

New and old topics on controlling diseases in the vineyard

**Gerry Adams, UNL Plant Pathology
Associate Professor of Practice**

**Associate Professor Emeritus,
Michigan State University**



Who is Gerry?

The name Measles comes from the symptoms
on fruit



Esca or Black Measles causes decline In young vines



Early season



Mid season

Measles caused by fungus, *Phaeoacremonium*



Fungus isolated from stained vessels
diagnosis

Eutypa Dead Arm and Dieback



I'm interested in causes of decline in vines



I'm interested in **Prediction system for Black Rot**

**Temperature °F and minimum leaf wetness duration (hr)
for light infection**

Temperature

Leaf wetness duration

**Other predictive
systems for
Nebraska?**

50

24

55

12

60

9

65

8

Powdery mildew

70

7

Botrytis bunch rot

75

7

?

80

6

85

9

90

12

Powdery Mildew

Sources:

Infected spur buds (perennation), fruiting bodies on bark & leaf litter

Other susceptible species are Wild grapes, Monk's hood vine (*Ampelopsis aconitifolia*), Virginia creeper (*Parthenocissus quinquefolia*) and Boston ivy (*P. tricuspidata*).

Predictive models: Originally for determining when to apply sulfur dust applications

Now modified for triazole systemic fungicide applications



PM
model

**Temperature of leaf*
(°F)**

**Days for spores to develop, infect
vine, and produce new spores**

43

32

48

25

54

18

59

11

63

7

73

6

79

5

86

6

91 (for at least 3 days)

0 (but 10% can recover in 5 days)

105 (for at least 6 hrs)

0 (kills the fungus)

Powdery Mildew

The flowers and berries are highly susceptible to infection from flower formation through fruit set and until the berries reach 8° Brix. Also, newly formed and expanding leaves

Infection spring: [wetness] at least **12-15 hours of continuous leaf wetness** are required when average temperatures are between **50-60°F** [source-fruiting bodies][perennating in bud?]

Infection summer: [humidity $\geq 85\%$] Requires 3 consecutive days with at least 6 hrs between **70-86°F** to trigger spore formation [source-sporulation on new leaves]. Then, less than 6 hrs reduces risk, >6hrs continues risk with new spores formed every 5 days.

PM

Spring
Sexual
spore

Daily Average Temperature (F)

Hours of Leaf Wetness required for heavy ascospore infection

42

40

43

34

44

30

45

27

46

25

47

23

48-49

20

50

19

51

18

52

17

53

17

54-55

16

56-57

15

58-59

14

60-62

13

63-75

12

76

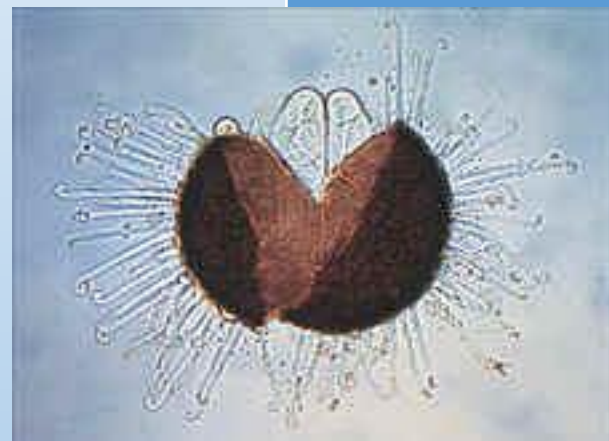
13

77

14

78

17



PM

Asexual
spore



Powdery Mildew Risk Index	Spray Material	Spray Interval
0 to 30	sulfur dust	14 days**
	micronized sulfur	18 days**
	DMI fungicides*	21 days**
40 to 50	sulfur dust	10 days
	micronized sulfur	14 days
	DMI fungicides*	17 days
60 to 100	sulfur dust	7 days
	micronized sulfur	10 days
	DMI fungicides*	14 days

* DMI fungicides: Bayleton, Rally, Vintage.

** Or label maximum.

Susceptible

Bacchus
Cabernet Franc
Cabernet Sauvignon
Chancellor
Chardonnay
Chasselas
Gamay
Gewurztraminer
Grenache
Himrod
Madeleine Angevine
Madeleine Sylvaner
Malbec
Muller Thurgau
Pearl of Csaba
Petit Verdot
Rkatzeteli
Riesling
Sauvignon blanc
Schonburger
Siegerebe
Syrah
Viognier

Intermediate

Chelois
Chenin Blanc
Concord
Foch
Pinot blanc
Malbec
Merlot
Ortega
Pinot Noir
Perlett
Sheridan
Vidal Blanc
Weissburgunder

Least Susceptible

Auxerrois
Malvoisie
Melon
Pinot Gris
Semillon

Level of resistance of grape cultivars to powdery mildew

Fungicides

For Powdery Mildew

Effectiveness

★ Also controls
Botrytis bunch rot
at maximum
labeled rate

Trade Names	Active Ingredients	Class	FRAC Group1	Mildew Efficacy	Resistance Risk
Abound	azoxystrobin	QoI	11	Good	High
<u>Adament</u> ★	<u>Tebuconazole + trifloxystrobin</u>	DMI QoI	3 11	Excellent	Medium High
<u>Armicarb</u>	potassium bicarbonate	Carbonate	NC	Fair	Low
<u>Flint</u> ★	trifloxystrobin	QoI	11	Excellent	High
<u>Inspire Super</u> ★	<u>Difenconazole + cyprodinil</u>	DMI AP	3 9	Excellent	Medium Medium
<u>JMS Stylet Oil</u> ★	narrow-ranged oil	PDSO	NC	Good	Low
<u>Kaligreen</u>	potassium bicarbonate	Carbonate	NC	Fair	Low
<u>Pristine</u> ★	<u>Pyraclostrobin + boscalid</u>	QoI Carboxamide	11 7	Excellent	High Medium
<u>Rally Nova</u>	myclobutanil	DMI	3	Good	Medium
<u>Serenade Max</u>	<u>Bacillus subtilis</u>	Biological	44	Fair	Low
<u>Sonata</u>	<u>Bacillus pumilis</u>	Biological	44	Fair	Low
<u>Quintec</u>	quinoxifen	Quinoline	13	Excellent	Medium
<u>Rubigan Vintage</u>	fenarimol	DMI	3	Good	Medium
<u>Sovran</u>	<u>kresoxim-methyl</u>	QoI	11	Good	High
<u>Sulfur</u>	Sulfur	Sulfur	M2	Good	Low
<u>Unicorn</u>	<u>Tebuconazole + sulfur</u>	DMI Sulfur	3 M2	Good	Medium Low
<u>Vivando</u>	<u>Metrafenone</u>	<u>benzophenone</u>	U8	Excellent	Medium

Powdery Mildew *infections can encourage* Brunch rot

PM > BunchRot > wild yeast & bacti > wine quality

Presence of PM diffuse colonies on berries-

- (i) increased spoilage microorganisms;
- (ii) increased volatile ethyl acetate, acetic acid & ethanol;
- (iii) increased volatiles increased infestation by insects;
- (iv) increased rotting by *Botrytis*; and
- (v) increased frequency of defects in wines

UNL—We can do this type of research –

-from disease to wild yeasts to wine with defects


Horticulture + Plant pathology + Food Science



UC Statewide IPM Project
© Regents, University of California

PIERCE'S DISEASE



 UNIVERSITY OF CALIFORNIA
Agriculture &
Natural Resources
FARMERS FIRST



UGA4822048

Bacterial Leaf Scorch Symptoms

*Xylella =
Pierce's
Disease*

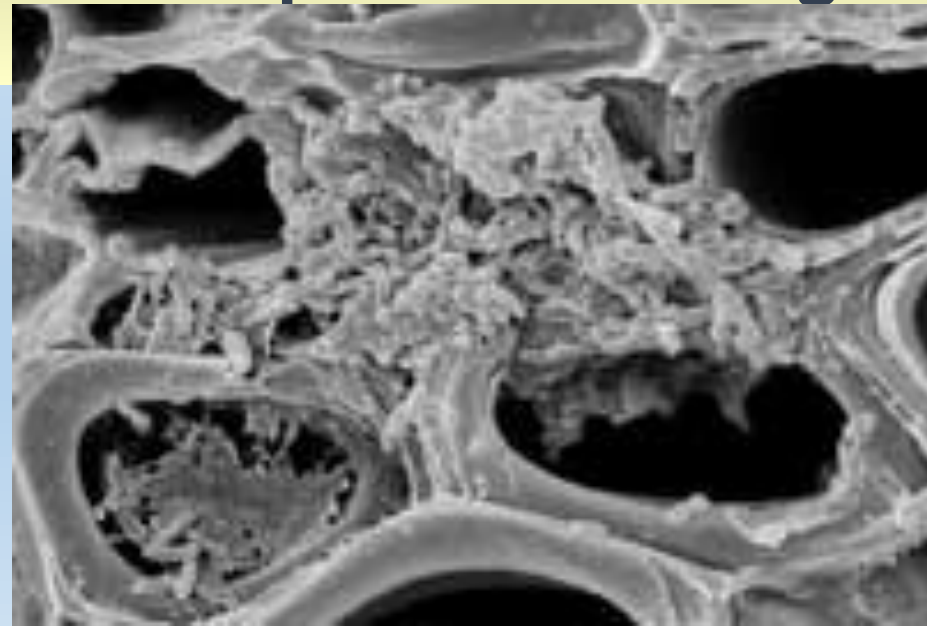


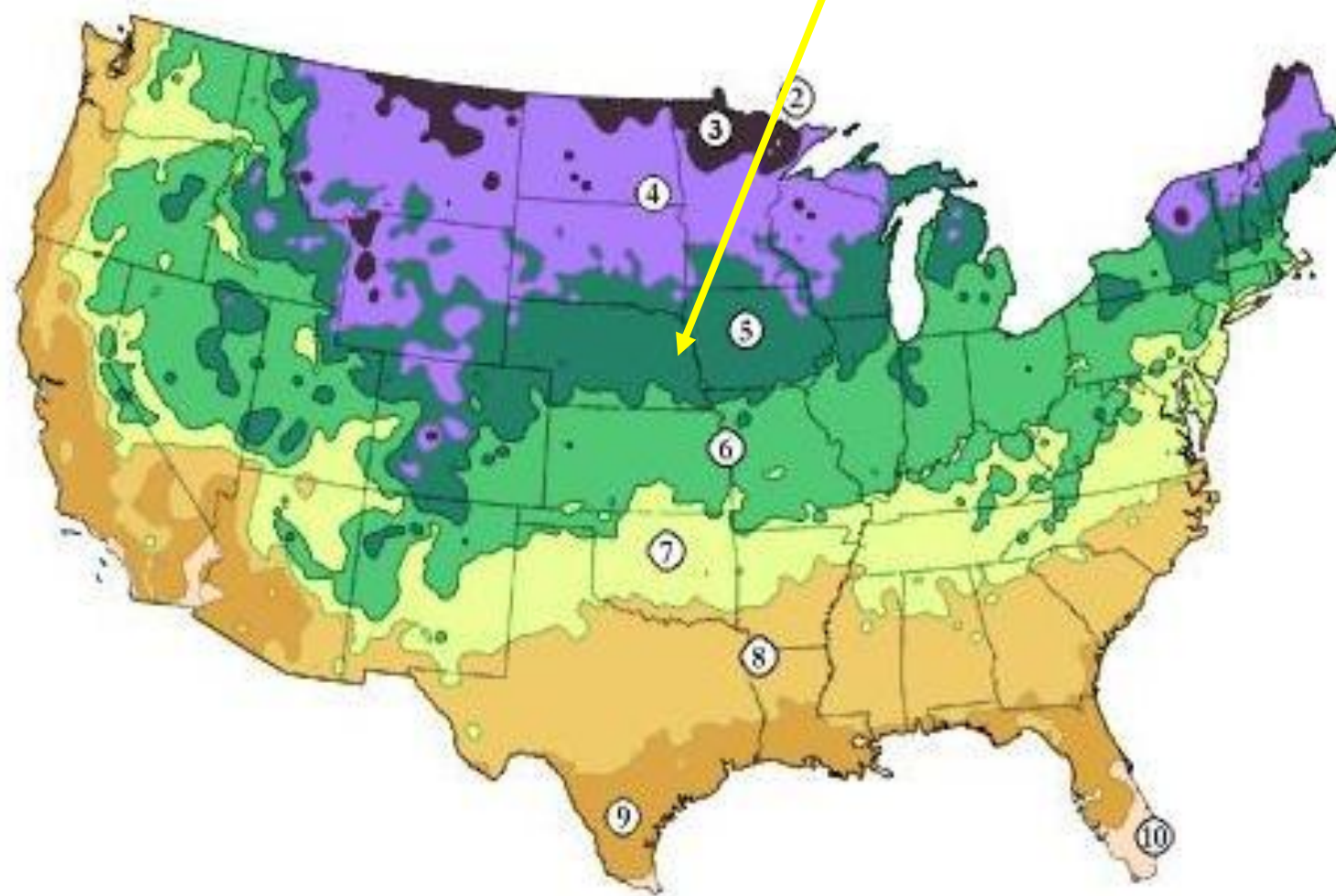
Incidence and Distribution of Bacterial Leaf Scorch of Hardwoods in the North Central and Plains States

States Covered: North Central States IA, IL, IN, MI, MN, MO, WI

Plains States ND, SD, NE, KS

Pathogen: *Xylella fastidiosa* a xylem limited bacterium that has fastidious nutritional requirements for growth





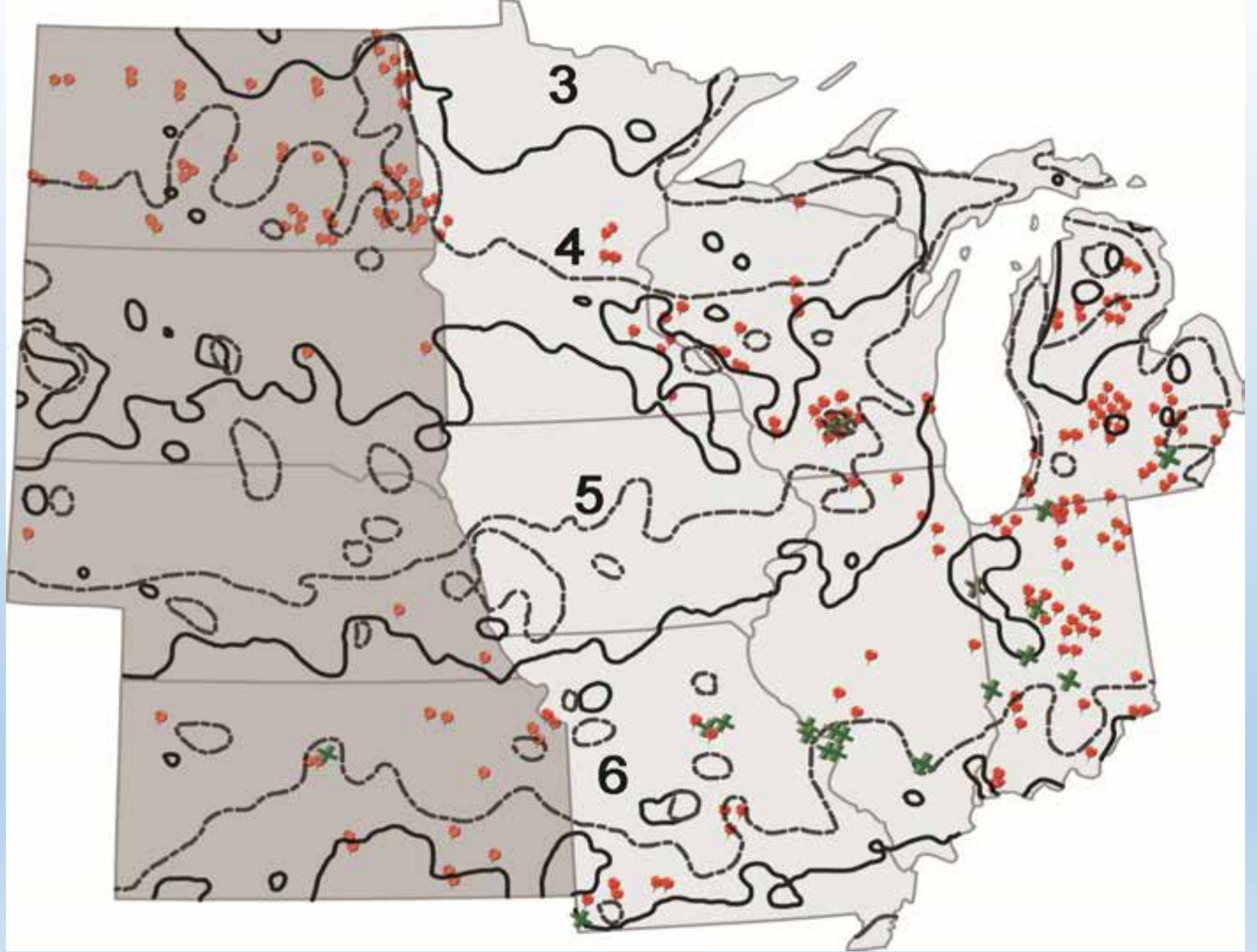
Range of average annual minimum temperatures for each zone

Zone 1	below -50° F
Zone 2	-50° to -40°
Zone 3	-40° to -30°
Zone 4	-30° to -20°
Zone 5	-20° to -10°
Zone 6	-10° to 0°
Zone 7	0° to 10°
Zone 8	10° to 20°
Zone 9	20° to 30°
Zone 10	30° to 40°
Zone 11	above 40°

**Warming climate has shifted zones up since
1990s Map,
NE formerly zones 4/5, NE now only zone 5.**

**If warming brought Nebraska into
zone 6,
then *Xylella* [Pierce's Disease of
Grape] could become a problem**

Xylella
Distribution
Zone 6



Hosts represented in the assayed leaf samples showing scorch

Acer ginnala (Amur maple) 2, *Acer negundo* (Box elder) 2, *Acer platanoides* (Norway maple) 3, *Acer rubrum* (Red maple) 1, *Acer saccharinum* (Silver maple) 1, *Acer saccharum* (Sugar maple) 1, *Acer tataricum* (Tatarian maple) 1, ***Acer sp.*** 7, *Aesculus glabra* (Ohio Buckeye) 3, *Aesculus hippocastanum* (Buckeye Horsechestnut) 4, *Cercis occidentalis* (Western redbud) 1, ***Fraxinus americana* (White ash)** 1, *Fraxinus pennsylvanica* (Green ash) 9, *Juglans nigra* (Black walnut) 1, *Malus spp.* (Flowering crabapple) 1, ***Morus rubra* (Mulberry)** 3, *Parthenocissus quinquefolia* (Virginia creeper) 1, *Populus tremula* 'Erecta' (Columnar poplar) 2, *Populus tremuloides* (Quaking aspen) 2, *Prunus virginiana* (Chokecherry) 1, *Pyrus ussuriensis* (Prairie gem) 3, *Quercus alba* (White oak) 1, *Quercus acutissima* (Sawtooth oak) 1, ***Quercus bicolor* (Swamp oak)** 2, ***Quercus imbricaria* (Shingle oak)** 1, ***Quercus macrocarpa* (Bur oak)** 14, ***Quercus palustris* (Pin oak)** 13, hybrid *Quercus rober* 'Fastigiata' x *Q. bicolor* ('Regal Prince') 1, ***Quercus rubra* (Red oak)** 30, *Quercus velutina* (Black oak) 3, *Quercus sp.* 13, *Syringa villosa* (Late or Villous lilac) 1, *Syringa vulgaris* (Common lilac) 1, *Tilia americana* (American linden) 10, *Ulmus americana* (American elm) 5, *Ulmus davidiana* var. *japonica* (Japanese elm) 1, *Vitis sp.* 1 [145/170]

***Xylella* Positive hosts are in Bold fonts**

States with positive samples of BLS = IL, IN, KS, MI, MO, WI

Why the concern? -- New Vectors? Climate warming?



Vectors: Sharpshooters, leafhoppers, Psyllids, plant hoppers

Pierce's Disease of Grapes:
Glassy-winged sharpshooter: a new vector in California has spread *Xylella* throughout the grape vineyards

Reminders: *Phytotoxicity*

1. Do not mix Oils with Sulfurs, Captan

Following oil application wait 14 days before applying sulfur or Captan

2. Sulfur applications should end 30 days before harvest because they interfere with fermentation

3. You can use Sulfurs pre-bloom on sulfur-sensitive varieties

Sanitation pruning



Sanitation—the removal and destruction of all overwintering mummies and diseased canes



Pruning to improve ventilation and sunlight penetration into the grapevines may decrease leaf moisture and reduce disease.

Preventing Bunch rot



Before



After



Leaf removal strategies for Pinot Noir



Mechanical leaf removal of Pinot Noir at Buena Vista Carneros with a Precision Leaver built by Grape Harvester Sales (Fresno, CA) traveling at 2 to 2.5 miles/hour.

The period from **immediate prebloom through 3 to 4 weeks after bloom** is the most critical for protecting the fruit from infection by Phomopsis, black rot, powdery mildew and downy mildew.

Fungicides for Organic Growers

1. Liquid lime sulfur
2. Bordeaux Mixture
3. Sulfur
4. Copper (fixed)
5. Phosphoric acids (i.e., Aliette)
6. AQ-10 a fungus parasitic on Powdery mildews
7. Sylet oil
8. Dormant oil

Controlling Downy Mildew

If grower cannot use Mancozeb or Captan for Downy mildew, then a metalaxyl, phosphoric acid, copper, or strobilurin can be used

Average Spray Schedule? - How does Nebraska differ from New York?

Growth Stage	Mancozeb	Captan	Rubigan	Nova	Abound	Sulfur	Rovral/ Vangard	Ridomil
1-inch	3 lb							
3-5 inch	3 lb		3 oz					
10-inch	3 lb		4 oz					
1st Prebloom				5 oz				As required*
Immediate Prebloom	3 lb				11 oz	6 lb	As required*	
1st Post bloom	3 lb				11 oz	6 lb		
2nd Post bloom		2.5 lb		5 oz		6 lb		As required*
Bunch-close							As required*	
Cover Sprays		2.5 lb				6 lb		As required*
5° Brix							As required*	
14 days later							As required*	

* Dependent on weather conditions, availability of overwintering inoculum, and severity of disease pressure during the growing season. Insecticides and Miticides are used infrequently on an as needed basis. The most frequently used insecticide was Sevin. When included in the spray program, Sevin was applied in the 1st post-bloom spray. On the 224 acres of vinifera included in this survey, insecticides were used an average of less than one application per year.

Effectiveness of Fungicides for the Control of Grape Diseases

Fungicide	Phomopsis cane and leaf spot	Black rot	Downy mildew	Powdery mildew	Botrytis rot	Bitter rot
Abound	+	+++	++	+++	++	?
Bayleton	0	+++	0	+++	0	0
Captan	+++	+	+++	0	+	++
Elevate	0	0	0	0	+++	0
Elite	0	+++	0	+++	0	0
Endura	0	0	0	+++	++	0
Ferbam	+	+++	+	0	0	++
Fixed copper	+	+	+++	++	+	+
Flint	+	+++	+ (FRP)	+++	++	0
JMS Stylet Oil	0	0	0	+++	0	0
Mancozeb	+++	+++	+++	0	0	++
Nova	0	+++	0	+++	0	0
Potassium salts	0	0	0	++	0	0
Phosphorous acid	0	0	+++	0	0	0
Presidio	0	0	+++	0	0	0
Pristine	++	+++	++	+++	++	?

Effectiveness of Fungicides for the Control of Grape Diseases

Fungicide	Phomopsis cane and leaf spot	Black rot	Downy mildew	Powdery mildew	Botrytis rot	Bitter rot
Procure	0	++	0	+++	0	0
Quintec	0	0	0	+++	0	0
Revus	0	0	0	+++	0	0
Ridomil Gold MZ	+	++	+++	0	0	++
Ridomil Gold	+	+	+++	++	+	+
Rovral	0	0	0	0	+++	0
Rubigan	0	++	0	+++	0	0
Scala	0	0	0	0	+++	0
Sovran	+	+++	++ (FRP)	+++	++	0
Sulfur	+	0	0	+++	0	0
Topsin M ¹	++	+	0	+++	++	++
Vangard	0	0	0	0	+++	0
Ziram	++	+++	++	0	0	0

Key to ratings: +++=highly effective; ++=moderately effective; +=slightly effective; 0=not effective; ?=effectiveness unknown or not established;

Resistance-prone Fungicides and Risk of Resistance by Chemical Class

Fungicide class		Common (chemical) name(s)	Trade name(s)
Benzimidazole (Group 1)	High	Thiophanate-methyl	Topsin-M
Phenylamide (Group 4)	High	Mefenoxam	Ridomil Gold
		Mefenoxam (+ copper)	Ridomil Gold/Copper
		Mefenoxam (+ mancozeb)	Ridomil Gold MZ
Strobilurin (Qol) (Group 11)	High	Azoxystrobin	Abound,
		Kresoxim-methyl	Sovran
		Pyraclostrobin (+ boscalid)	Pristine
		Trifloxystrobin	Flint
Dicarboximide (Group 2)	Medium to High	Iprodione	Rovral
Sterol Inhibitors (Group 3)	Medium	Fenarimol	Rubigan Vintage
		Myclobutanil	Nova Rally
		Tebuconazole	Elite
		Triflumizole	Procure
Carboximide (anilide) (Group 7)	Medium	Boscalid	Endura
		Boscalid (+ pyraclostrobin)	Pristine
Anilinopyrimidine (Group 9)	Medium	Cyprodinil	Vangard
		Pyrimethanil	Scala
Quinolines (Group 13)	Medium	Quinoxifen	Quintec
Hydroxylanilid (Group 17)	Medium	Fenhexamid	Elevate
		Fenhexamid + captan	CaptEvate
(Group 40)	Medium	Mandipropamid	Revus
(Group 43)	Medium	Fluopicolide	Presidio

Revus Top contains mandipropamid and difenoconazole. Mandipropamid is a new chemistry (Group 40) effective only against downy mildew.

Disease	Rate	Critical Comments
Downy Mildew (<i>Plasmopara viticola</i>)	Dilute spraying 40 mL per 100 L of water Concentrate spraying Refer to the Application section	This use is subject to a CropLife anti-resistance strategy. DO NOT apply more than 3 sprays of REVUS per season. DO NOT apply more than 2 sequential sprays of REVUS alone before applying at least the same number of sprays from a different resistance group. DO NOT make REVUS alone the last spray of the season. Apply by dilute or concentrate spraying equipment. Apply the same amount of product to the target whether applying this product by dilute or concentrate spraying methods. Apply at 10-14 day intervals as part of a Downy Mildew control program before the first sign of infection. Use the shorter interval during periods of rapid growth or when conditions are more conducive to disease development. DO NOT apply later than <u>end of flowering</u> . PHI = 14 days

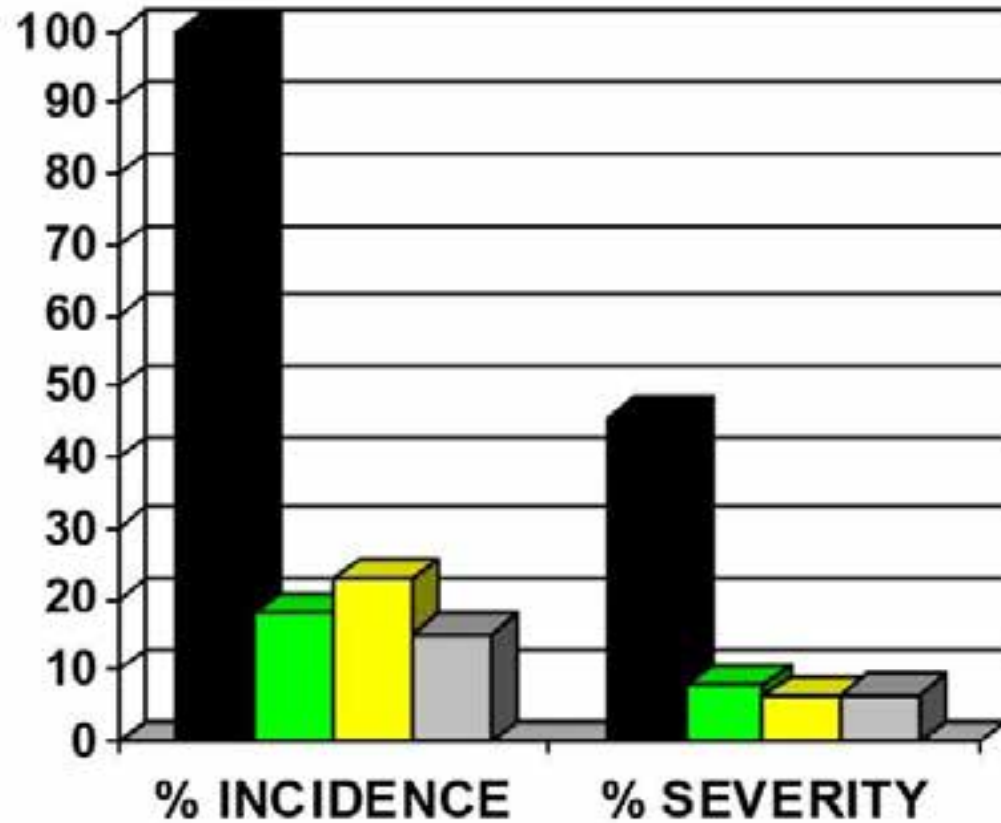
InspireSuper = Difenoconazole* 8.4% Group 3 [in Revus Top]
 Cyprodinil** 24.1% Group 9 [=Vanguard]

Crop	Diseases	Rate fl. oz./Acre	Remarks
Grapes (except Concord, Concord Seedless, and Thomcord. See Precaution under Remarks)	Powdery Mildew (<i>Uncinula necator</i>) Botrytis Bunch Rot and Blight (<i>B. cinerea</i>) Alternaria Rot (<i>A. alternata</i>) Rotbrenner (<i>Pseudopezicula tracheiphila</i>) Septoria Leaf Spot (<i>S. ampelina</i>) Black Rot (<i>Guignarda bidwellii</i>) Angular Leaf Spot (<i>Mycosphearella angulata</i>) Anthracnose (<i>Elsinoe ampelina</i>) Leaf Blight (<i>Pseudocercospora vitis</i>)	16 - 20	<p>For powdery mildew, begin at bud break and apply on a 10- to 21-day interval, making no more than 2 sequential applications before alternating to a fungicide with a different mode of action.</p> <p>For black rot - begin when shoot length is 1-3 inches and continue on a 10-day interval.</p> <p>For all other diseases, begin applications prior to disease onset when conditions are conducive for disease. Apply Inspire Super on a 10-21 day schedule making no more than 2 sequential applications before alternating to another fungicide with a different mode of action.</p> <p>If disease pressure is high, use the shortest interval and highest rate.</p> <p>PRECAUTION: On <i>V. labrusca</i>, <i>V. labrusca</i> hybrids and other non-viniferea hybrids where sensitivity is not known, the use of Inspire Super by itself or in tank mixtures with materials that may increase uptake (adjuvants, foliar fertilizers) may result in leaf burning or other phytotoxic effects.</p>

- Do not apply within 14 days of harvest (14-day PHI).

Presidio

Grape – Downy Mildew Control



■ Untreated check

■ Presidio (4 fl oz/A) + Abound (7.7 fl oz/A)

■ Abound (15.4 fl oz/A)

■ Pristine (14.7 oz/A)

Site: Dundee,
Investigator: ACDS.

Elevate

GRAPES		
Disease	Application Rate	Application Timing
<i>Botrytis</i> bunch rot (<i>Botrytis cinerea</i>) Powdery mildew suppression (<i>Uncinula necator</i>)	1.0 lb/A (0.5 lb AI/A)	<ul style="list-style-type: none">• Early bloom.• Bunch pre-closure.• Veraison.• Up to day of harvest.• Apply in a minimum of 50 gallons of water by ground.
Restrictions <ul style="list-style-type: none">• PHI = 0 day.• ELEVATE 50 WDG has been shown to enhance the efficacy of other fungicides when used in a powdery mildew spray program.• Do not make more than 2 consecutive applications. Refer to the Resistance Management section for rotation guidelines.• Do not apply more than 3.0 lbs of ELEVATE 50 WDG (1.5 lbs AI) per acre per season.		

ORGANIC GRAPE PRODUCTION

Table 7.1. Relative disease susceptibility and sensitivity to sulfur and copper among grape varieties¹

Variety	<i>Disease susceptibility or chemical sensitivity^o</i>									
	BR	DM	PM	Bot	Phom	Eu	CG	ALS	S ^c	C ^d
Aurore	+++	++ ^b	+++	+++	++	+++	++	+++	No	++
Baco noir	+++	+	++	+++	+	++	++	++	No	?
Cabernet Franc	+++	+++	+++	+	?	?	+++	?	No	+
Cabernet Sauvignon	+++	+++	+++	+	+++	+++	+++	?	No	+
Canadice	+++	++	+	++	?	?	++	++	No	?
Cascade	+	+	++	+	++	++	+	?	No	?
Catawba	+++	+++	++	+	+++	+	+	+	No	++
Cayuga White	+	++	+	+	+	+	++	++	No	+
Chambourcin	++	++	+++	+	++	?	?	?	Yes	?
Chancellor	+	+++	+++	+	+++	+++	++	+++	Yes	+++
Chardonel	++	++	++	++	?	?	++	++	No	?
Chardonnay	+++	+++	+++	+++	+++	++	+++	++	No	+
Chelois	+	+	+++	+++	+++	+++	++	+++	No	+
Concord	+++	+	++	+	+++	+++	+	+	Yes	+
Corot noir (NY70.0809.10)	+	++	+	+	?	?	+	?	No	?
DeChaunac	+	++	++	+	+++	+++	++	+++	Yes	+
Delaware	++	+++ ^b	++	+	+++	+	+	+	No	+
Dutchess	+++	++	++	+	++	+	++	+	No	?
Elvira	+	++	++	+++	+	+	+	++	No	++
Einset Seedless	+++	+++	++	+	?	?	+	?	?	?
Foch	++	+	++	+	?	+++	+	+	Yes	?

Disease susceptibility or chemical sensitivity

Variety	BR	DM	PM	Bot	Phom	Eu	CG	ALS	S ^c	C ^d
Fredonia	++	+++	++	+	++	?	+	+	No	?
Frontenac	++	+	++	+	?	?	+	?	?	?
Frontenac gris	++	+	++	+	?	?	+	?	?	?
Gewurztraminer	+++	+++	+++	+++	?	?	+++	+	No	+
GR7	+	++	++	++	+	+	+	?	No	?
Himrod	++	+	++	+	?	?	?	+	No	?
Ives	+	+++	+	+	?	++	+	+	Yes	?
La Crescent	++	++	++	+	?	?	+	?	?	?
Marquette	+	+	++	++	+	?	+	?	?	?
Marquis	+++	++	++	+	+	?	?	?	No	?
Melody	+++	++	+	+	?	?	+	+++	No	?
Merlot	++	+++	+++	++	+++	+++	+++	?	No	++
Moore's Diamond	+++	+	+++	++	?	++	?	?	No	?
Niagara	+++	+++	++	+	+++	+	++	+	No	+
Noiret (NY73.0136.17)	+	++	+	+	?	?	++	?	No	?
Pinot blanc	+++	+++	+++	++	?	?	+++	?	No	+
Pinot gris	+++	+++	+++	+++	?	?	+++	+++	No	+
Pinot noir	+++	+++	+++	+++	?	?	+++	+	No	+
Riesling	+++	+++	+++	+++	++	++	+++	+	No	+
Rosette	++	++	+++	+	++	++	++	++	No	+++
Rougeon	++	+++	+++	++	+++	+	++	+++	Yes	+++
Sauvignon blanc	+++	+++	+++	+++	?	?	+++	?	No	+
Seyval	++	++	+++	+++	++	+	++	++	No	+
Steuben	++	+	+	+	?	?	+	++	No	?
Traminette	+	++	+	+	?	?	+	?	No	?
Valvin muscat (NY62.0122.01)	++	+	++	+	?	?	+	?	No	?
Vanessa	+++	++	++	+	+	?	+	?	?	?
Ventura	++	++	++	+	+	?	+	+++	No	?
Vidal blanc	+	++	+++	+	+	+	++	+	No	+
Vignoles	+	++	+++	+++	+++	++	++	++	No	?

Average Harvest Dates for Eastern Nebraska's Major Grape Cultivars

AUGUST 2014

NOTES:

Edenvalley

First 2 Weeks of August

LaCrosse

Mid to Late August

Frontenac

Later Part of August through Sept or Later

Marechal Foch

Mid to Late August

Marquette

Late August through September

LaCrescent

Early to Late September

St Croix

Later August to Early September

deChaunac

Mid to Late September

Chambourcin

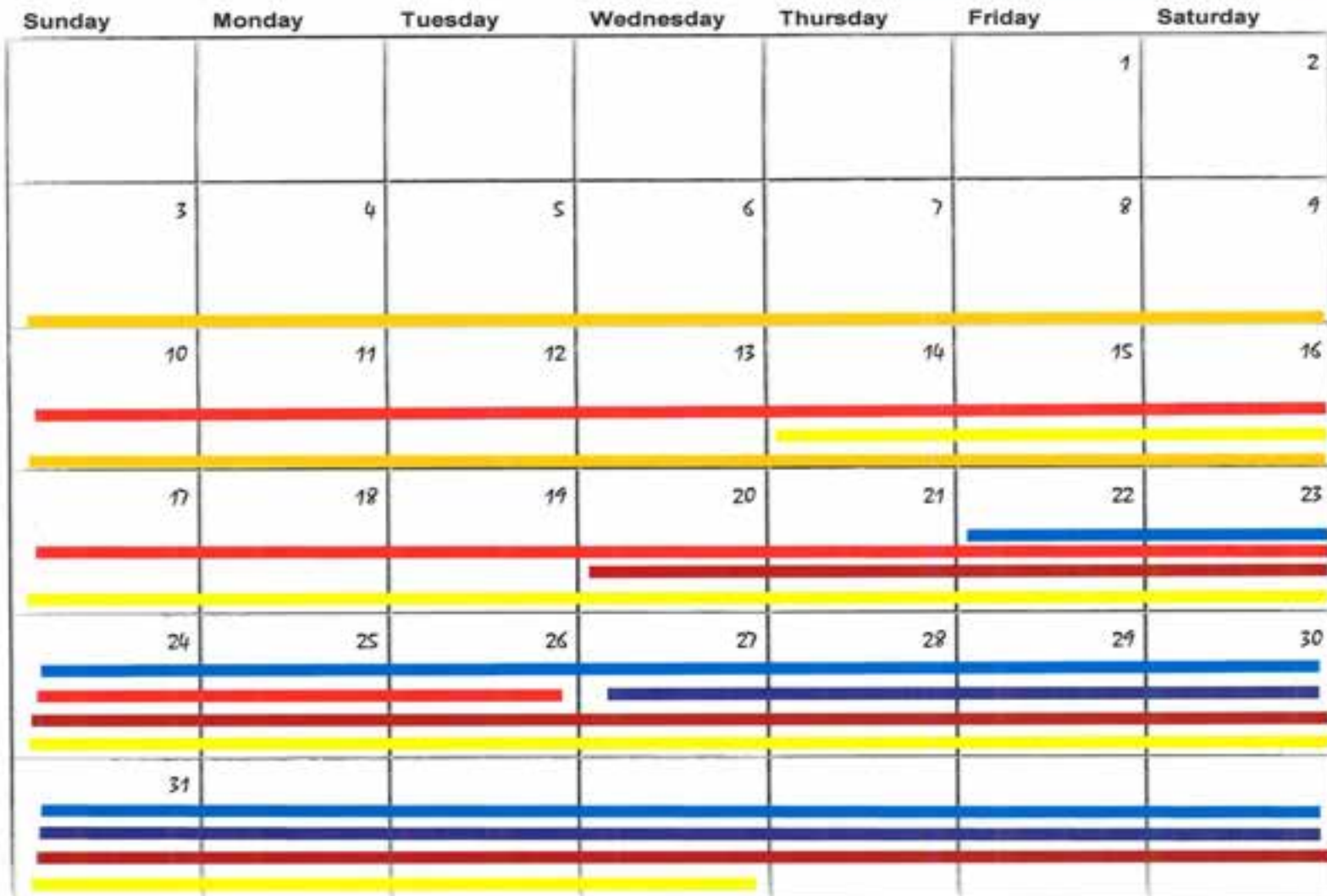
Mid September to Mid October

Vignoles

Mid September to Mid October

Norton

Late September to Mid October

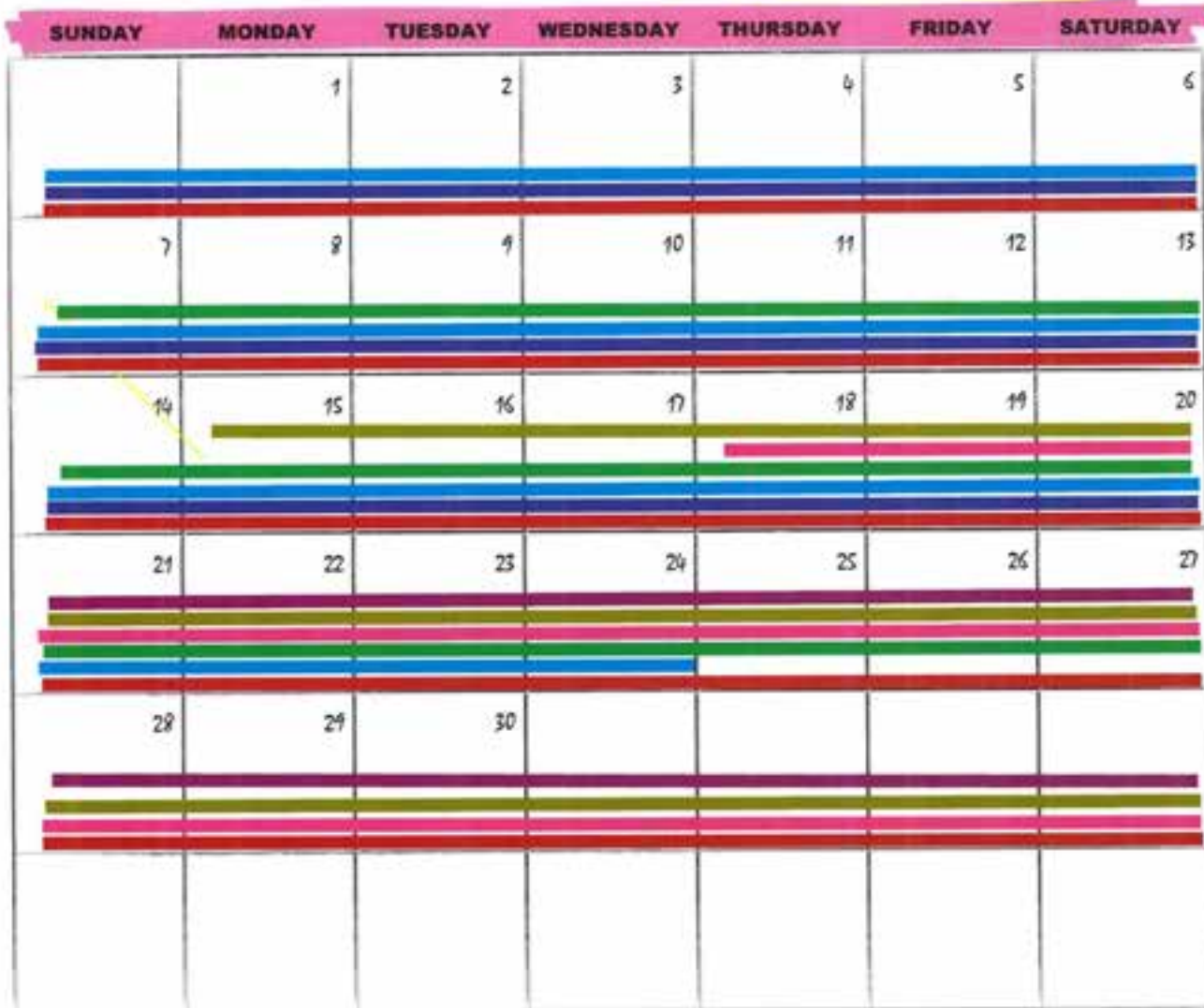


Average Harvest Dates for Eastern Nebraska's Major Grape Cultivars

SEPTEMBER 2014

NOTES:

- Edelweiss
First 2 Weeks of August
- LaCrosse
Mid to Late August
- Frontenac
Later Part of August through Sept or Later
- Marechal Foch
Mid to Late August
- Marquette
Late August through September
- LaCrescent
Early to Late September
- St Croix
Later August to Early September
- deChaunac
Mid to Late September
- Chambourcin
Mid September to Mid October
- Vignoles
Mid September to Mid October
- Norton
Late September to Mid October



RE-ENTRY

Do not allow entry into treated areas until the spray has dried.

Quintec has a 12-hr re-entry period

Manzate (Mancozeb) “the standard” – 66 days

Ziram 76DF do not apply later than 21 days of harvest. Begin when shoots are at least 1” [Bunch rot, Ripe rot].

Ferbam 76WDG do not apply within 7 days of harvest. Before bloom, after bloom, 14-days later.

Re-registration. “Do not apply in late season sprays where unsightly residues may affect the fresh fruit finish of light skinned grape varieties.” For fresh fruit, late-season sprays should use Ziram Granuflo instead of Ferbam. Do not make more than 3 applications/season. Do not apply within 7 days of harvest.

Ridomil Gold MZ for downy mildew cannot be applied within 66 days of harvest because it contains
Manzate

Ridomil Gold Copper for downy mildew has a 42-day PHI (can be applied up to 42 days of harvest)

In seasons when **downy mildew** is a problem and on highly susceptible cultivars, pre-bloom and post-bloom applications of Ridomil will aid greatly in disease control. However, additional fungicide protection may be required within the 42 and 66-day preharvest interval on late-harvested, highly susceptible cultivars. The alternative fungicides for use during this period are Captan, copper fungicides, phosphorus acid fungicides, or the strobilurin fungicides Abound or Pristine.

Aliette WDG --Do not apply within 15 days of harvest (PHI = 15 days). Restricted-entry period = 12 hrs.

Quintec – 35 days. A protectant fungicide only. Quintec is a quinoline fungicide (Group 13) for powdery mildew. **“Grapes: Do not harvest for 35 days after treatment.”**

Endura 70WG Fungicide is relatively new fungicide chemistry and is highly effective for control of powdery mildew and provides good control of Botrytis bunch rot. It is different chemistry from the sterol-inhibiting and strobilurin fungicides; therefore, it is an excellent material to use in rotation with these materials in a fungicide resistance management program. Endura contains the fungicide **boscalid** which is one of the active ingredients in Pristine

Phosphorous Acid (Phosphite fungicides)

(Agri-Fos, ProPhyt, Phostrol, Rampart, Topas, Aliette , there are many others)

Several of these materials have been registered in the United States as fungicides for control of downy mildew on grape. In multiple New York trials, phosphite fungicides provided excellent control of downy mildew but does not control any other grape disease. Australian experience suggests that phosphites provide most control on *foliage* when it is applied within a few days after the start of an infection period, providing only a few days of additional residual (protective) activity. Experience in New York suggests that spray timing is less critical for control of downy mildew on *fruit*, perhaps because this highly mobile chemical accumulates in these organs. When applied on a seven to 10-day protectant program, they appear to provide good to excellent control of downy mildew. **Aliette WDG** --Do not apply within 15 days of harvest (PHI = 15 days). Restricted-entry period = 12 hrs.

Fungicides, Pre-Harvest Intervals
&
Timing for Specific Varieties