THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Ohio Grape Diseases-A Year in Review

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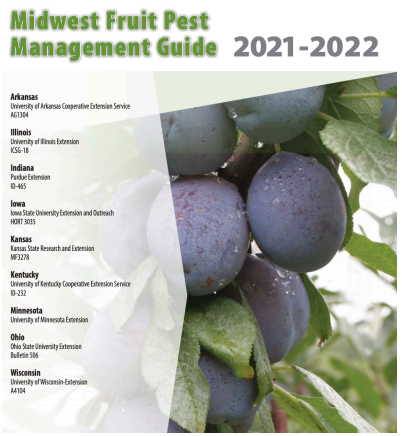
MARCH 2020

2020-A Year in Review

Diagnostics

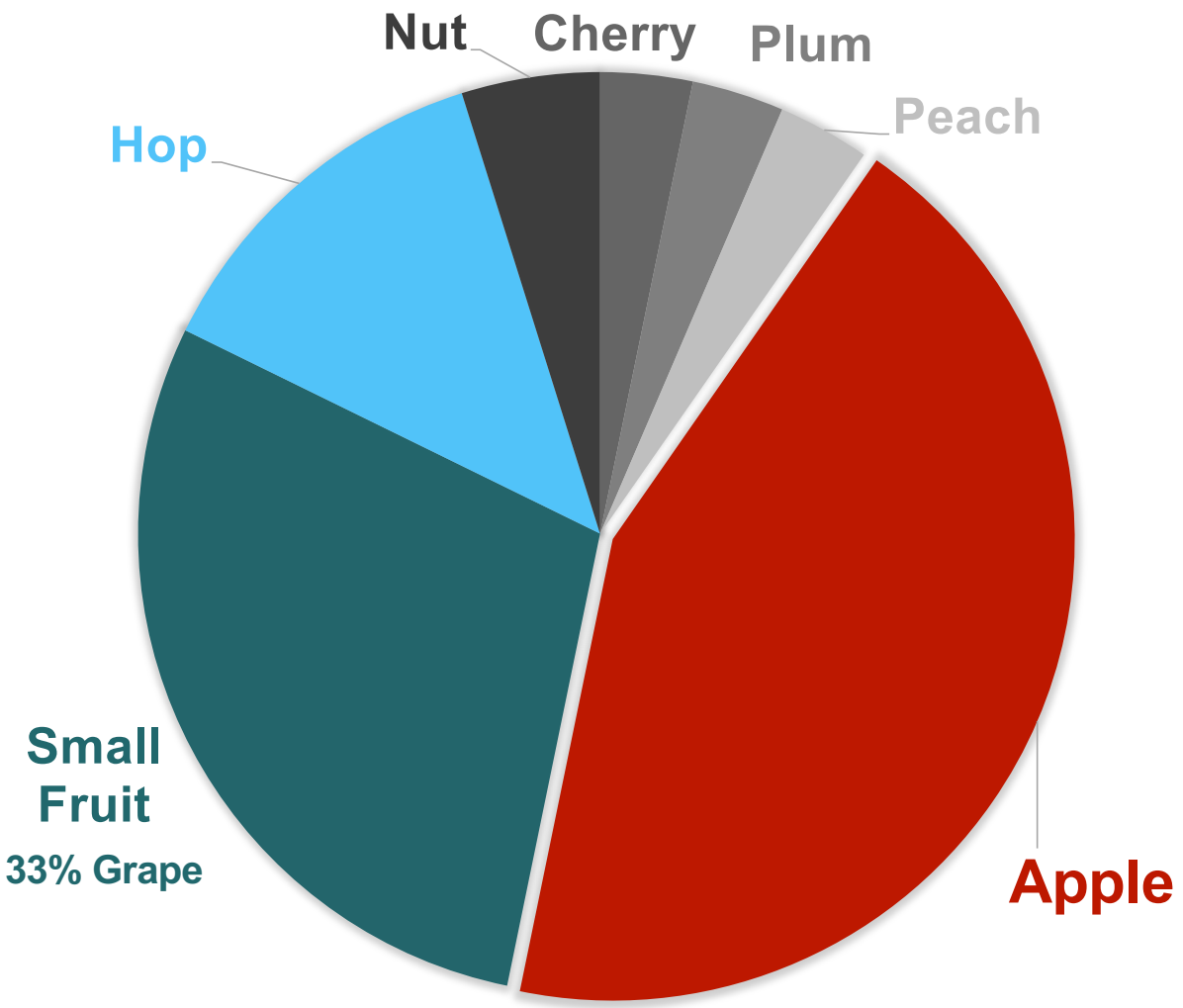
Research



Extension

2020 Diagnostic Samples

- 62 samples
- 29% small fruit
  - 33% grape



Captan mixed with oil-containing products

Photo credit: D. Ward

Photo credit: OMAFRA

Captan Injury

- Occurs on vinifera and hybrid cultivars
- When mixed with an oil-based product it makes the tissue penetrable to Captan

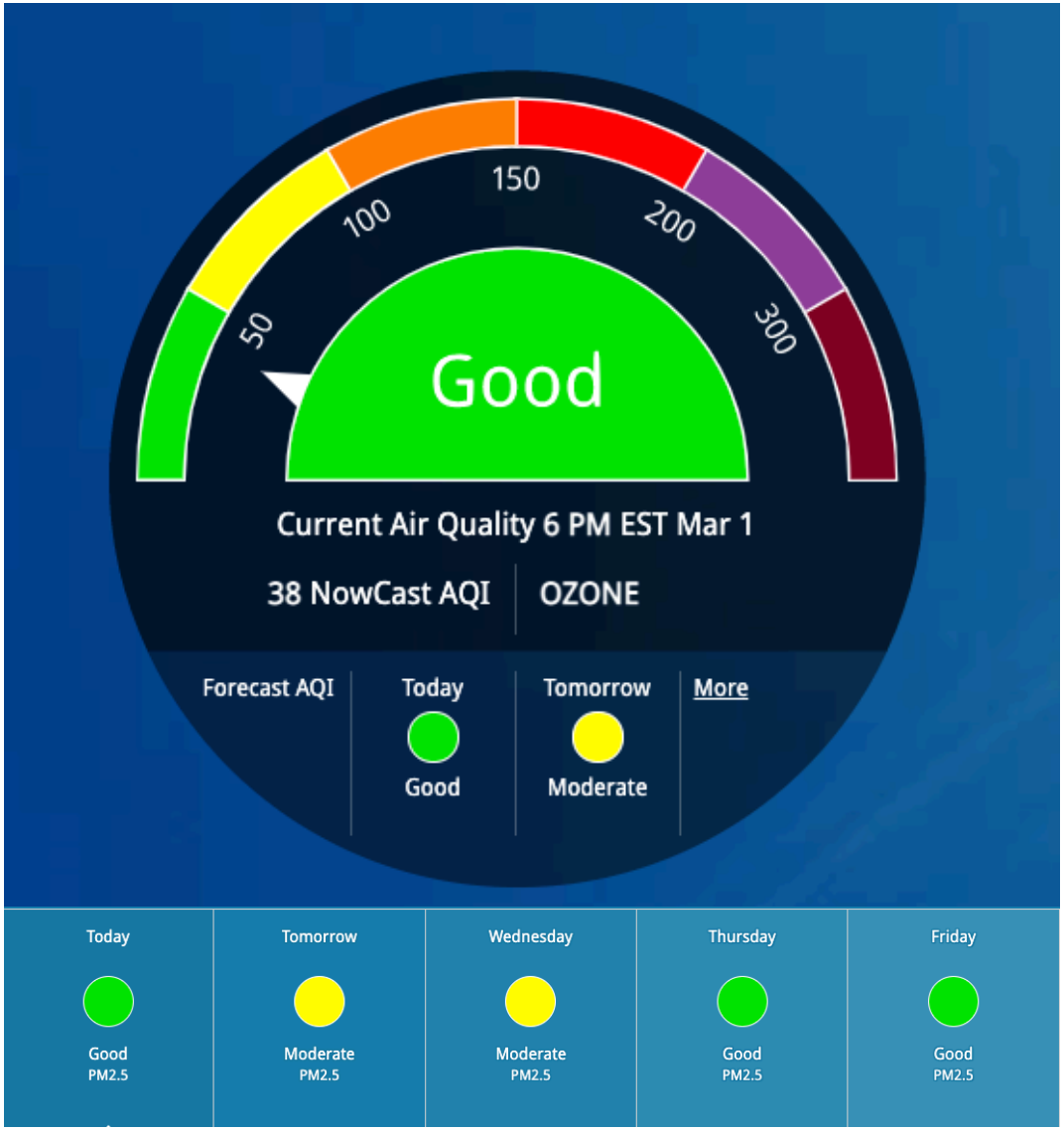
Photo credit: OMAFRA

Photo credit: OMAFRA

Ozone Injury

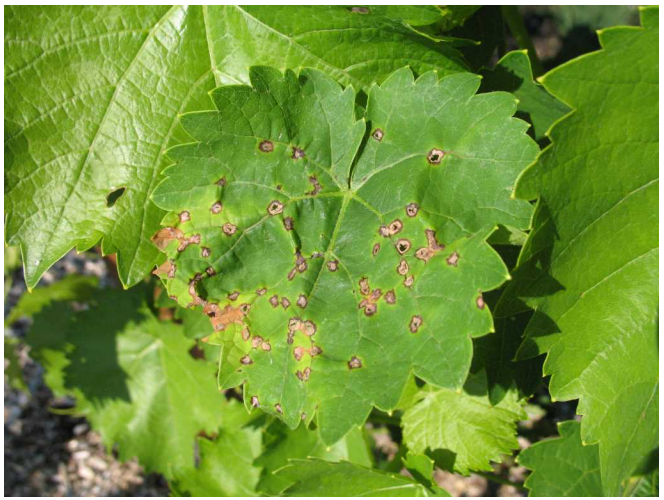
- Uniform speckling on the upper side of older leaves
- Often confused with leafhopper burn or potassium deficiency

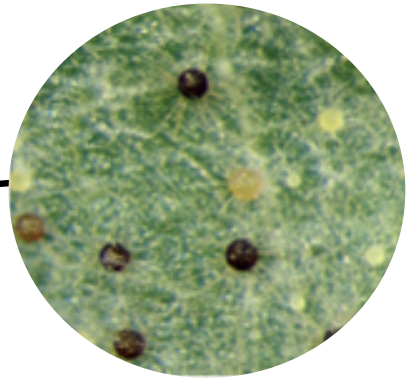
Airnow.gov


50
100
150
200
300
Good
Current Air Quality 6 PM EST Mar 1
38 NowCast AQI
OZONE
Forecast AQI
Today
Good
Tomorrow
Moderate
More
Today
Good
PM2.5
Tomorrow
Moderate
PM2.5
Wednesday
Moderate
PM2.5
Thursday
Good
PM2.5
Friday
Good
PM2.5

Anthracnose

- *Elsinoe ampelina*
- Cv. Vidal and Reliance are very susceptible
- Overwinters on shoot tissue
- Dormant spray very effective





Fruiting bodies drop and land on bark

Powdery Mildew

- Cause by the fungus *Erysiphe necator*
- Overwinters as tiny fruiting bodies (chasmothecia) in bark crevices

2020 Research Update

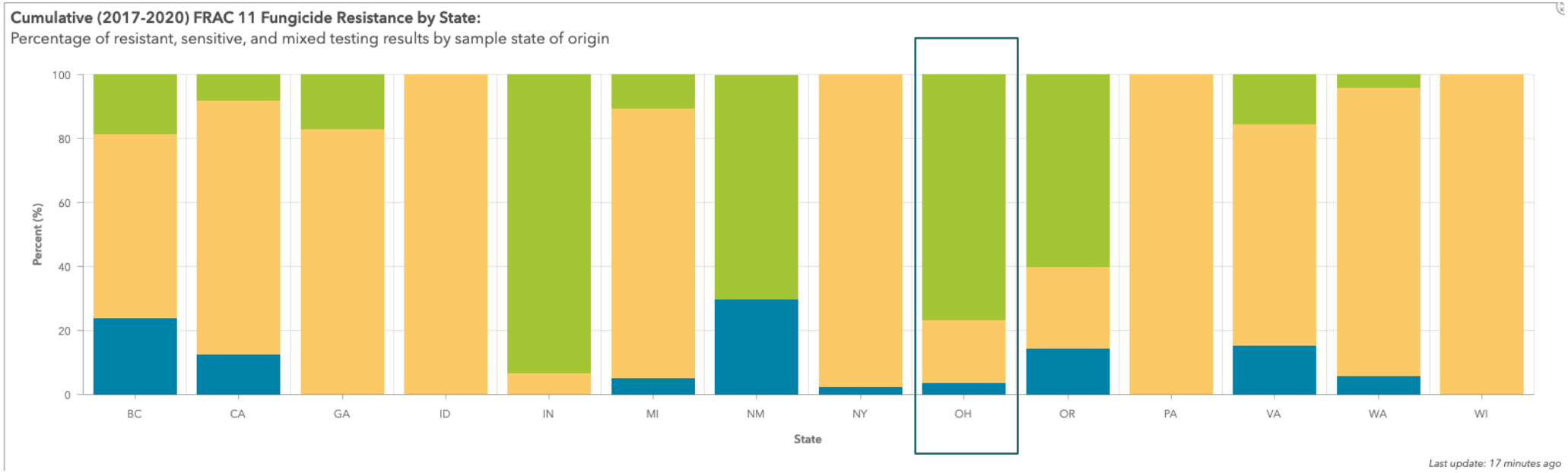
1. Tracking QoI resistance in the vineyard
   a. Sentinel plots for early detection
   b. State-wide testing (voluntary)
   c. Impact of low volume sprays on resistance development

2. Intelligent sprayer validation trial (final year)

Early Detection of Powdery Mildew in the Vineyard

- Utilize a glove and swab sampling protocol
- Detect powdery mildew spores BEFORE symptoms are observed
- Early detection of FRAC11 resistant populations

- PM spores detected on May 27
- PM spores detected 8/10 sampling times
- QoI resistance detected August 20 (last sampling time)



Resistant | Sensitive | Mixed

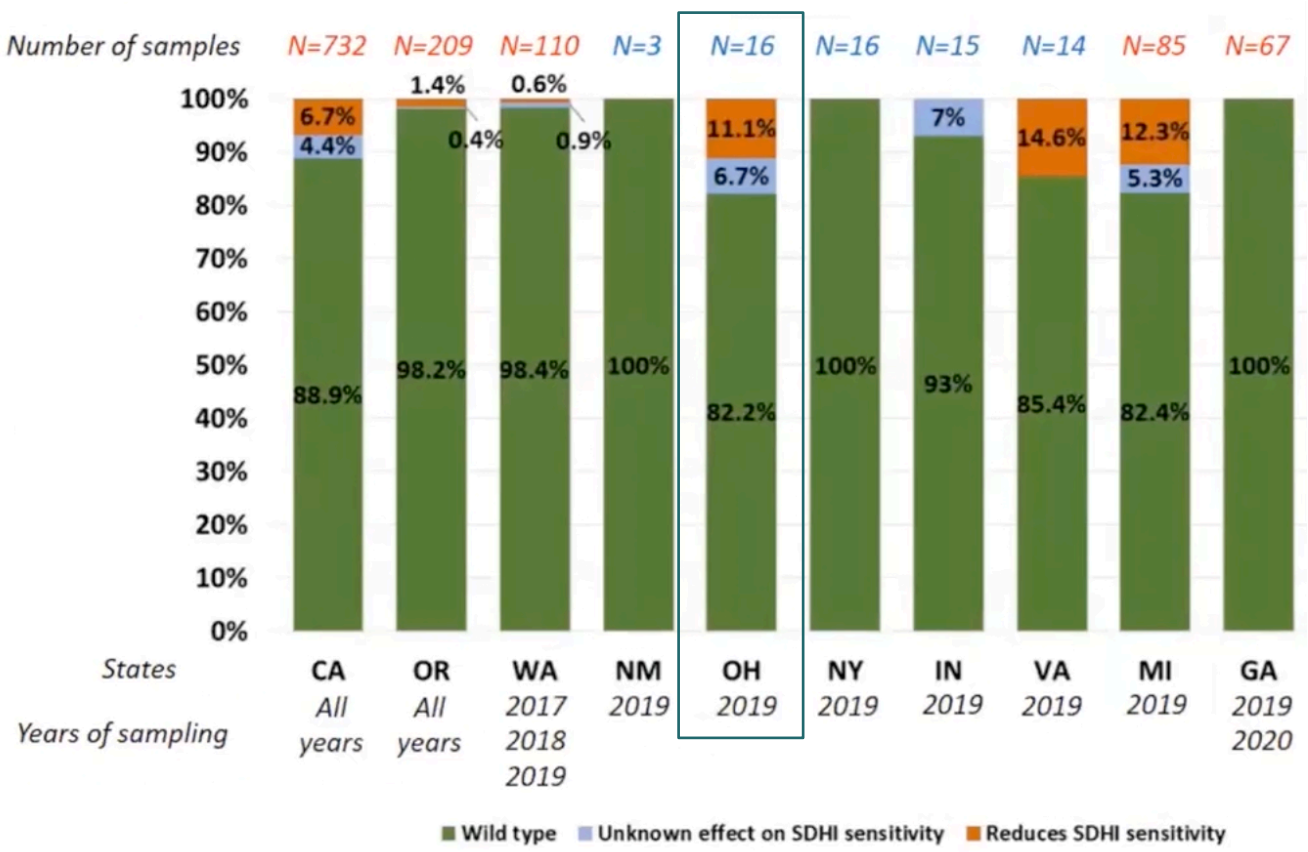
N_{OH}=158

QoI (FRAC 11) Fungicide Resistance by State

- Dashboard for tracking resistance

SDHI (FRAC 7) Fungicide Resistance by State

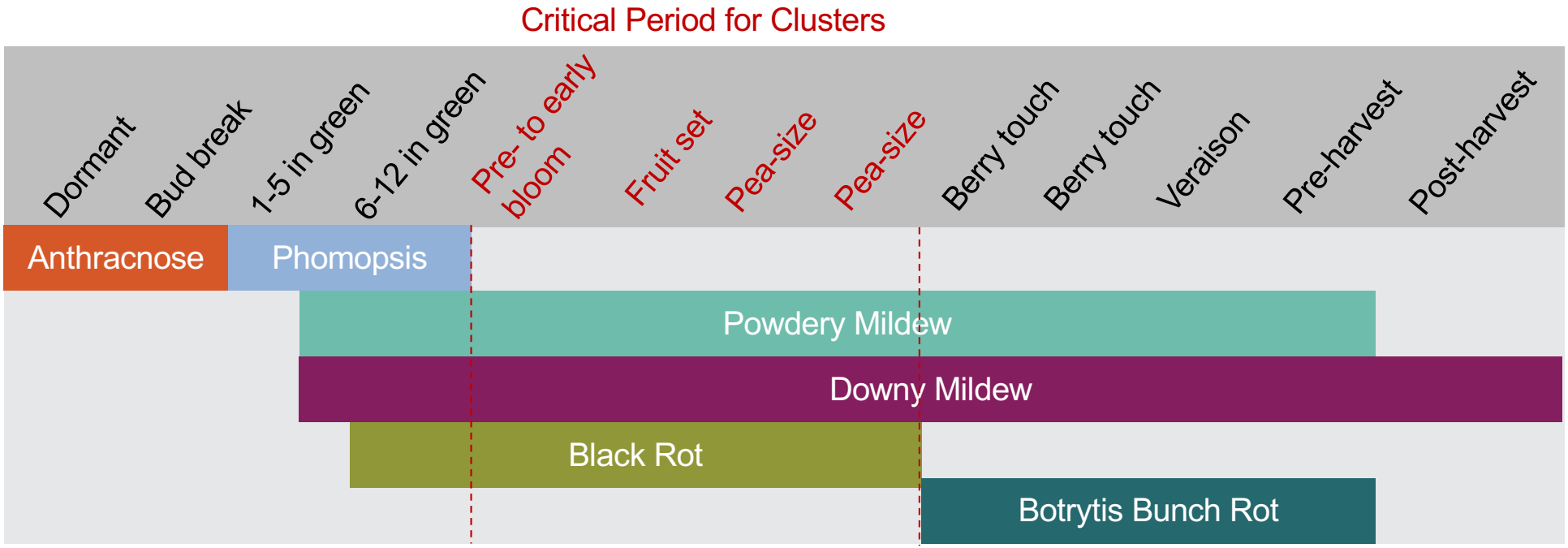
- 24 mutations in the SDH subunits
- 2 mutations decrease sensitivity to E. nector



Fungicide Spray Program Considerations

1. Target pathogens/disease
2. Environmental conditions
3. Known fungicide resistance
4. Fungicide characteristics
   - Efficacy
   - Pre-harvest interval
   - Cost

Disease Consideration for Spray Program Development



Fungicide Selection Based on Efficacy-Pre-Bloom Through Shatter

Product	FRAC Group	Downy Mildew	Powdery Mildew	Black Rot	Botrytis
Abound	11	E	E	E	s
Aliette	33	E	x	x	x
Aprovia	7	x	G-E	G-E	F
Captan 80WG	M3	G	i	F	F
Elevate	17	x	x	x	E
Endura	7	x	E	x	G
Inspire Super	3+9	x	G	E	E
Mancozeb	M	E	x	E	i
Quintec	13	x	E	x	x
Revus Top	3 + 40	E	E	E	x

Sources: 2021-2022 Midwest Fruit Pest Management Guide

E-Excellent; G-Good; F-fair; s-Suppression; i- ineffective; x-not on label

Fungicide Application Recommendations

- Mancozeb as the backbone of your program
- Use systemic fungicides to enhance protectant fungicides
- Follow the 2-spray rule for high-risk fungicides
  - Alternate after one application if resistance detected
- Timing
  - Critical period- 7 to 10-day intervals
  - Pre- and post-critical period- 10 to 14-day intervals

Modify timing based on rain forecast and/or leaf wetness

2020-2021 Extension Update

1. Conversion of FRAME resistance workshop to virtual workshop
   - Offered regionally
   - Cost recovery
2. Sour rot factsheet-NEW
3. Revisions to Midwest Fruit Pest Management Guide

DISEASE NAME PLPATH-FRU-XX

College of Food, Agricultural, and Environmental Sciences, Department of Plant Pathology

Sour Rot of Grape

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Elizabeth Y. Long, Assistant Professor, Department of Entomology, Purdue University, West Lafayette, IN; Adjunct Assistant Professor, Department of Plant Pathology, The Ohio State University, CFAES Wooster, Wooster, OH.

Sour rot of grape is a disorder causing the microbial breakdown of ripening berries rendering them unsuitable for wine production. Sour rot is caused by insect associated microbes that expedite berry decay following entry through a wound. Many disorders, including sour rot, result in disease-like symptoms and can cause yield losses or reduce crop quality.

Sour Rot Development and Symptoms

Sour rot occurs on fruit only and causes fruit discoloration followed by berry shrivel and decomposition. White grape varieties afflicted with sour rot appear tan to light brown in color (Figure 1), while red grape varieties appear brownish-red or brick-colored (Figure 1). Symptoms of sour rot can look like fungal bunch rot diseases, such as black rot (Figure 2) or Botrytis bunch rot (see Ohioline PLPATH-FRU-24 and PLPATH-FRU-03). However, a notable difference is that berries with sour rot have a strong vinegar-like smell and often attract high numbers of insects, including yellowjackets and flies.

Sour rot requires the presence of wounded fruit and the interaction of fruit flies, yeast, and bacteria for symptoms to develop. For example, when berries are injured by birds, hail, insects, or pruning, the subsequent open wounds attract fruit flies that transmit sour rot-associated microbes to the fruit. Two species of fruit flies are associated with sour rot development: the common fruit fly, *Drosophila melanogaster*, and the spotted-wing drosophila, *D. suzukii*. Common fruit flies can access fruits only after a wound has been inflicted but spotted-wing drosophila has a specialized egg-laying organ that can cut the berry skin and create a wound that contributes to sour rot development (see Ohioline ENT-86). These flies introduce specialized bacteria (*Acetobacter spp.* and *Gluconobacter spp.*) into the wounds that interact with wild yeasts (*Saccharomyces spp.*) to produce acetic acid. Acetic acid is responsible for the distinctive vinegar-like odor associated with sour rot. The production of acetic acid further attracts fruit flies and other insects, contributing to the spread of sour rot within and between clusters.

Figure 1. Left: Sour rot symptoms on white Traminette grape berries. Right: Brick-colored berries are symptomatic of sour rot disorder on red berries such as 'Pinot Noir' grapes. Right photo B courtesy of Y. Woodworth, OSU- OSU-Ashtabula Agricultural Research Station.

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PURDUE UNIVERSITY

ohioline.osu.edu/factsheet/plpath-fru-XX

Midwest Fruit Pest Management Guide

Grape Insect Pests

Prepared by E. Long, K. Athey, C. Welty, R. Bessin, C. Guedot, D. Lewis

The shaded/colored boxes represent the crop stages where common pests in the Midwest are active. Scouting and/or preventative sprays may be necessary or recommended.

View this table in color at the website, qrco.de/Grapebugs

Grape Growth Stage								
Delayed Dormant through Bud Swell	Bud Break	4- to 10-inch Shoots	Pre-bloom through Bloom	Bloom	Shatter	Shatter to Veraison	Veraison to Harvest	Post-harvest
Grape flea beetle								
	Grape phylloxera							
		Rose chafer			Rose chafer			
					Grape berry moth			
					Japanese beetle			
							Drosophila flies	
							Multicolored Asian lady beetle	
							Green June beetle	
							Grape root borer	
Climbing cutworm								
Grape mealybug					Grape mealybug			
Grape scale			Grape scale					
							Stink bug	
					Spotted lantern fly			

Major	Present in most vineyards in most years and usually causing economic damage if not managed.
Minor	Often present but usually not causing economic damage and not requiring management.
Impending	Pest is not known to occur in Midwestern states but is likely to appear in the future.

Representation of crop stage where insect pest is commonly active

Midwest Fruit Pest Management Guide

Grape Bud Break to Pre-bloom – Diseases

Notes on disease management

- Begin fungicide applications at 1-3 inch new shoot growth; repeat at 7-10 day intervals or according to label instructions and environmental conditions.
- **Powdery mildew:** Primary infections of powdery mildew can occur during this period. Adding a FRAC 3 fungicides (Cevya, Mettle, Procure, Rally, Tebuzol) in the third or fourth spray during this time period improves control of powdery mildew and black rot.

Phytotoxicity Alert

- Inspire Super, Quadris Top, and Revus Top all contain the active ingredient difenoconazole. All fungicides with difenoconazole labeled for grapes have the following precaution: "On *V. labrusca, V. labrusca* hybrids, and other non-vinifera hybrids where sensitivity is not known, the use of Inspire Super, Quadris Top, or Revus Top by itself or in tank mixes with materials that may increase uptake (adjuvants, foliar fertilizers) may result in leaf burning or other phytotoxic effects."

Notes are now specific to phenological stages and followed by fungicide tables

Foundation Fungicide Program for Early Season Control of Grape Diseases[1]

Product and formulation Active ingredient	FRAC[2]	Black rot	Downy mildew	Phomopsis	Powdery mildew	REI[4] PHI[3]	Max amt[5] Max app[6]
Captan 80 WDG	M3	1.2-2.5 lb.	1.2-2.5 lb.	1.2-2.5 lb.	1.2-2.5 lb.	48h	12 lb.
captan		F	G	E	i	0d	NA
Microthiol Disperss	M	x	x	3-10 lb.	3-10 lb.	12h	NA
sulfur		x	x	F	E	0d	NA
Ridomil Gold Copper	4+M	x	2 lb.	x	x	48h	8 lb.
mefanoxam + Copper Hydroxide		x	E	x	x	42d	4
Ridomil Gold MZ	4 + M	x	2.5 lb.	x	x	48h	10 lb.

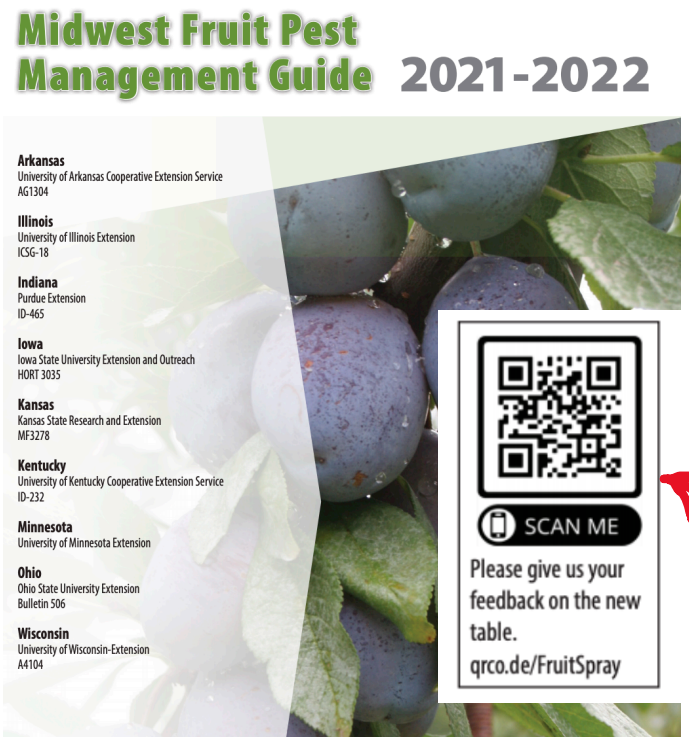
Fungicide tables now include efficacy data

Foundation Fungicide Program for Early Season Control of Grape Diseases[1]

Product and formulation Active ingredient	FRAC[2]	Black rot	Downy mildew	Phomopsis	Powdery mildew	REI[4] PHI[3]	Max amt[5] Max app[6]
Captan 80 WDG	M3	1.2-2.5 lb.	1.2-2.5 lb.	1.2-2.5 lb.	1.2-2.5 lb.	48h	12 lb.
captan		F	G	E	i	0d	NA
Microthiol Disperss	M	x	x	3-10 lb.	3-10 lb.	12h	NA
sulfur		x	x	F	E	0d	NA
Ridomil Gold Copper	4+M	x	2 lb.	x	x	48h	8 lb.
mefanoxam + Copper Hydroxide		x	E	x	x	42d	4
Ridomil Gold MZ	4 + M	x	2.5 lb.	x	x	48h	10 lb.
mefenoxam + mancozeb		x	E	x	x	66d	4
Roper DF Rainshield	M	1.5-4 lb.	1.5-4 lb.	1.5-4 lb.	x	24h	24 lb.
mancozeb		E	E	E	x	66d	6

E = excellent control **G** = good control **F** = fair control **[r]** = fungicide/insecticide resistance possible **s** = suppression only **i** = ineffective **u** = unknown efficacy
x = pest not on the label

Midwest Fruit Pest Management Guide



- PDF available for free on-line
- Hardcopy available for $15 plus shipping at Purdue
- Hardcopy available for $15 through OSU Fruit Pathology Program

Survey to get feedback on new layout

Supporting  Fruit Production

OHIO FRUIT NEWS

Research and Recommendations from Experts at The Ohio State University

u.osu.edu/fruitpathology/fruit-news-2/

- Focus is fruit, nut and hop IPM (diseases, insect pests, weeds)
- Published every other month
- Supported by Ohio Vegetable and Small Fruit Research and Development Program and The Ohio State University Department of Plant Pathology

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