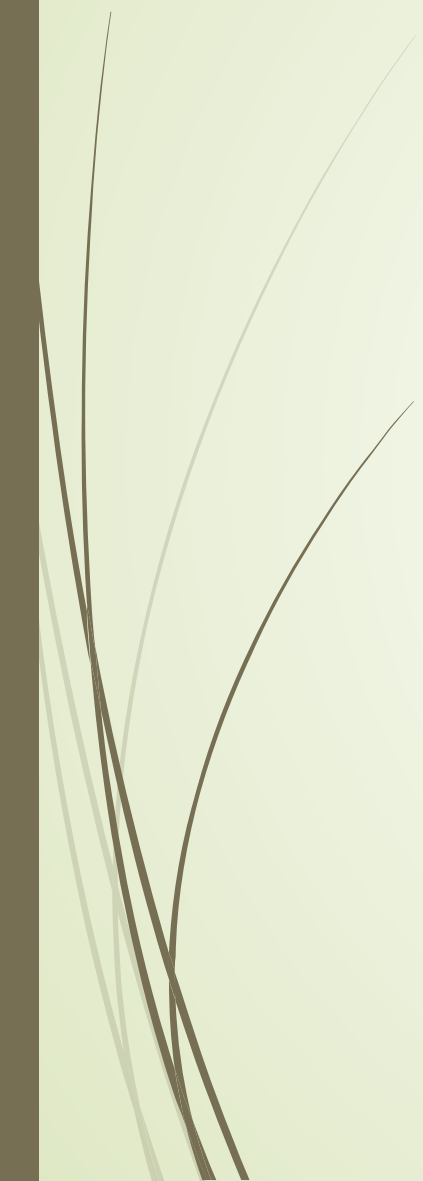


Japanese Beetle

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- Grapevines damaged by Japanese beetles attract more Japanese beetles
 - Japanese beetles do not have congregation pheromone
 - Japanese beetles typically appear around Father's Day weekend
 - Establishing grapevines need to be protected from defoliation
 - Bearing grapevines need protection but cultivar dependent and vigor dependent



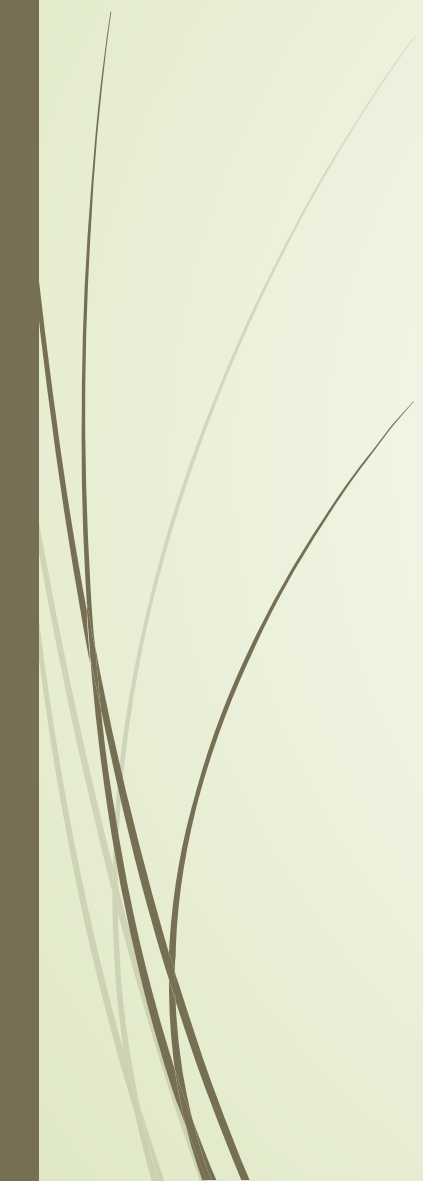
Weather Outlook-HOT, Hot, Hot


- 
- ▶ Check out your irrigation now before you need it!
 - ▶ Grapevine photosynthesis works well between 77 and 95° F
 - ▶ Canopy interior much cooler than fully exposed exterior leaf in full sun – as much as 15° F



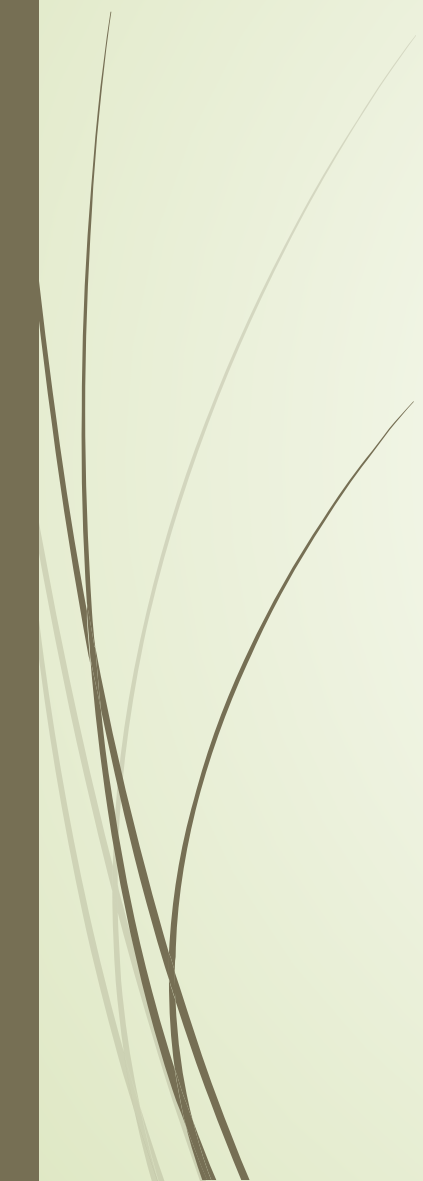



Powdery mildew

- Spores germinate between 43 to 91° F
 - Optimum temperature for growth 77° F
 - Temperatures above 91° F detrimental to growth
 - Powdery mildew colonies killed when
 - 12 h above 95° F and
 - exposed to UV light
 - Powdery mildew reproduction and development limited when temperatures above 90° F
 - Moisture detrimental to powdery mildew spores
- 

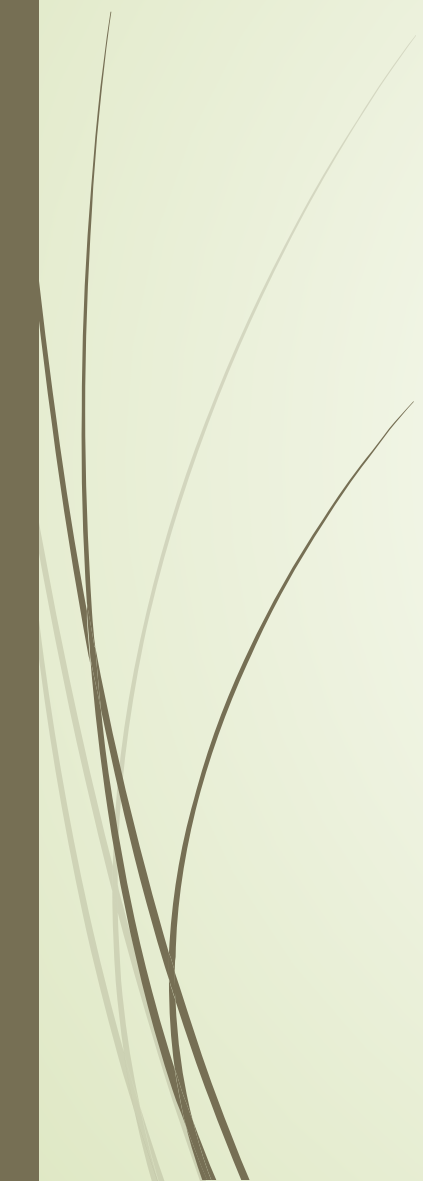



Scouting for powdery mildew

- Border vineyard rows shaded by trees
 - Monitor leaves within the canopy interior-Why?
- 





Scouting for powdery mildew

- Border vineyard rows shaded by trees
 - Monitor leaves within the canopy interior-Why?
 - Shaded leaves cooler providing optimal temperatures for powdery mildew growth and development
 - Shaded leaves are not exposed to UV light that can kill powdery mildew
 - Powdery mildew thrives in high humidity and interior canopy microenvironment has higher humidity compared to exterior of canopy
- 

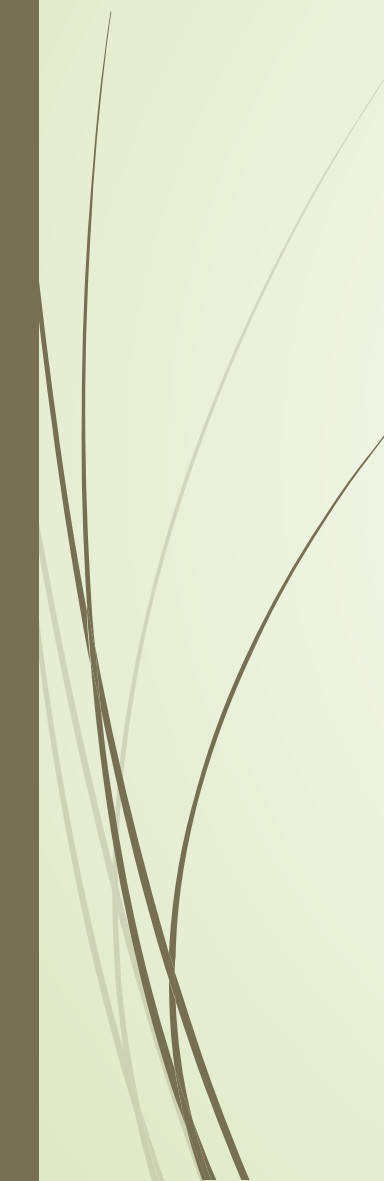


Scouting for powdery mildew

- Unlike downy mildew, powdery mildew can form colonies on the top and bottom of the leaf
 - Highly susceptible grape cultivars
 - Chambourcin
 - Seyval
 - Vidal blanc
 - Vignoles
- 



Heavy outbreak of powdery mildew

- Sulfur applications will not work
 - For low to moderate pm pressure
 - Potassium bicarbonate applications will not work
 - For low to moderate pm pressure
 - Water
 - 200 to 400 gallons/acre followed by
 - 1 to 2% Horticultural mineral oil within 2-days of water
 - If you have been applying sulfur then oil and sulfur could cause phytotoxicity
 - Apply a fungicide 5 to 7 days after Horticultural oil
- 

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Do not apply Qol fungicides (FRAC 11) or DMI fungicides (FRAC 3) to a heavy outbreak of powdery mildew





Sour rot complex

- Monitor susceptible cultivars and apply management around 15 brix
- Wet rainy weather starting at ~ 15 brix will often set Sour rot in motion
- Need to control bacteria and fruit flies
 - Oxidate anti-microbial
 - Insecticide-fruit flies
- Preventative management starting at 15 brix better than post-mortem management
- Protect integrity of berry from birds and hail (hail netting)

Drosophila resistant to three different modes of action

Trade Name	Common Name	Sub-group or active ingredient	IRAC
Assail	acetamiprid	Neonicotinoids	4A
Malathion	malathion	Organophosphates	1B
Mustang Maxx	Zeta-cypermethrin	Pyrethroid/Pyrethrins	3A

The Drosophila population remains susceptible Delegate (spinetoram)

Phomopsis?



C3 Pestalotiopsis

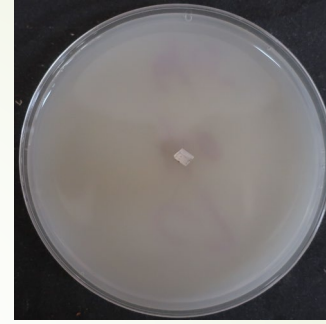
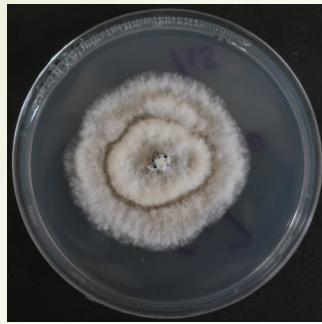


C7 Neopestalotiopsis

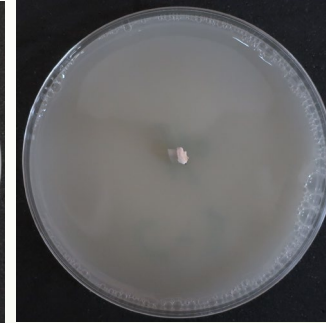
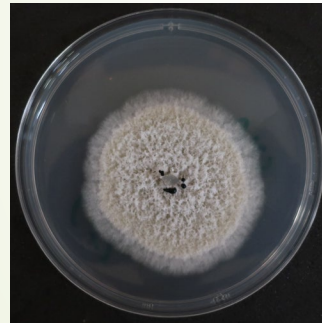
Control



Phomopsis ?



C7
Neo
Pestalotiopsis



C3
Pestalotiopsis

0

1/1000

1/100

1/10

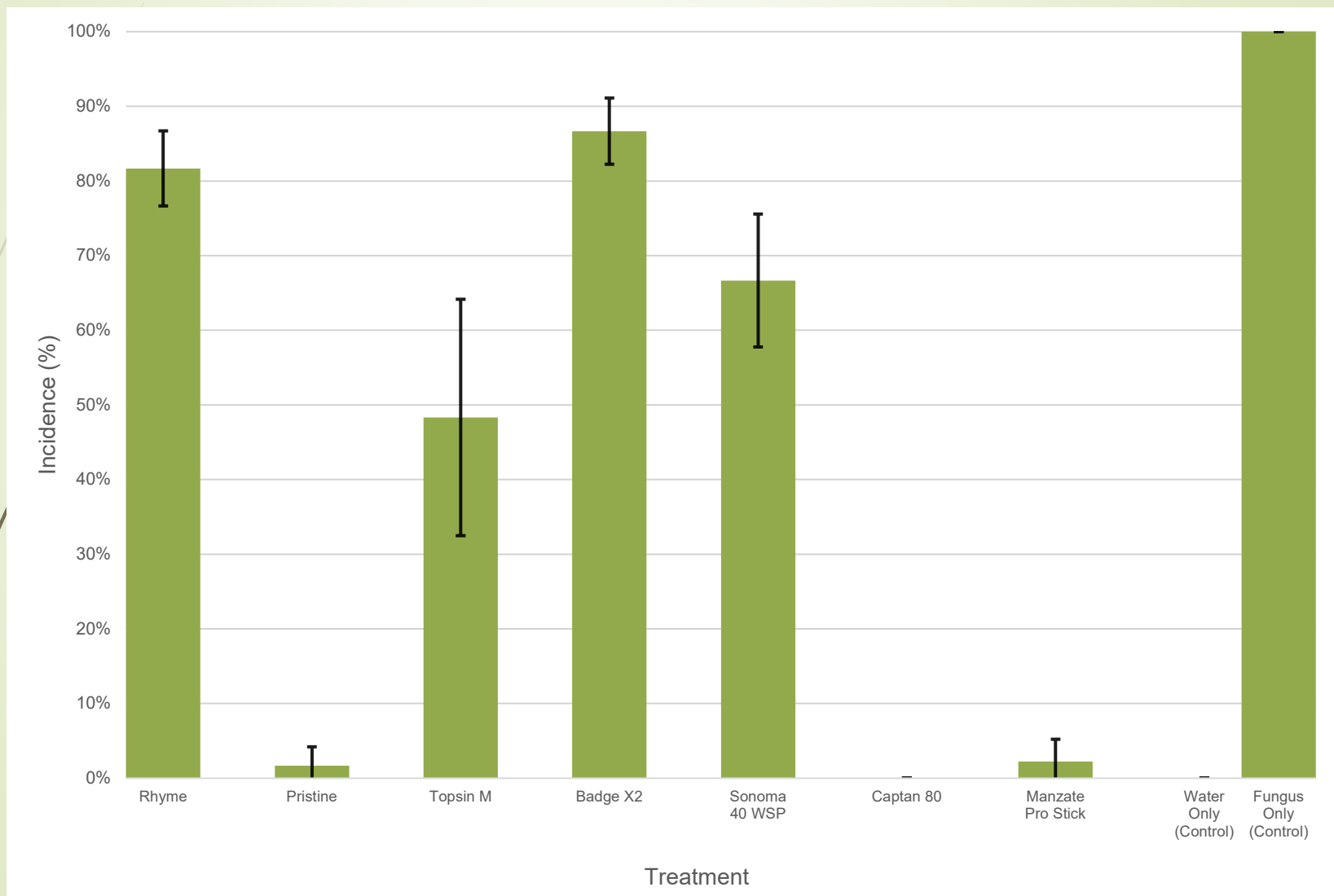
Manzate Pro-Stick (3 lbs/35 gallons water)

C3 Pestalotiopsis 7 DAT



Control

1×10^6 conidia/L



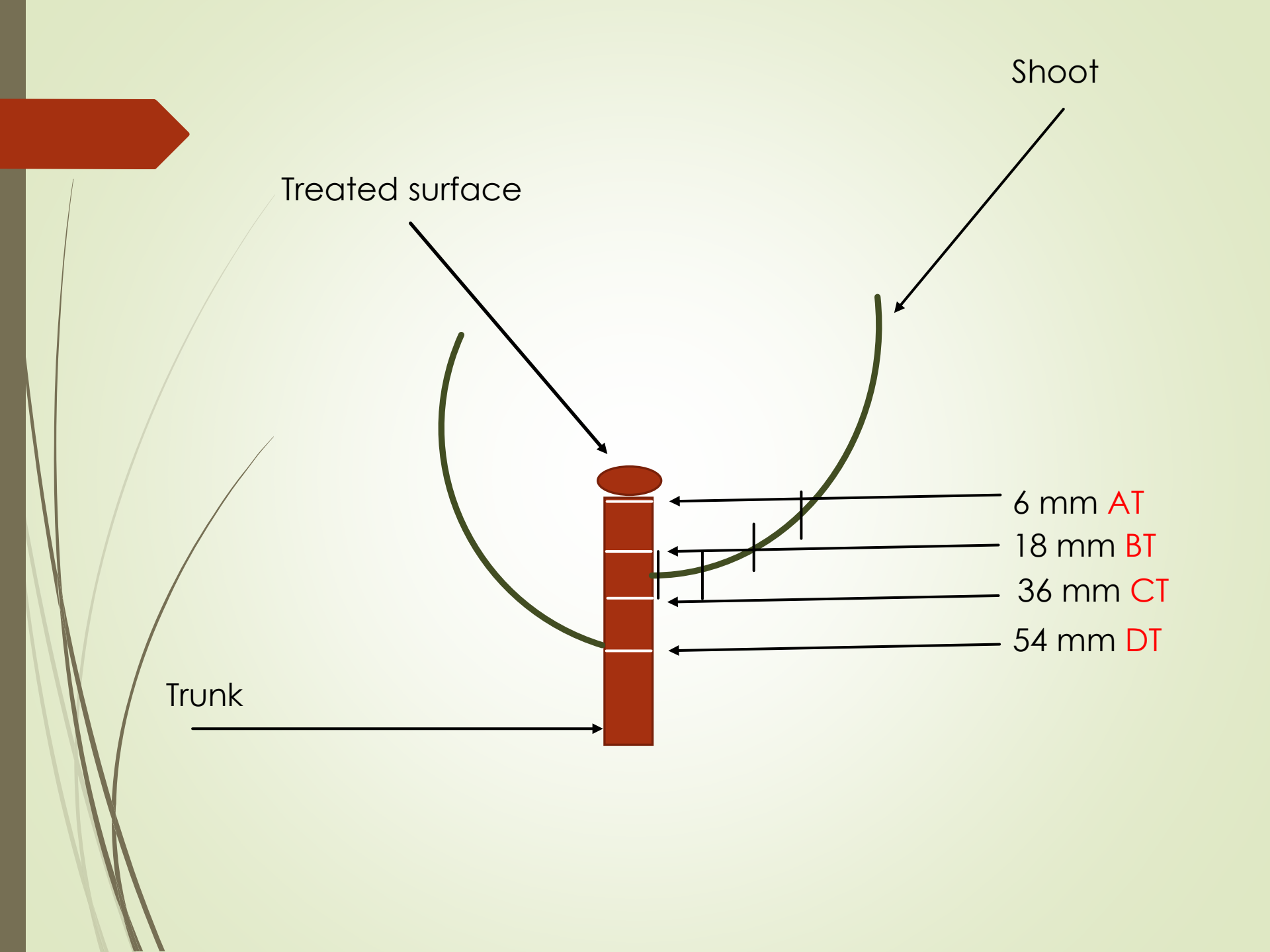
C3 Pestalotiopsis 14 DAT

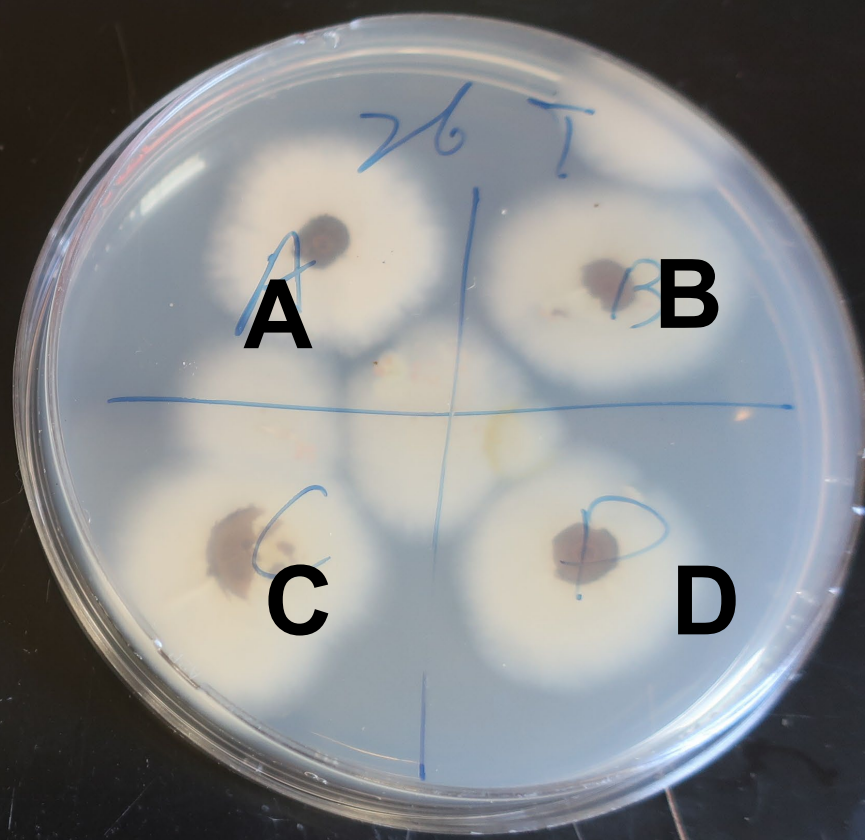
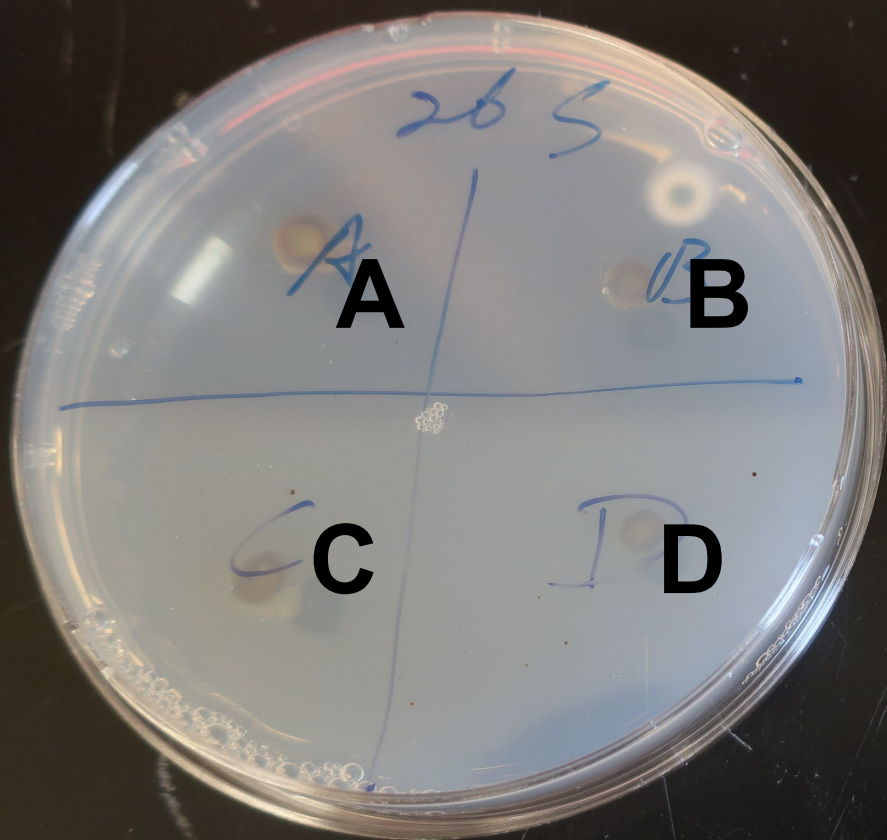


1×10^6 conidia/L





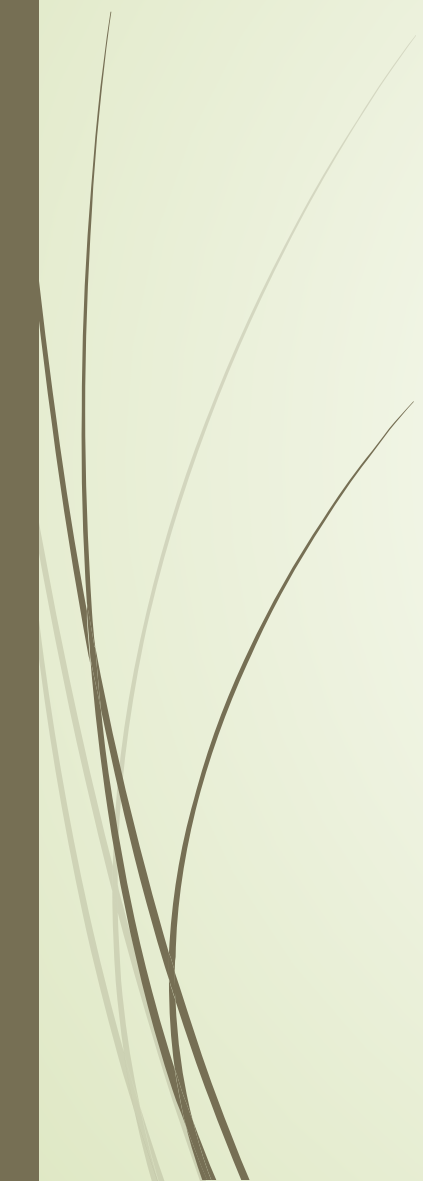






Preliminary results

Pestalotiopsis GTD

- Pestalotiopsis can travel into the trunk
 - Pestalotiopsis traveled 54 mm in 90 days
 - Pestalotiopsis did not move into the shoot
 - Currently evaluating select fungicides to prevent Pestalotiopsis from infecting cut surfaces
- 



Red Blotch updates

- Many potential vectors identified
- Here in MO, *Entylia carinata* identified as a vector in greenhouse studies
- TCAH not found in 3-vineyards infected with GRBV over 2 growing seasons
- GRBV first identified in Crimson Cabernet in MO, 2016
- Current research is addressing : potential host reservoirs of GRBV

Red Blotch updates

- *Entylia carinata* host preferences Asteraceae
 - Canadian horseweed, *Conyza canadensis*
 - Annual ragweed, *Ambrosia artemisiifolia*
 - Giant ragweed, *Ambrosia trifida*
 - Horsenettle, *Solanum carolinense*
- Raccoon grape or false grape, *Ampelopsis cordata*
- Native grape species. *V. aestivalis*, *V. cinerea*, *V. palmata*, *V. riparia*, *V. rupestris*, *V. vulpina*, *V. labrusca*, *V. rotundifolia*.
- Virginia creeper, *Parthenocissus quinquefolia*



Red Blotch updates

- ▶ Tomato pseudo curly top virus (Geminiviridae)
 - ▶ Vectored by treehopper *Micrutalis mallaifera*
 - ▶ TPCTV and GRBV have similar coat protein amino acid sequences
 - ▶ *A. trifida* is a host of TPCTV
- ▶ Justification for selecting potential weedy host plants that could be reservoirs for GRBV



Red Blotch updates

- *Entylia* sp. were identified in 2019 in New York as being able to acquire GRBV
- *Entylia* sp. were discounted because of the low level of samples collected in vineyards having GRBV
- Our research suggests that *Entylia carinata* can acquire and transmit GRBV

Entylia carinata = (*E. Bactriana*)



Photo credit: Harper Smith



Photo Credit: Lorie Volenberg,
BugGuide



Wild Grapevines & GRBV

- 137 single grapevine accessions collected from perimeters of 9 commercial vineyards
- 77 single weed accessions collected
 - Marestalk *Conyza canadensis*
 - Horsenettle *Solanum carolinense*
 - Common ragweed *Ambrosia artemisiifolia*
 - Giant ragweed *Ambrosia trifida*
- 5 single accessions collected
 - Porcelain Berry *Ampelopsis cordata*

Ampelopsis cordata





Results for GRBV

- ▶ 10% of wild grapevines GRBV positive
- ▶ No weed species tested positive for GRBV
- ▶ One of the five accessions of *Ampelopsis cordata* tested positive for GRBV
- ▶ Six of 156 accessions (3.8%) of *A. cordata* collected by Wenping Qiu tested positive for GRBV



GRBV prevalence in Crimson cabernet

- A two acre block was being removed
- A total of 273 vines sampled
- A sample consisted of 2 basal leaves from 2 different shoots per cordon providing a total of four leaves per vine
- 55% of samples tested positive for GRBV



Prevalence of GTD in Crimson cabernet

- Trunk samples were collected from the vineyard
- A sample consisted of a 6 –inch long trunk section taken ~4-inches from the crown
- A total of 52 samples
- A total of seven GTD organisms identified in 42 samples
- The most predominant GTD was pestalotiopsis/neopestalotiopsis 40% (17/42 samples)



HARC Planting



108 Norton
60 Chardonnay
84 Vidal blanc



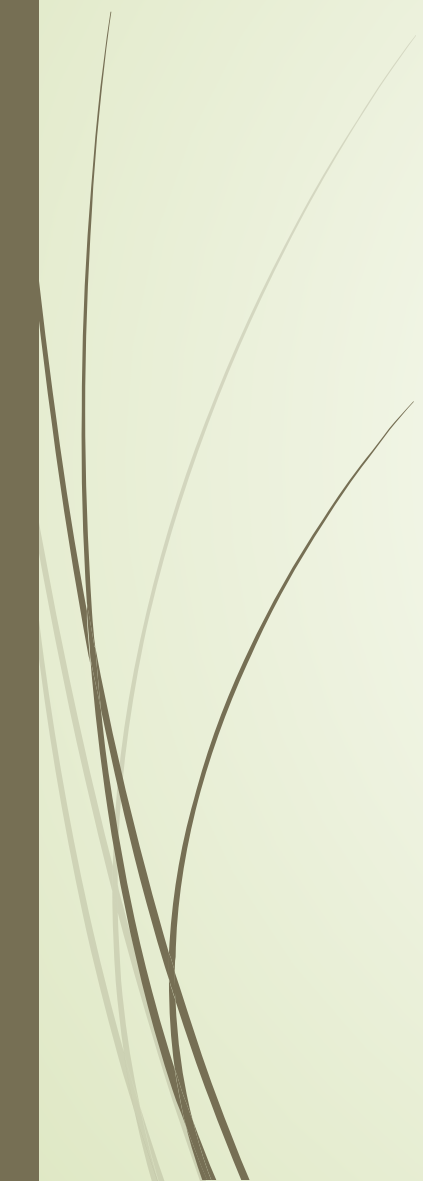
HARC Planting



- Norton
 - Healthy, GRBV, GLRaV3, GLRaV2, GLRaV2RG
GRBV+GLRaV3, GLRaV2RG+GLRaV3
- Chardonel
 - Healthy, GRBV, GVCV, GLRaV3, GRBV+GVCV
- Vidal blanc
 - Healthy, GVCV, ToRSV, GLRaV2+GLRaV3,
GVCV+GLRaV2+GLRaV3,
ToRSV+GVCV+GLRaV2+GLRaV3,
GVCV+ToRSV+GLRaV2+GLRaV3



HARC Planting: Reminder

- Norton has not exhibited visual symptoms to any of the viruses present in the vine as tested with PCR
 - Chardonel exhibits visual symptoms of GVCV but not of other viruses such as GRBV or GLRaV3
 - Vidal blanc exhibits visual symptoms to ToRSV in clusters (hen and chicks). Anecdotal observations suggest that GVCV in combination with GLRaV3 results in similar symptomology.
- 

South Farm Planting





10W14N-Parentage

- (Riparia x Cabernet Franc) X (St. Croix x Calzin)
- Calzin = Zinfandel x Mondeuse
- Mondeuse - Either a grandparent or half sibling to Syrah.
- Semi-upright growth habit
- Small clusters and berries
- Disease tolerant (Only powdery on some unsprayed vines)
- Only somewhat susceptible to 2-4-D & Dicamba
- Hardy to -19 F



10W14N

Date	Brix	pH	TA G/L
09/05/17 <u>Mother</u> <u>Vine</u>	24.5	3.58	9
09/10/18	22	3.3	7.8
09/22/19	22.3	3.37	11.18



9E3N-Parentage

- (Riparia x Cabernet Franc) X (DM-95-16)
- DM-95-16-parentage contains: Merlot, Chambourcin
- Semi-upright growth habit
- Medium loose clusters. Medium berries
- Must control Phomopsis with early sprays
- Moderately susceptible to 2-4-D & Dicamba
- Hardy to -19 F
- Thick, tough skins

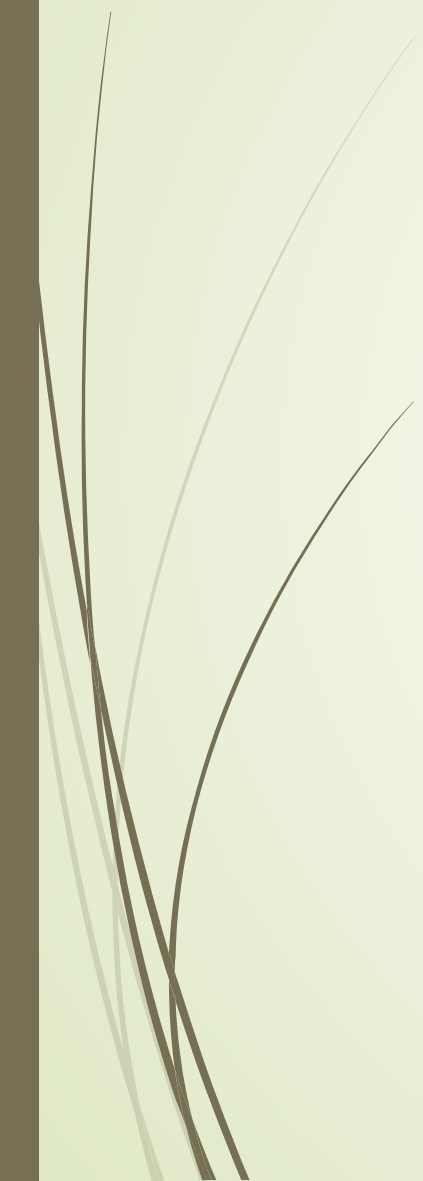


9E3N

Date	Brix	pH	TA G/L
09/28/17	21	3.32	12
10/12/18	21.5	3.35	7.7
10/02/19	19.8	3.34	6.75



Other Notables

- NC-6 (white) Norton x Cabernet sauvignon, MSU Wenping Qiu
 - Loose clustered Vignole selections
 - Nine *V. vinifera* cultivars
 - Petite Manseng
 - Petite Verdot
 - Regent
 - Gruner veltliner
 - Cabernet franc
 - Saperavi
 - Alberino
 - Kerner
 - Lemberger
- 











Show Me Grape and Wine Conference and Symposium

- Conference and Symposium

March 1-2, 2023

- Beginner Grape School

March 3, 2023



Midwest Fruit Pest Management Guide 2021-2022

Midwest Fruit Pest Management Guide 2021-2022

Arkansas
University of Arkansas Cooperative Extension Service
AG 1304

Illinois
University of Illinois Extension
ICSG-18

Indiana
Purdue Extension
ID-465

Iowa
Iowa State University Extension and Outreach
HORT 3035

Kansas
Kansas State Research and Extension
MF3278

Kentucky
University of Kentucky Cooperative Extension Service
ID-232

Minnesota
University of Minnesota Extension

Ohio
Ohio State University Extension
Bulletin 506

Wisconsin
University of Wisconsin-Extension
A4104



Please help
yourself to a
guide before
leaving
today.



Looking Back: Frost/Freeze Update and Grape Demand

- Late frost/freeze events the last two years
 - April 21-22, 2021
 - April 10 & 18, 2020
 - These events have reduced available fruit
 - Some Norton vineyards had extremely low cluster counts in 2021
 - Looking back to 2019, at times more than 500 tons of fruit available on the grape exchange
 - In 2021, less than ~20 tons posted on the exchange
- 