Identification and diagnosis of grape bunch rots and other grape cornucopia

Show Me Grape and Wine Conference
March 5, 2020

9:00 AM

DR. DEAN S. VOLENBERG

VITICULTURE AND WINERY OPERATIONS EXTENSION SPECIALIST

Phomopsis

- Infection can occur at flowering
  - Disease process latent
  - At veraison disease process awaken
  - No remedy at this point
- Important to manage phomopsis at early vine growth
- Berries do not develop age related resistance
- Spores are depleted at around fruit set

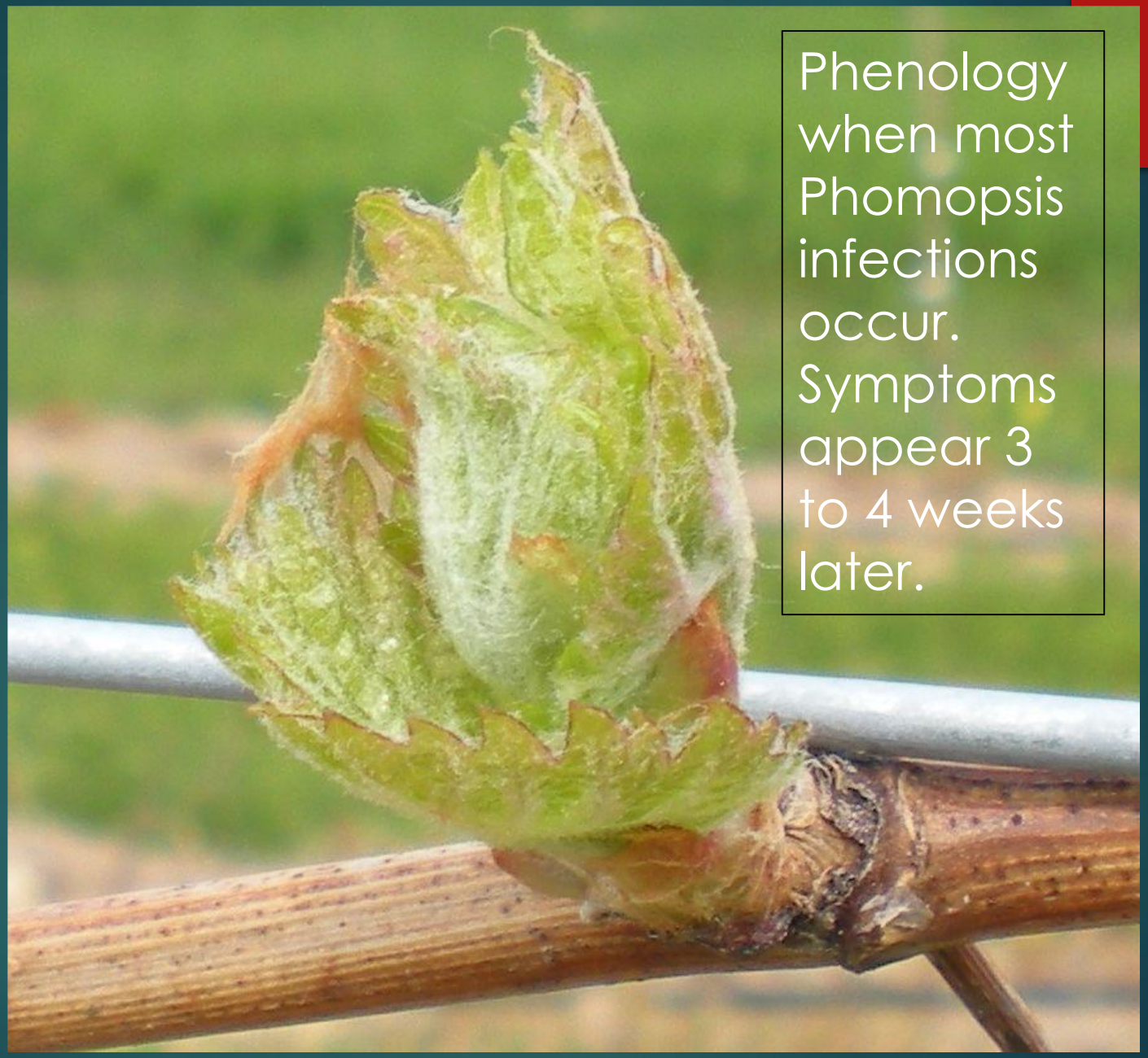
Fruit infections prior to fruit set become latent – surprise at veraison

Rachis infections often cause shatter during pre-harvest

Phomopsis

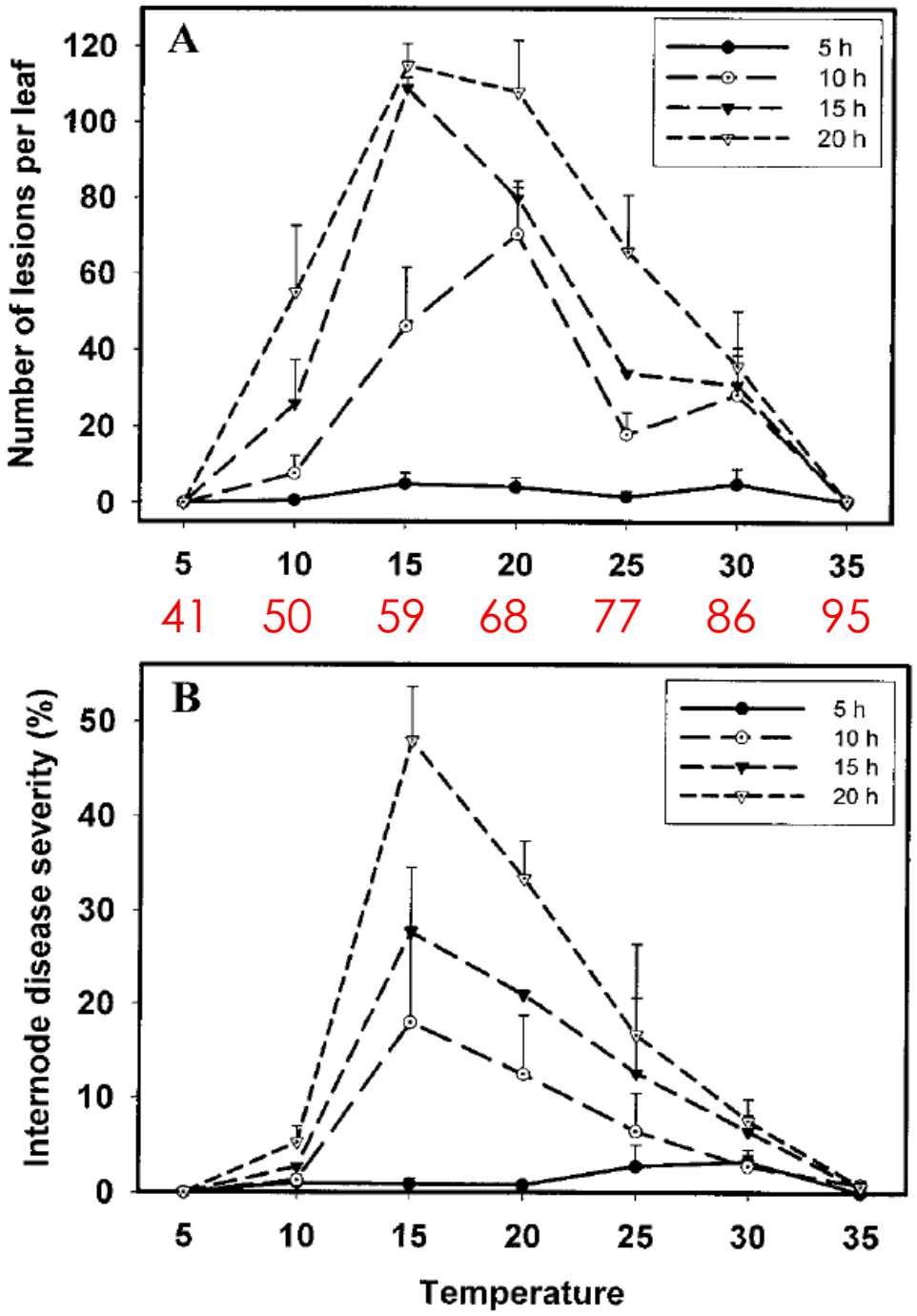
- One of the primary trunk disease pathogens
- Isolates have different virulence on different tissues
- Sanitation in the vineyard
- In wet cool springs phomopsis is a major problem
- Are you managing phomopsis too late after budburst?

Phomopsis



Phenology when most Phomopsis infections occur. Symptoms appear 3 to 4 weeks later.

Phomopsis



Erincik, O. et al. 2003

The rise of rots

I love social media

- Dear Sirs,

  I was just forwarded your IPM Report and I was very disappointed to see this false information come out of MU. I think you may want to print a retraction **Botrytis cinerea (grey/noble rot) is rare here and has not or has never been a problem in Missouri grapes.** This sort of poor advice hurts the finances and time of the inexperienced or unaware growers as well as having an unnecessary impact on the environment. It's just bad for business all the way around and with the reputation of a solid ag program like MU, maybe it should be reviewed before it is sent out.
  Thank you for your time.

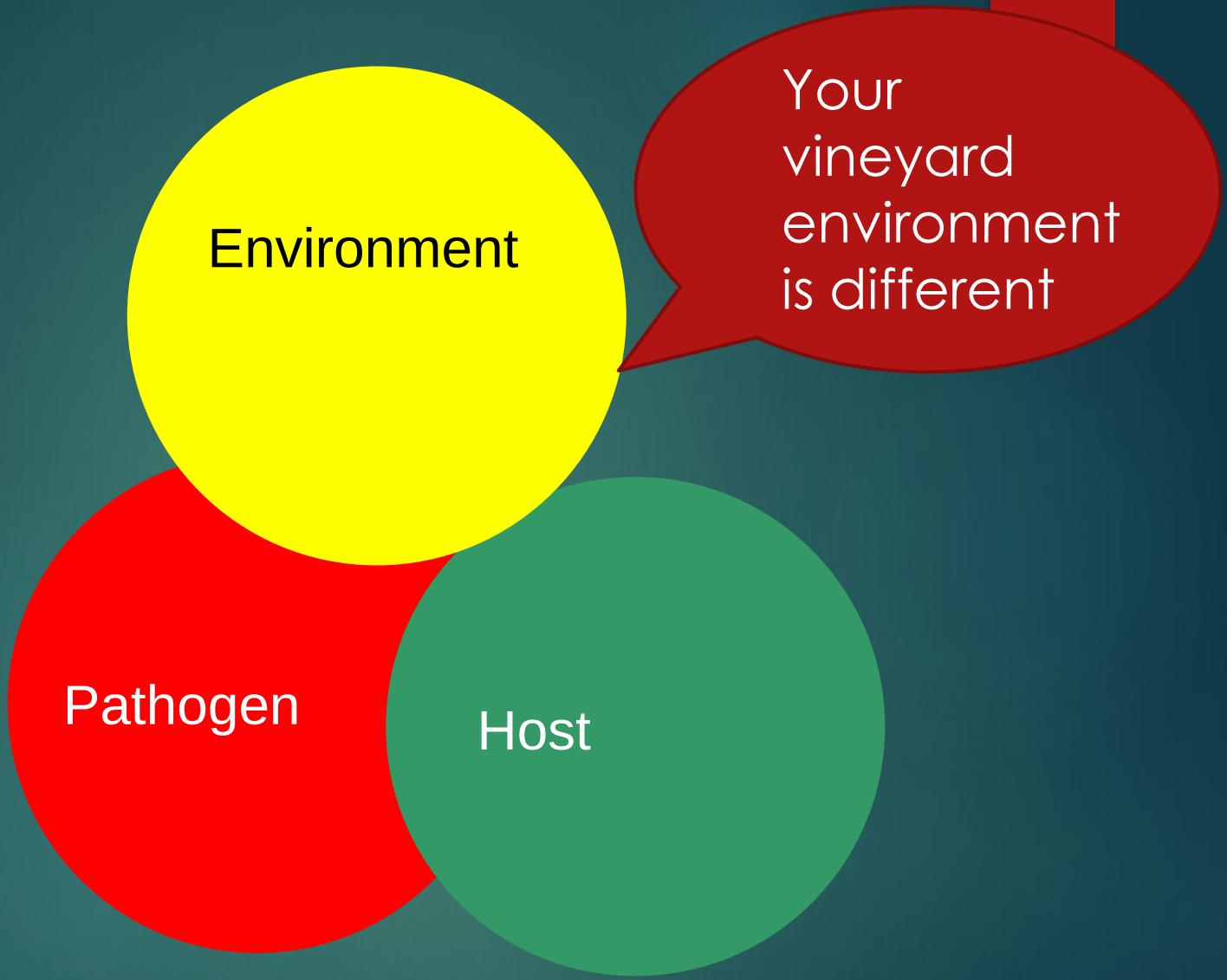
  Author to remain anonymous

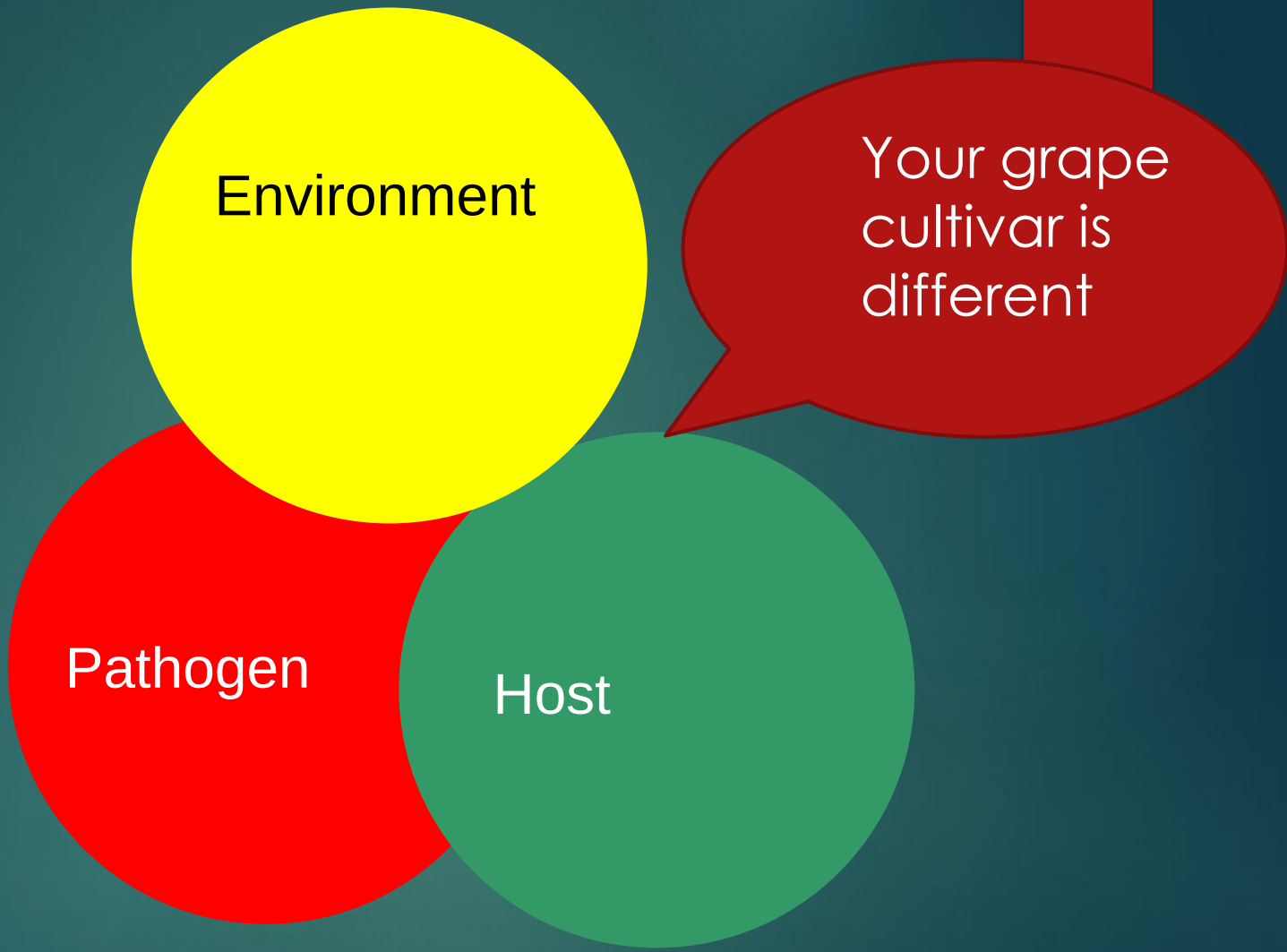
Example of a lack of understanding

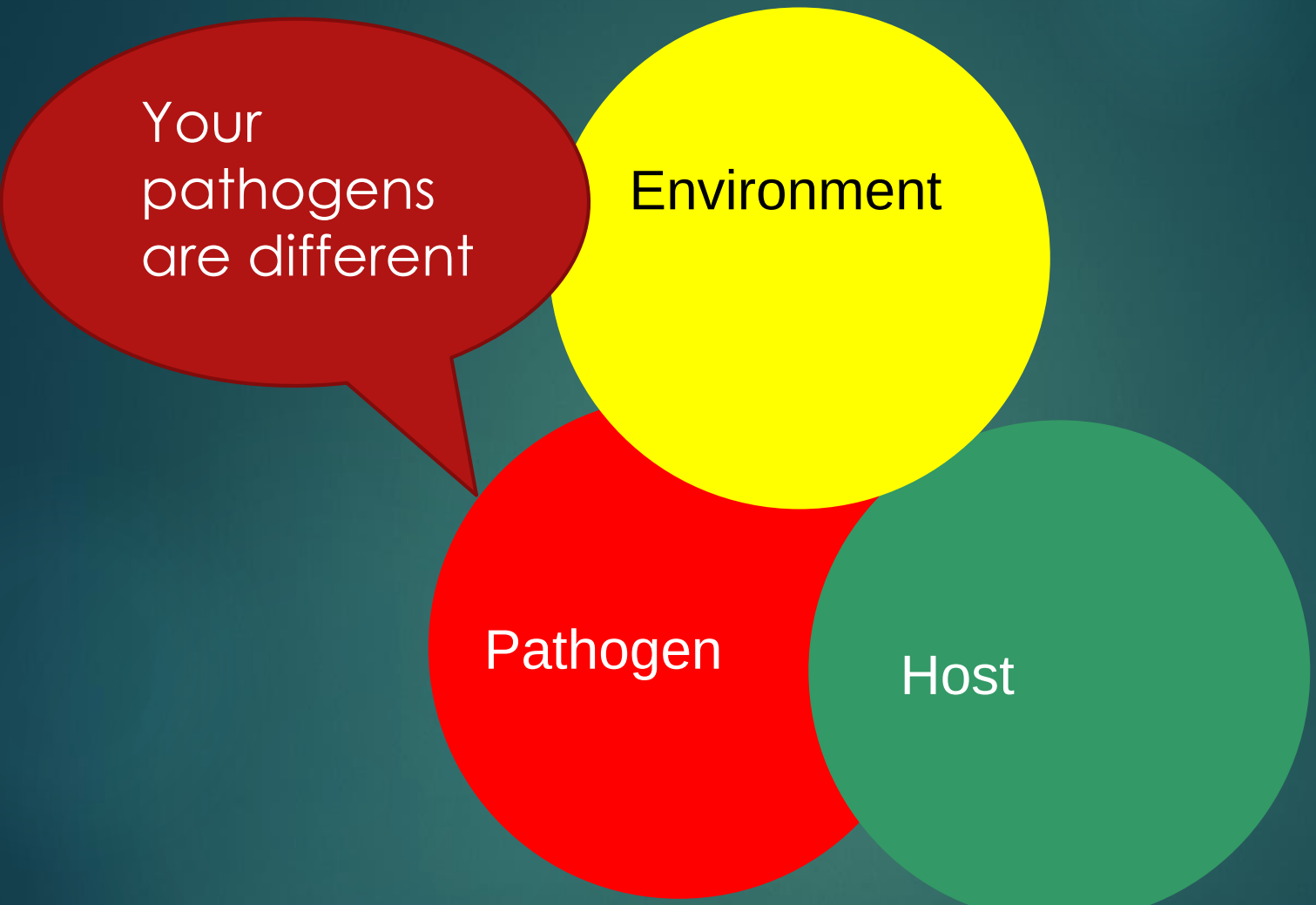
- Provides opportunity to educate
- Changing environments from year to year
- Changing fungicide changes selection pressures
- In almost all cases in growing any crop – something "new" emerges
- Reporting a potential problem will hopefully incite people to get into the vineyard to scout

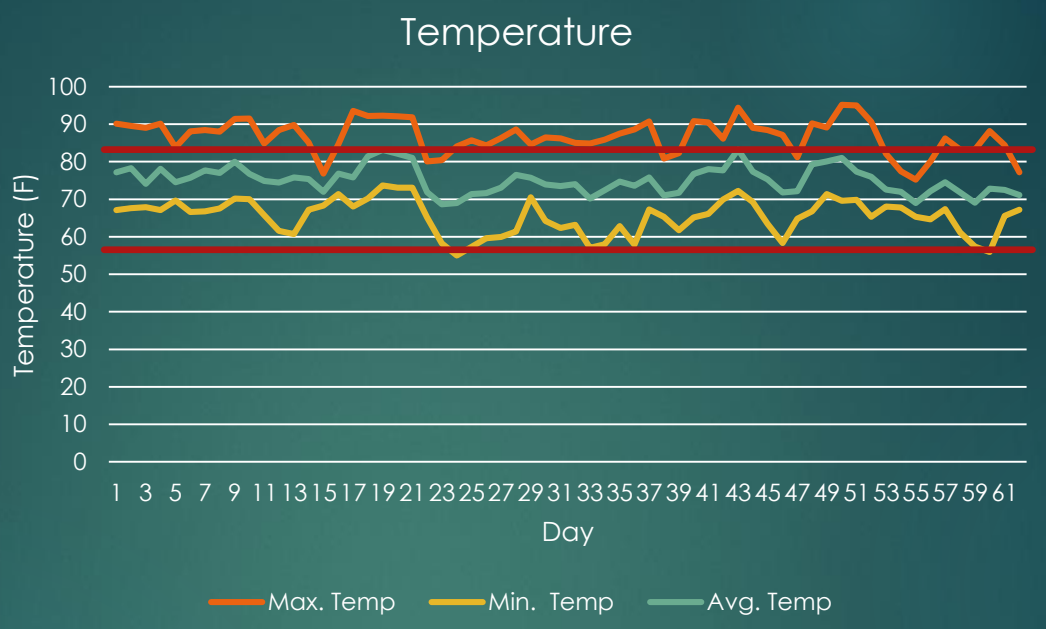
We are all biased by our experiences

- What is happening in your vineyard may not be what is happening in your neighbors
- A visual image or video has more power over the audience
- Social media is a communication device
  - No different than a newspaper with an advice column – Dear Abby or Tom Savage
- Except now with social media everyone has a voice or power of the pen……but everyone is biased by their own experiences.


Environment
Your vineyard environment is different
Pathogen
Host


Environment
Your grape cultivar is different
Pathogen
Host


Your pathogens are different
Environment
Pathogen
Host


Temperature
Temperature (F)
100
90
80
70
60
50
40
30
20
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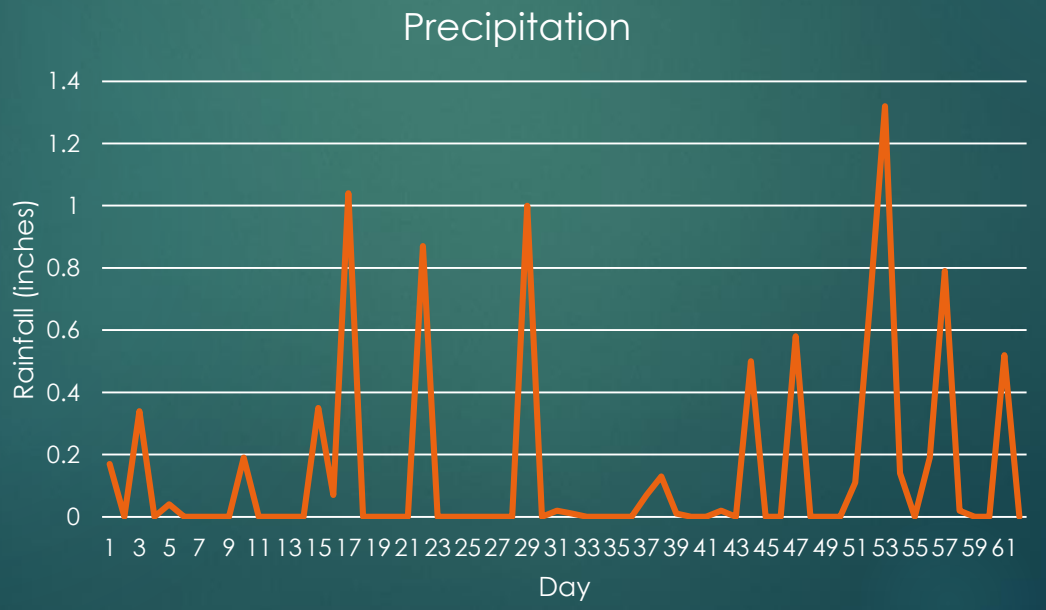
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61
Day
Max. Temp
Min. Temp
Avg. Temp


Precipitation
Rainfall (inches)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61
Day

Even so…just tell somebody

Leaf Removal for Control of Botrytis Bunch Rot of Wine Grapes in the Midwestern United States

ABSTRACT

English, J. T., Kaps, M. L., Moore, J. F., Hill, J., and Nakova, M. 1993. Leaf removal for control of Botrytis bunch rot of wine grapes in the midwestern United States. Plant Dis. 77:1224-1227.

The influences of leaf removal on canopy structure and Botrytis bunch rot were examined in two wine grape vineyards in Missouri. Leaf removal significantly reduced canopy density and increased evaporative potential in vines of hybrid grape cultivars Vignoles and Seyval blanc. However, the effectiveness of the practice in reducing disease varied with seasonal weather patterns and with vine support and trellis system. In the warm and dry growing season of 1991, grapes matured very early and no disease occurred in Vignoles with or without leaf removal. Disease levels also were low in Seyval blanc; however, leaf removal significantly reduced the incidence and severity by up to 47 and 79%, respectively, compared to vines without leaf removal. Application of iprodione provided no additional disease control. In the much wetter season of 1992, bunch rot occurred at both vineyards; and leaf removal significantly reduced the incidence and severity of bunch rot in both cultivars. However, iprodione applied to Seyval blanc also reduced disease incidence significantly in vines with or without leaf removal. Evaporative potential provided a simple means of measuring the degree of canopy opening and the drying conditions created by leaf removal.

Plant Disease 77: 1224-1227 (1993)

Growing Grapes in Missouri

Botrytis Bunch Rot

Pathogen: *Botrytis cinerea* Pers.

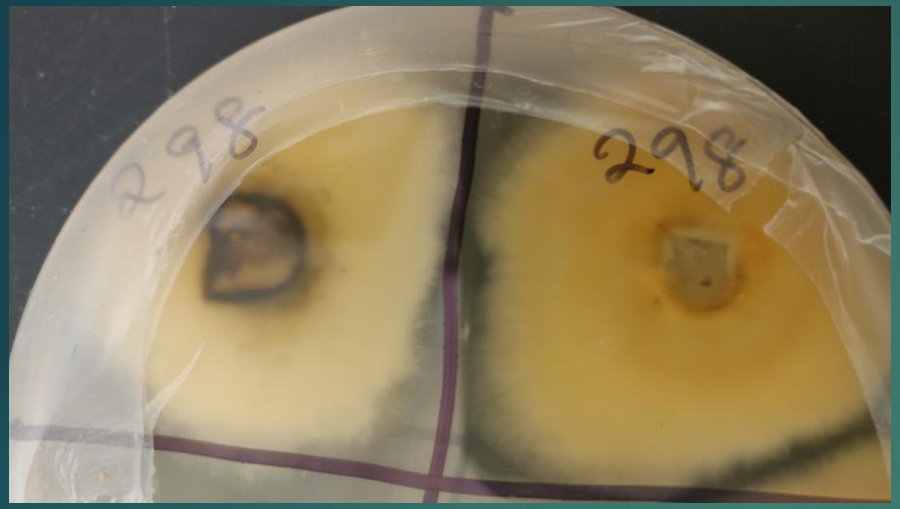
Impact: Recent evidence indicates Botrytis bunch rot probably does not occur in Missouri as often as had been assumed. Other late-season berry rots are often mistakenly identified as caused by *B. cinerea*. However, *Botrytis* can cause economic losses, particularly on some tight clustered hybrid and vinifera cultivars in cool weather. Once established, infection can move rapidly throughout berries on a cluster.

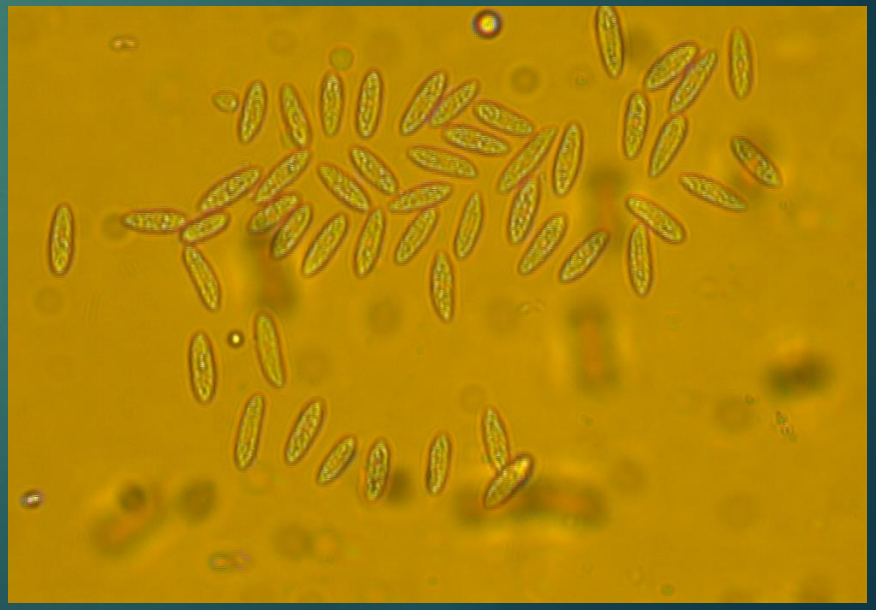
Bitter rot *Greenaria uvicola*

- Can infect at bloom and remain quiescent
- Disease process starts once secondary ripening phase begins
- Stobilurins and mancozeb provide good control
- DMI (Frac code 3) not effective: Rally, Tebuzol, Mettle, Procure
- No age related resistance to Bitter rot unlike Black rot
- Bitter rot often confused with Black rot

	Black rot	Bitter rot
Symptoms on berries	Fruit set to 4 to 6 weeks after flowering	At veraison
Appearance on berry	Sooty	Sooty (will stick to fingers if wet)
Progression on berry	Mummy	Mummy
Primary infection spore source	Mummy berries	Mummy berries
Berry age related resistance	4 to 6 weeks after flowering	No age related resistance
Disease Management Period	Bud burst to 4 to 6 weeks post bloom	Bloom to Harvest

Bitter rot





Bitter rot

- Berries do not develop resistance
- Initial infections can take place at bloom
- Protect with a strobie, Captan or Mancozeb (watch PHI) at bloom
- Early season infections latent until veraison
- Berries susceptible from bloom to harvest
- Often confused with Black rot

Black rot

- Most destructive of rots
- A number of disease cycles can occur throughout growing season
- Berries develop resistance 4 to 6 weeks after flowering
- Green grapevine tissue remains susceptible to infection

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

Black rot

Temperature	Leaf Wetness
(F)	(Hours)
45	No infection
50	24
55	12
60	9
65	8
70	7
75	7
80	6
85	9
90	12

Spotts, R.A. Ohio State University

Anthracnose

- Symptoms can appear on all green tissue
- Inflorescence susceptible prior to flowering
- Berries susceptible through veraison
- Primary infection – prolonged wet periods
- Range of temperatures for infection 36 to 90 °F

Anthracnose

Anthracnose

Anthracnose

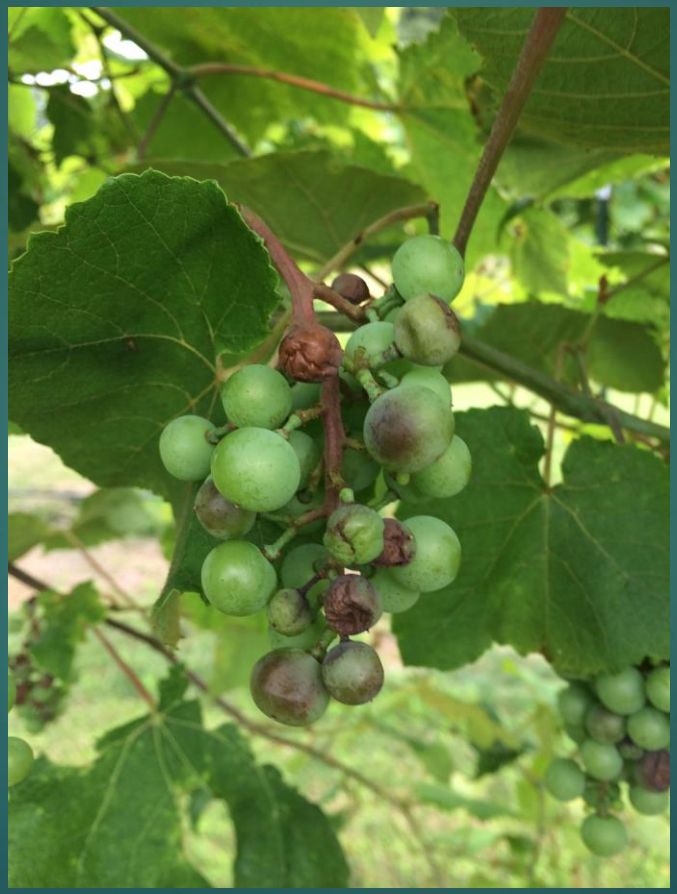
Pesto and Anthracnose

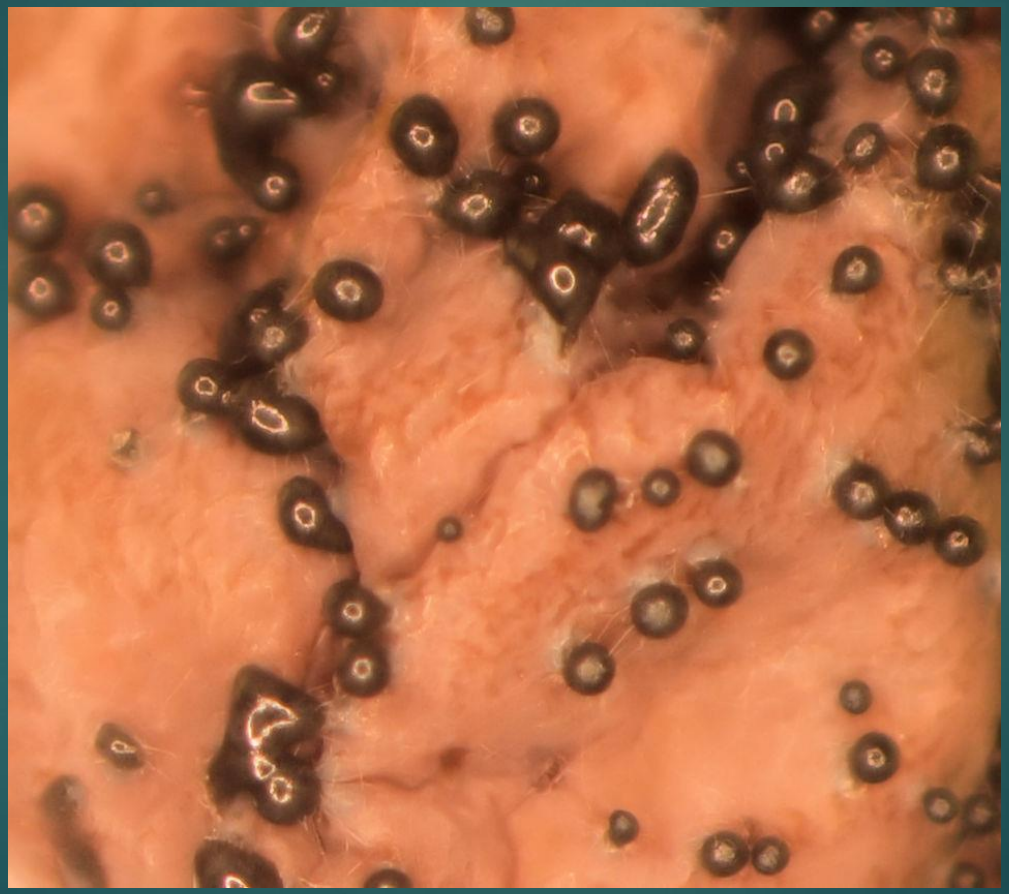
- IN avocado and strawberry *Pestolotiopsis* spp. causes similar symptomology as Anthracnose *Colletotrichum gloeosporioides*
- Pesto often found in association with Anthracnose
- Some Pesto spp. inhibit Anthracnose
- Glyphosate and paraquat promote hyphal growth, conidial production, germination and soil survival of *C. gloeossporioides*. Glufosinate was inhibitory
- Suggesting glyphosate and paraquat may also give rise to Pesto outbreaks. Research needed!

Pesto Updates

- Anecdotal evidence out of VA
  - Merlot vineyard has suffered from Pesto the last decade
  - Other Merlot vineyards in area do not have Pesto problem
  - The Merlot vineyard with Pesto problem
    - Routinely uses glyphosate and paraquat

Pesto on Norton





Red Blotch updates

- Russel Ranch had 7.1% infection rate
- Brianna was one of the cultivars at RR testing positive for GRBV
- UC Davis SCRI (USDA-NIFA) 4-year $3 million for Ecobiology, impact, and management of grapevine red blotch virus and its vector(s) in California and Oregon vineyards
- GRBV is spreading in areas without TCAH
- GRBV expression in the grapevine poorly understood – limits detection
- Other vectors likely are playing a role besides TCAH

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
- Future research will address: 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*
- Native grape species. *V. aestivalis, V. cinereal, V. palmata, V. riparia, V. rupestris, V. vulpine, V. labrusca, V. rotundifolia*.

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

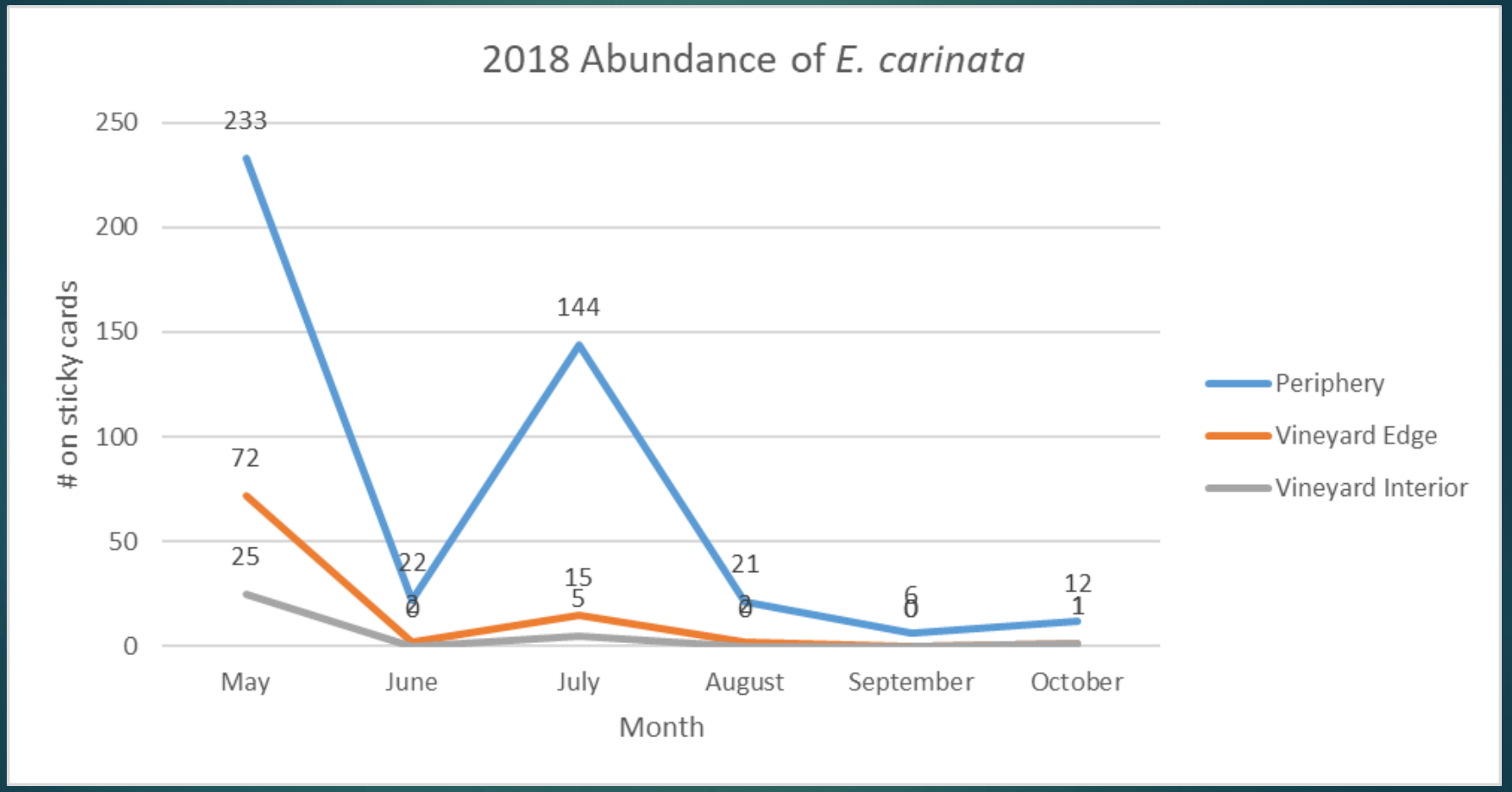
Red Blotch updates

- *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


2018 Abundance of E. carinata
250
200
150
100
50
0
on sticky cards
233
72
25
22
0
0
144
15
5
21
0
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6
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12
1
1
May
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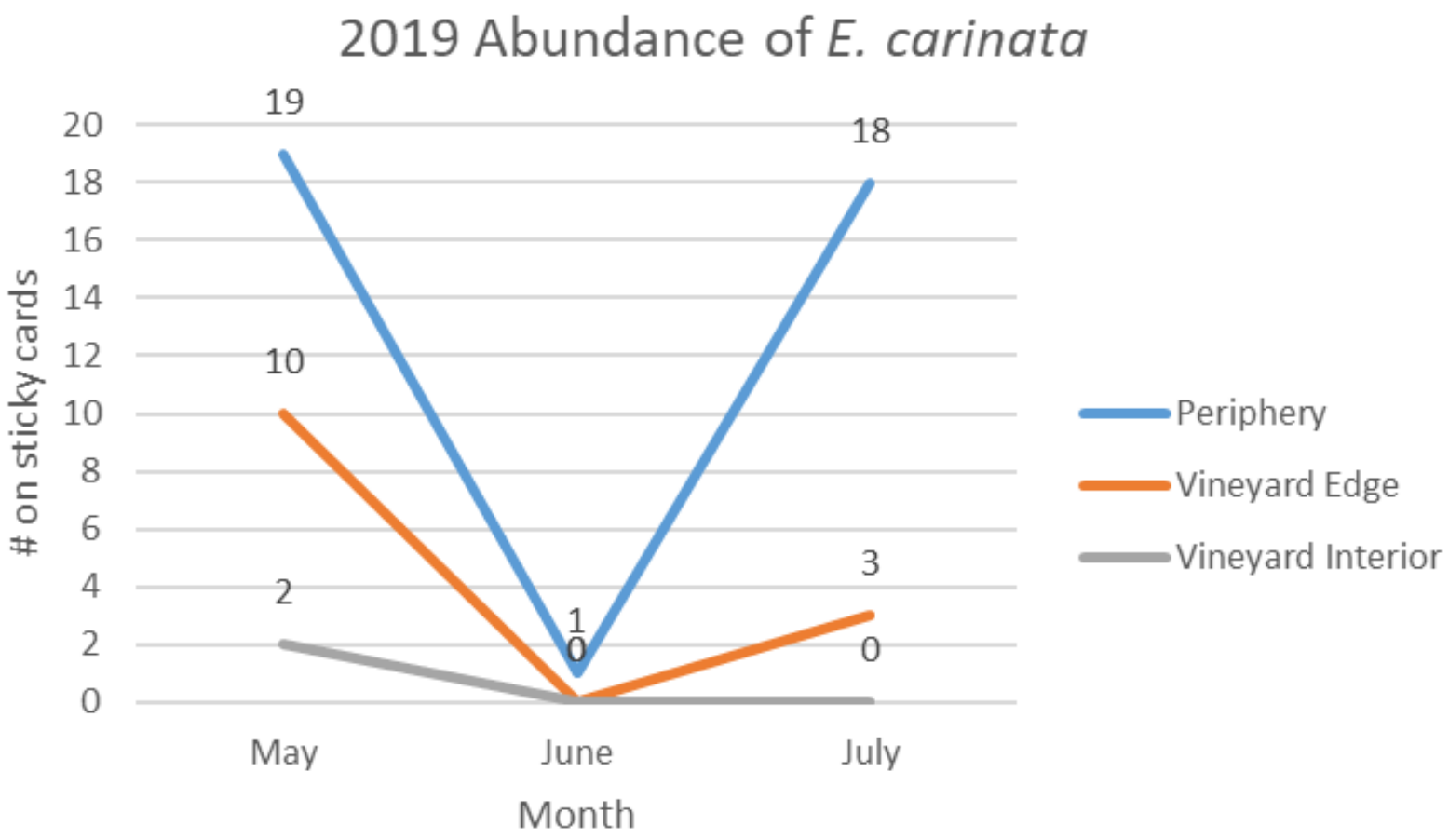
July
August
September
October
Month
Periphery
Vineyard Edge
Vineyard Interior


2019 Abundance of E. carinata
on sticky cards
20
18
16
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12
10
8
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1
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3
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May
June
July
Month
Periphery
Vineyard Edge
Vineyard Interior

Spray Guide 2019-2020

- Midwest Fruit Workers Group working to make the book available in a digital and printed format for 2021
- For current spray guide updates see website at Purdue
- Free pdf of 2019-2020 Spray Guide available at https://ag.purdue.edu/hla/hort/documents/id-465.pdf

Pest Management Guide Discussion

- Would a relative pricing structure be important for each pesticide? For example: $=low cost versus $$$=high cost
- Are the tables helpful?
- Is the format by phenology helpful?
- What would you like to see included or excluded from the guide.

- Comments

Grape Bloom

Apply when caps begin to fall.

Pest/Problem	Material	Rate/Acre	Comments
black rot, Phomopsis cane and leaf spot, powdery mildew, downy mildew	Same as for Grape Bud Break to Pre-bloom, page 80. If wet weather persists during bloom, or if the interval between the pre-bloom and shatter spray is greater than 7-10 days, a fungicide application during bloom may be necessary.		
downy mildew	Downy mildew is one of the most common diseases in the Midwest. Initial infections can occur as early as bloom. Leaf infections may occur throughout the summer, so it may be necessary to protect susceptible varieties from bloom to post-harvest. **Fungicide Resistance Alert:** The downy mildew pathogen is especially prone to fungicide resistance. Avoid back-to-back applications of any one systemic fungicide class.		
	Abound	10.0-15.5 fl. oz.	
	Captan 80WDG	1.25-2.5 lbs.	Do not apply sulfur or Captan within two weeks of an oil application, and do not apply stylet oil within two weeks of a sulfur or Captan application.
	fixed copper	See comments.	See Fixed Copper Fungicides, page 13.
	Forum	6.0 oz.	
	Mancozeb 75DF	3-4 lbs.	66-day PHI.
	phosphorous acid	See label	Phosphorous acid products include but are not limited to ProPhyt, Phostrol, Fosphite, Fungi-fite, Confine Extra, K-phite, and Rampart.
	Pristine 38WG	8-12.5 oz.	Do not apply on Concord or other American type grapes as injury may occur.
	Ranman	2.1-2.75 fl. oz	Do not use any surfactant.
	Reason 500C	2.7 fl. oz.	
	Revus	8 fl. oz.	Adding a spreading/penetrating type of adjuvant (such as a nonionic-based surfactant or crop oil concentrate or blend) is recommended.
	Ridomil Gold Copper	2 lbs.	42-day PHI.
	Ridomil Gold MZ WG	2.5 lbs.	66-day PHI.
	Sovran 50WG	3.2-6.4 oz.	
	Zampro	11-14 fl. oz.	Do not exceed 2 applications per season.
	Ziram 76DF	3-4 lbs.	

Effectiveness of Fungicides for Control of Grape Diseases[1] *(continued)*

Trade Name	Common Name	FRAC Code[3]	Phomopsis cane and leaf spot	black rot	downy mildew	Powdery mildew	Botrytis rot	bitter rot	anthracnose	Grape Pre-harvest Intervals (PHI) and Limitations (maximum amount per acre per season)[2]	REI[4] (hours)
JMS Stylet Oil	oil	-	0	0	0	E	0	0	0	0	12
Kenja 400SC	isofetamid	7	0	G-E	0	F	F	0	0	16 (66 fl. oz.)	12
Luna Experience	fluopyram + tebuconazole	7+3	G	G	G	E	E	G	0	14 (34 fl. oz)	12 / 5 days[5]
Merivon Xemium	fluxapyroxad + pyraclostrobin	7+11	0	0	0	E	0	0	0	14 (33 fl. Oz)	12
Mettle 125ME	tetraconazole	3	0	E	0	E[R]	0	0	E	14 (10 oz.)	12 / 7 days[6]
Pristine	pyraclostrobin + boscalid	11+7	F	E	E[R]	E	G	1	E	14 (69 oz.)	12 hr / 5 days[5]
Procure 480SC	triflumizole	3	0	G	0	E[R]	0	1	1	7 (32 fl. oz.)	24
Prophyt, Phostrol, Agri-Fos, Legion, Rampart	phosphorous acid	33	0	0	E	0	0	0	0	0	4
Quadris Top	difenoconazole + azoxystrobin	3+11	F	E	E	E	G	1	E	14 (56 fl. oz.)	12
Quintec	quinoxyfen	13	0	0	0	E	0	0	0	21 (33 fl. oz.)	12
Rally 40WSP	myclobutanil	3	0	E	0	E[R]	0	1	E	14 (1.5 lbs.)	24
Ranman 400SC	cyazofamid	21	0	0	E	0	0	0	0	30 (16.5 fl. oz.)	12

Needs Assessment Coming

- Needs Assessment 2020 – What are the needs of the industry!
- Focus on viticulture and enology
  - Research needs
  - Extension needs
- Identify best methods of communication
- Identify present and future workforce needs

Needs Assessment Coming

- Last completed in 2015
- Viticulture – focus on pest management, nutrient management, Pest ID, Grape cultivars for MO
- Enology – Troubleshooting common problems in unfinished wine, Fining agents and their application, Troubleshooting color and haze problems in unfinished wine

2015 Needs Assessment

- Identified Beginner Grape School
  - 2019 School had 24 attendees
  - 2020 School has 31 registered attendees
- Identified Extension communication
  - ViNews reaches more than 700 individuals on a weekly basis during the growing season
- We can do better together!

Tailgate Meetings 2020

- Session I: 3 locations first week of May prior to flowering
- Topics covered:
  - Critical period of disease management
  - You missed an early disease management window: how to manage Phomopsis
  - Pesticide updates
  - Latent ripe rots and their management
  - Petiole testing at bloom
  - Nitrogen applications: when and why

Tailgate Meetings 2020

- Session II: 3 locations first week of June prior to bunch closure
- Topics covered:
  - Potential disease issues
  - The importance of ontogentic resistance
  - The differences of downy and powdery mildew
  - Understanding downy mildew and powdery mildew management
  - Are you ready: Japanese beetle management
  - When should irrigation be applied: tips to manage irrigation

Tailgate Meetings 2020

- Session III: 3 locations first week of July. Midsummer disease management to veraison
- Topics covered:
  - Midseason pest issues
  - Why scout: IPM an important component of your pest management and your pocketbook
  - Nutrient management
  - Petiole sampling at veraison
  - Biotic vs abiotic problems

Cultivar Trial

- A new enologist is coming on board in the future
- A cultivar trial has benefits for:
  - The grape and wine industry
  - Recruiting an enologist
- There are a lot of new cultivars coming from
  - John Clark University of AK
  - Matthew Clark University of MN
  - Tom Plochner Independent Breeder, MN
  - Ed Swanson, Cuthills Vineyard, NE
  - Chin-Feng Hwang, Missouri State University
  - Wenping Qui, Missouri State University
  - Bruce Reisch, Cornell

Grape and Wine Institute
University of Missouri

NO. 12

Vinews
Viticulture Information News, Week of 10 June 2019
Columbia, MO

Norton and Mancozeb Phytotoxicity

Last week I reported that grape growers in Virginia reported observing phytotoxicity from mancozeb on Norton leaves in 2018 and this was followed by a report from a grower in Missouri in June 2019. A Missouri grape grower reached out to me this week and shared some pictures of mancozeb phytotoxcity symptomology on Norton (Figure 1 and 2). As reported last week the symptomology observed in Virginia Norton leaves is very similar to what was observed in Missouri on Norton leaves after being treated with mancozeb. The underside of the Norton leaves turn tan or light brown and over time the leaves become necrotic. Eventually after 4 to 5 weeks the older basal leaves drop from the grapevines (Figure 3).

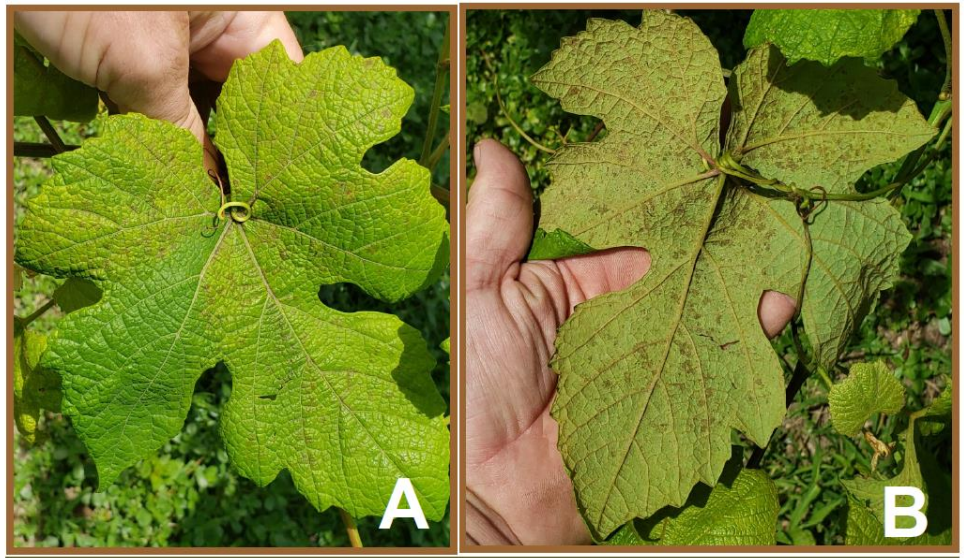
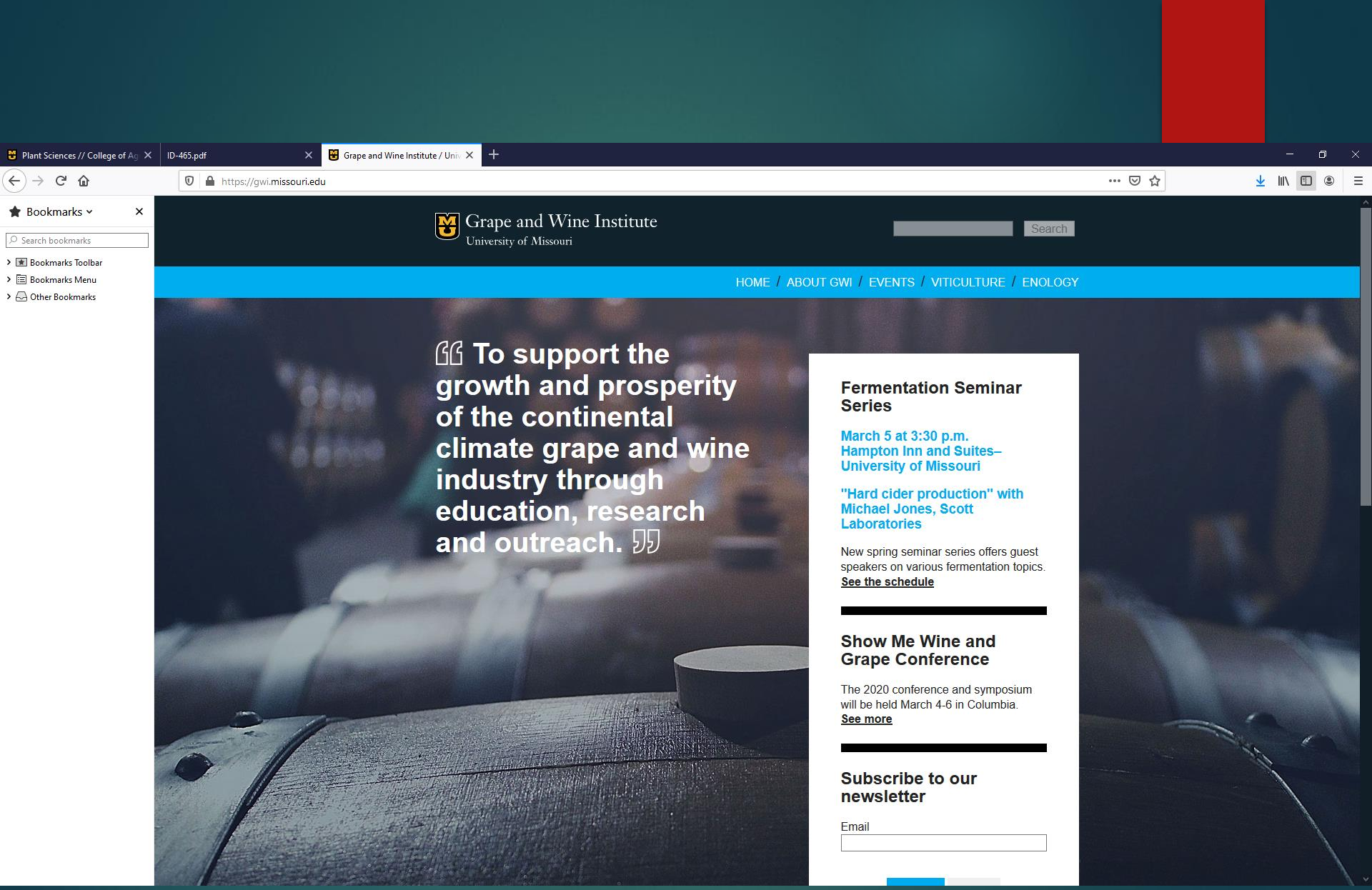


Figure 1. Mancozeb phytotoxicity on adaxial (A) and abaxial (B) Norton leaf in Missouri in June 2019. Photo credit: M Brennecke.


Plant Sciences // College of Ag
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Bookmarks Toolbar
Bookmarks Menu
Other Bookmarks
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“To support the growth and prosperity of the continental climate grape and wine industry through education, research and outreach.”
Fermentation Seminar Series
March 5 at 3:30 p.m.
Hampton Inn and Suites–University of Missouri
"Hard cider production" with Michael Jones, Scott Laboratories
New spring seminar series offers guest speakers on various fermentation topics.
See the schedule
Show Me Wine and Grape Conference
The 2020 conference and symposium will be held March 4-6 in Columbia.
See more
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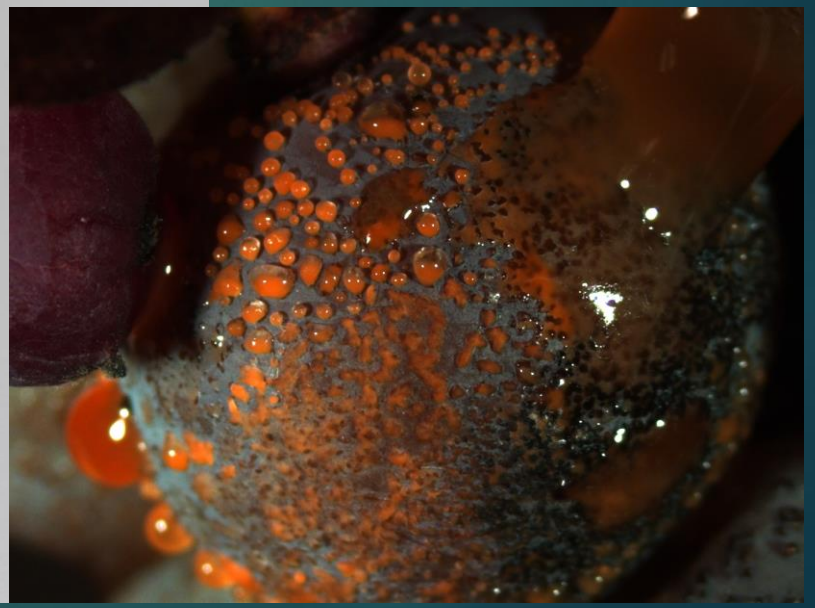
Ripe rot



Vinews
Viticulture Information News, Week of 18 March 2019
Columbia, MO

Bud Mortality

Over the past week I have evaluated a number of grape cultivars for bud mortality from Northcentral and Northwest Missouri. Anecdotal reports from Northeast Missouri suggested that bud mortality was evident. Therefore, in Northwest Missouri grape cultivars from Clay/Ray, Lafayette and Livingston counties were evaluated. In Northcentral Missouri, grape cultivars were evaluated from Macon county.

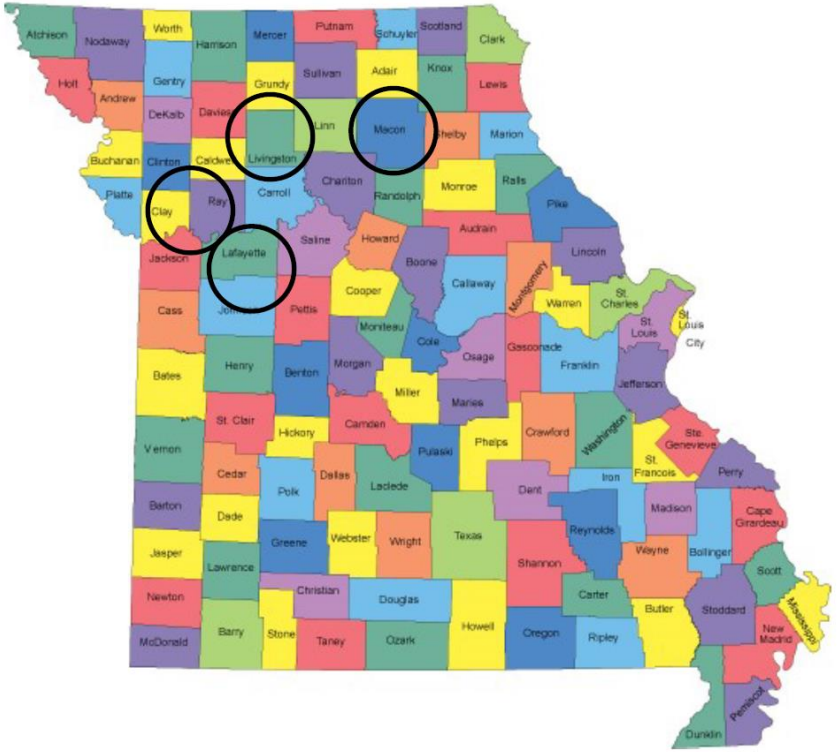


Table 1. Bud mortality of grape cultivars from northwest and northcentral Missouri during the week of 18 March 2019.

Nearest Town	County	Cultivar	Mortality
			%[1]
Macon	Macon	Norton	11
Macon	Macon	Vignoles	8
Macon	Macon	Chambourcin	75
Macon	Macon	Chambourcin	66
Macon	Macon	Chardonel	34
Macon	Macon	Verona	0
Wheeling	Livingston	Vignoles	23
Wheeling	Livingston	Elvira	3
Wheeling	Livingston	Wine King	22
Wellington	Lafayette	Norton	11
Wellington	Lafayette	Chambourcin	14
Wellington	Lafayette	Vignoles	15
Waverly	Lafayette	Norton	10
Waverly	Lafayette	Vignoles	12
Waverly	Lafayette	Chambourcin	15
Excelsior Springs	Clay/Ray	Crimson Cabernet	14
Excelsior Springs	Clay/Ray	Chambourcin	34
Excelsior Springs	Clay/Ray	Vignoles	9
			Average 21%

[1]% based on the examination of 100 buds from 20 randomly selected canes. Five count buds were examined per cane for primary bud mortality.

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Vinews
Viticulture Information News, Week of 17 June 2019
Columbia, MO

Rupestris Speckle

Rupestris speckle on Chambourcin near Hermann, MO June 19, 2019. Photo credit: submitted

Rupestris speckle is a physiological disorder that affects certain grape cultivars. Grape cultivars that are affected have *Vitis rupestris* in their heritage. Many of the hybrid grape cultivars have some *Vitis rupestris* in their genetic background. Grape cultivars affected by the disorder show different degrees of speckling (Figure 1, page 2). Valvin muscat typically displays moderate to severe speckling. Whereas, Chambourcin displays minor to moderate speckling. The physiological cause of the disorder is not known, but the disorder has been linked to stress that causes reduced or low vigor. The degree of the stress likely plays a role since Rupestris speckle does not appear every year and the degree of speckling often is different from year to year. The last time the disorder was reported by multiple growers in Missouri was in 2016.

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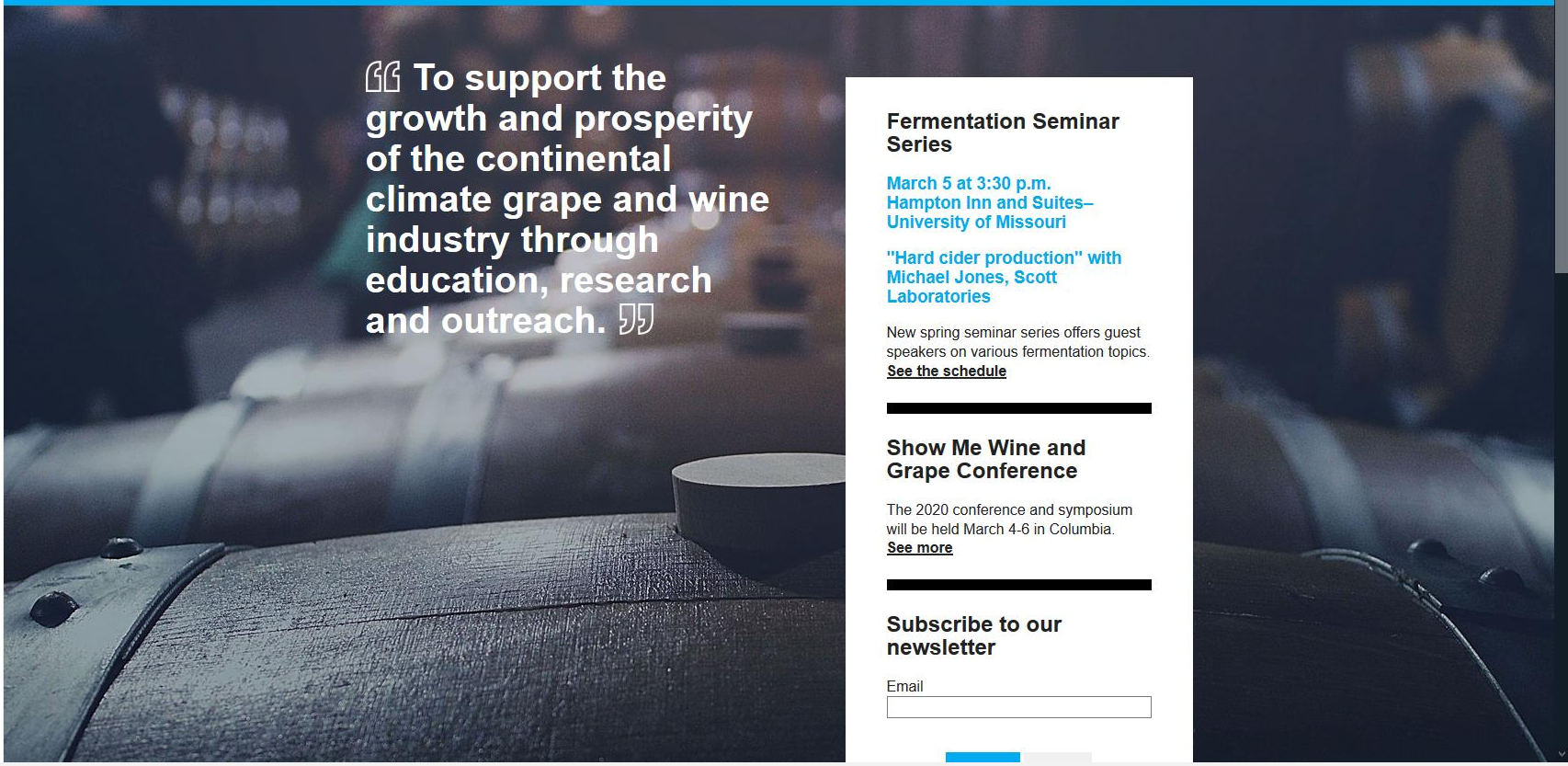

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