

Vineyard IPM Scouting Report for week of 3 May 2010

UW-Extension Door County and Peninsular Agricultural Research Station Sturgeon Bay, WI

What is the potential yield of grapes after a destructive spring frost?

There have been varying reports throughout Wisconsin of frost damage to grape buds this spring. Damage to grape buds from spring frost is variable due to a number of factors. Site selection plays a critical role in the potential for frost damage. If your vineyard is located on flat ground or within a low spot and surrounded by higher ground, the cold air will settle on the flat ground or flow to the low spot. In comparison, grapes planted on a sloping site allows for cold air to flow down the slope and is replaced by warmer air. These comments about vineyard location and slope/aspect should be considered if you are considering planting new vines this spring. The training system can also play a role in frost damage. Since cold air sinks, training systems that have the fruiting spurs closer to the ground are at greater risk than training systems that are higher off the ground. Here, think of the difference between a mid-cordon training system-VSP versus a high wire cordon.

The stage of the grape bud determines how susceptible the bud is to spring frost. As buds develop and the changes are visually perceived, these stages are noted as phenological stages (see page 6). As the bud passes through developmental stages, from dormant bud to bud burst, the bud becomes prone to frost damage at warmer temperatures (Table 1). The data in the Table 1 also indicates that dry buds are prone to cold damage at lower temperatures compared to wet buds. The reason why bud burst is more susceptible to spring frost than swelled buds is because water increases in buds through developmental stages. Plant tissues containing more water content have a tendency to freeze at higher temperatures. That is why young shoot tissue is more susceptible to frost than grape buds.

Table 1. Temperatures at which 50% of the buds are killed at four phenological stages of Concord grapevines.

Phenological Stage	Influence of surface moisture of bud	
	Wet ¹	Dry
Scale Crack	22° F ²	15° F ²
First swell	24° F	18° F
Full swell	26° F	19° F
Bud burst	27° F	21° F

¹Indicates presence of hoar frost, dew, ice or water from precipitation or irrigation.

²Values are T₅₀, temperature at which 50% of the buds are killed.

Data from: Johnson, D.E. and G. S. Howell. 1981. Factors influencing critical temperature for spring freeze damage to developing primary shoots of Concord grapevines. Am. J. Enol. Viticult. 32:144-149.

How are grape yields impacted by the loss of the primary buds? The loss of the primary bud will result in a 60 to 70% reduction in yield. Often, however, spring frosts seldom kills all the primary buds within a vineyard. For example, if you estimate that you have lost 40% of your primary buds, the secondary buds will produce approximately 35% of the primary buds production potential. To calculate the potential yield of the vineyard; $(40 \times 0.35 = 14)$. The secondary buds will produce 14% of the crop and the uninjured primary buds will produce 60%, for a total of 74% of the original crop.

The above example is a best guess estimate of what can be expected if the primary buds were lost to a spring frost. Other factors also come into play in determining crop yield after a frost event. A good example of this was the spring frost event Michigan grape growers experienced on April 23, 2002. Since the 2001 crop was light, it was estimated that the secondary buds produced approximately 66% of the primary bud in 2002. This shows, that if you cropped your vines heavy in 2009 and then experienced the loss of primary buds this spring, then your secondary buds likely will be producing 30 to 35% of the primary buds potential. On the other hand, if you cropped lighter in 2009, your secondary buds will likely produce more fruit this season.

One thing that Michigan growers learned from this early season frost event in 2002, was that you do not want to forego your spray program. Many growers eliminated their spray program before bloom in order to first determine the yield potential of their crop. Phomopsis cane and leaf spot (Figure 1 and 2) developed early in the season and migrated to the rachis later in the season, resulting in much of the crop falling on the ground. Phomopsis is a disease that attacks, leaves, canes, rachis and berries. Although phomopsis on leaves and canes appears harmless, the disease is often latent and will infect the rachis and berries if not managed early in the season. Remember, when plants experience a stress, such as frost damage, the plants are more susceptible to disease and insect attack. Continue to monitor, scout, and maintain the plant health of grape plants that have experienced frost damage.

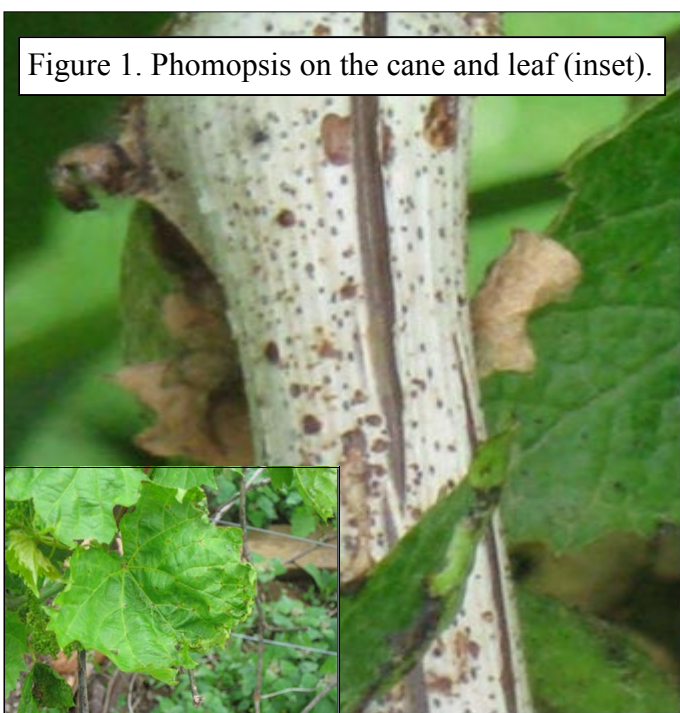


Figure 1. Phomopsis on the cane and leaf (inset).

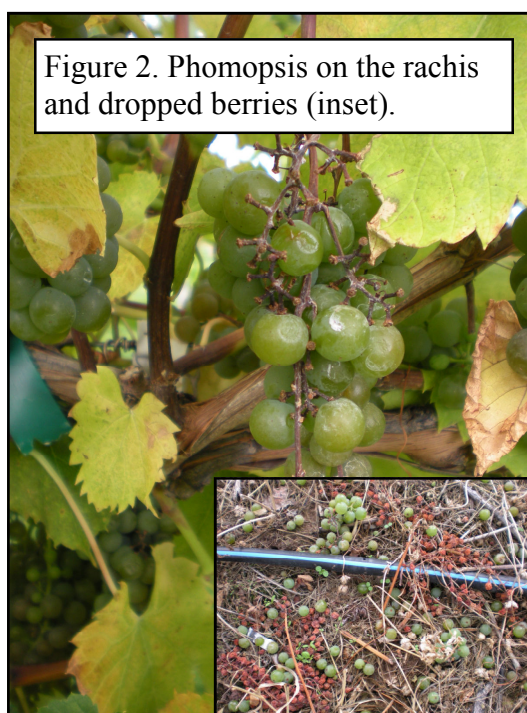


Figure 2. Phomopsis on the rachis and dropped berries (inset).

Figure 1. from <https://go.dmac.edu/programs/viticulture/blog/Lists/Posts/Post.aspx?ID=35>

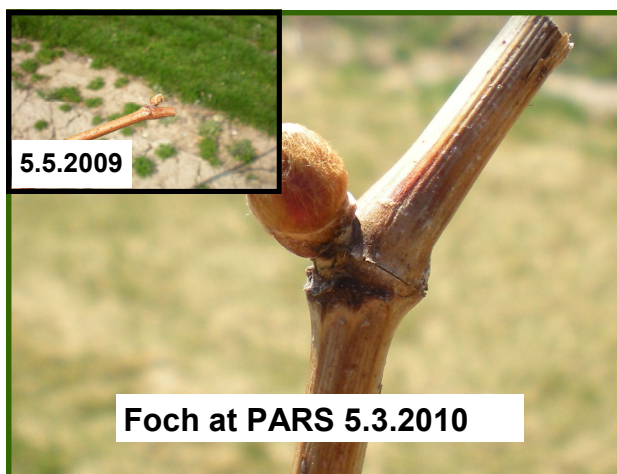
Development of wine grapes at the Peninsular Agricultural Research Station (PARS) Sturgeon Bay, WI and the West Madison Agricultural Research Station (WMARS), Madison, WI.



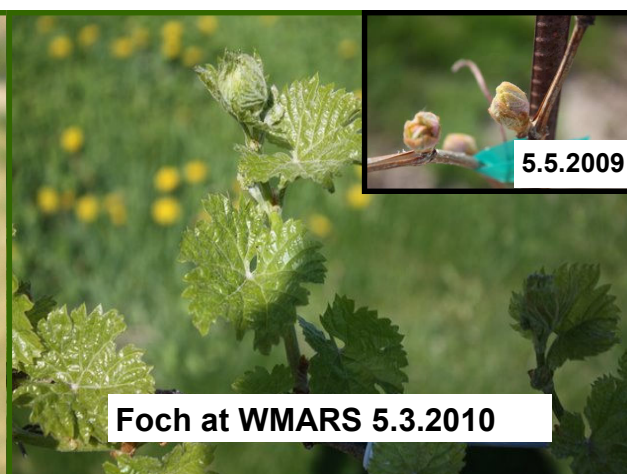
Brianna at PARS 5.3.2010



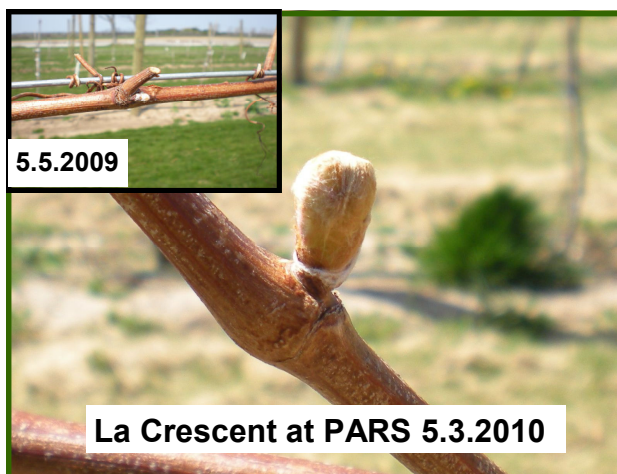
Brianna at WMARS 5.3.2010



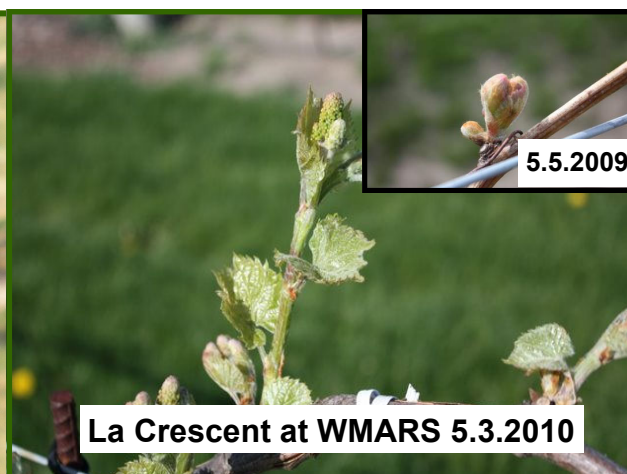
Foch at PARS 5.3.2010



Foch at WMARS 5.3.2010



La Crescent at PARS 5.3.2010



La Crescent at WMARS 5.3.2010

Development of wine grapes at the Peninsular Agricultural Research Station (PARS) Sturgeon Bay, WI and the West Madison Agricultural Research Station (WMARS), Madison, WI.



La Crosse at PARS 5.3.2010



La Crosse at WMARS 5.3.2010



Marquette at PARS 5.3.2010



Marquette at WMARS 5.3.2010



Wild grape at PARS 5.3.2010

Principal Periods of Major Grape Insect and Disease Risks

If you attended one of the grape IPM workshops last fall, you were given a small guide entitled “A pocket guide for grape IPM scouting in the North Central and Eastern United States” that was developed by Rufus Isaacs, Annemiek Schilder, Tom Zabadal, and Tim Weigle and published by Michigan State University. Below you will find a chart that I modified from the last two pages of the guide. I added grape flea beetle and also added the approximate growth stages based on the modified Eichhorn-Lorenz system of staging grape development. The chart provides a time-line based on grape developmental stages when insect and disease pests are usually active in the vineyard. If you are unfamiliar with the developmental stages of grapes and you have the pocket guide, turn to page 4 and 5 and you can view color photographs of the different stages. Also on the following page you will find photographs of the major grape phenological stages of grapes.

Growth stage Visual	Bud swell	Shoot 1-5”	Shoot 8-12”	Pre- bloom	Bloom	Pea- sized	Berry touch	Bunch closing	Verei- son	Pre- harvest	Harvest	Post- Harvest
Growth stage Modified Eichhorn- Lorenz	2-3	7-13	14-18	19-22	23	31	32	33-34	35	36-37	38	39-47
Insects												
Cutworm	+	+										
Grape Flea beetle	+											
Rose Chafer				+	+	+						
Grape Berry Moth				+	+	+	+	+	+	+	+	+
Grape Leafhopper				+	+		+	+	+	+	+	
Potato Leafhopper			+	+	+		+	+	+			
Japanese beetle								+	+	+		
Diseases												
Phomopsis		+	+	+	+	+	+	+	+	+	+	
Black rot		+	+	+	+	+	+	+	+			
Downy mildew			+	+	+	+	+	+	+	+	+	+
Powdery mildew		+	+	+	+	+	+	+	+	+	+	+
Botrytis bunch rot					+			+	+	+	+	

 Usual time for monitoring and management.

 Reduced risk from pests, but monitoring and control may be required.

 Potential period of insect activity or disease infection risk.

Major Grape phenological stages.

When scouting your vineyard for pests take note of the stage of development of the grape vines



Dormant

Early Bud Swell

Late Bud Swell

Bud Burst

**1-to 3-inch
shoots**



**4-to 8-inch
shoots**



**10-to 16-inch
shoots**



**Immediate pre-
bloom**



First bloom



Full bloom



Buckshot berries



Bunch closure



Veraison

Harvest



Harvest

Grape Flea Beetle

Most southern grapevines have shoots that have grown beyond 1 to 3 inches and damage from the grape flea beetle is now reduced. On the other hand grape growers in northern area should still be scouting and monitoring for grape flea beetles. The tell tale signs of grape flea beetle feeding is apparent on the buds pictured at the right. As temperatures warm and buds begin to expand there is the potential for grape flea beetle damage. Northern grape growers should begin scouting for grape flea beetles in your vineyards now. Grape flea beetles are metallic shiny blue, measuring 4 to 5 mm in length and often will jump if disturbed. Damage in the vineyard appears as hollowed out buds as pictured. Damage from grape flea beetles is sometimes confused with cutworm damage in the early season. Cutworms however will consume the whole bud, whereas the grape flea beetles only hollows out the bud. When scouting, scout borders first as often the flea beetle will migrate into the vineyard from wooded overwintering sites. Once shoots have grown to a length of 1 to 3 inches the potential for damage from the grape flea beetle is reduced. If several buds are damaged and beetle feeding is apparent, you may consider applying a broad spectrum insecticide for control.



Chemical Control Options for Grape Flea Beetle

Insecticide	Rate/Acre ¹
Baythroid 2E or XL	2.4 to 3.2 fl oz
Danitol 2.4 EC	5.3 to 10.7 fl oz
Leverage 2.7SE	5-8 fl/oz
Renounce 20WP	3 to 4 oz
Sevin XLR (4EC)	2 qt

¹Rates from Midwest Small Fruit and Grape Spray Guide, 2010. University of Wisconsin Extension A3899.

Degree Day¹ (base 50) Accumulation since April 1, 2010 at Peninsular Agricultural Research Station in Sturgeon Bay, WI

Date	2010	2009	5 Year Average²
5/2/2010	129	84	103

¹Modified method.

²Average from 2005 to 2009.

Degree Day¹ (base 50) Accumulation since April 1, 2010 at West Madison Agricultural Research Station, Madison, WI

Date	2010	2009	4 Year Average²
5/2/2010	222	127	148

¹Modified method.

²Average from 2006 to 2009.

Accumulated degree days¹ (base 50) for the month of March at Peninsular Agricultural Research Station.

Year	Degree days (base 50)
2010	42
2009	12
2008	0
2007	37
2006	9
2005	8
2004	9

¹Modified method.

Please scout your vineyards on a regularly scheduled basis in an effort to manage problem pests. This report contains information on scouting reports from specific locations and may not reflect pest problems in your vineyard. If you would like more information on IPM in grapes, please contact Dean Volenberg at (920)746-2260 or dean.volenberg@ces.uwex.edu