Vineyard IPM Scouting Report for week of 10 May 2010
UW-Extension Door County and Peninsular Agricultural Research Station
Sturgeon Bay, WI

Frost Injured Grape Plants and Diseases

Frost damaged grape plants will have shoots emerging from secondary buds which will prolong the bloom period and prolong the window for disease infection.

Over this past weekend, temperatures again fell below freezing, resulting in damage to grape shoot growth or developing buds. Reports from grape growers from around the state, suggest that frost damage was variable depending on location and the stage of development of the grape vines. At this stage, it is very difficult to predict how yield will be affected. However, grapes are resilient, having two other buds to replace the primary bud should such an event such as frost take place. Even if you lost all of your primary buds, the secondary buds should produce a harvestable, quality crop. In 2007, a late spring frost in Missouri killed over 90% of the primary buds in most grape varieties. Most of these grape varieties still produced quality fruit in the range of one ton per acre on secondary buds.

Pest management in frost damaged vineyards can be a bit more difficult. A frost damaged vineyard likely will contain shoots that were produced from primary and secondary buds. Flowering in the secondary shoots likely will lag behind flowering of the primary shoots by as much as two weeks. It follows that clusters in the vineyards will be at different maturities. In essence, you will be dealing with a prolonged bloom and for some grape diseases, a longer period of extreme susceptibility. For example, berries are susceptible to powdery mildew from immediate prebloom through fruit set. The developing berries will remain susceptible to new powdery mildew infections until a brix level of 8 to 10 is achieved. In a frost damaged vineyard, the window of susceptibility is now lengthened.

It may be possible to reduce some fungicide protectant sprays in frost damaged vineyards since new shoot tissue growth is retarded. Shoot tips damaged from frost will have growth retarded and new growth will come from axillary buds (buds in the axils of leaves). It will take a period of time before axillary shoots emerge from axillary buds. With shoot tissue not emerging there is little plant tissue left unprotected if protective fungicides have been applied on schedule. However, as secondary buds begin to break and axillary buds begin to grow this new relatively “soft” tissue will be emerging likely when temperatures are higher making the tissue susceptible to disease infection. For example, powdery mildew infection needs a minimum of 50° F for infection to occur, but as temperatures increase there is greater potential for infection. It will be very important to use protectant fungicides as secondary shoot tissue begins to emerge and grow and axillary bud shoot tissue commences growth.

Fungicide Resistance Management-Steve Jordan

As every grape grower knows, there are a number of diseases just waiting to ruin a crop. Thankfully, we have a number of weapons in our arsenal to prevent this from happening. Our primary tool for managing diseases in the vineyard is fungicides. To be fully effective, most fungicides must be applied before infection and in a sufficient spray volume to achieve thorough coverage. Protectant fungicides provide temporary protection; they must be reapplied to protect new growth when disease threatens and the weather is favorable. Poor disease control with fungicides can result from several causes including low application rate, low effectiveness of the fungicide on the pathogen, improper timing or application method, high disease pressure, and excessive rainfall immediately following application. Fungal resistance to fungicides is another cause of poor control. The development of fungicide resistance is influenced by the interaction several factors including mode of action of the fungicide (how the active ingredient inhibits the fungus), biology of the pathogen, and fungicide use pattern. Understanding fungicide resistance, how it develops, and how it can be managed is crucial for ensuring sustainable disease control with fungicides.

Resistance is a genetic adjustment by a fungus that results in reduced sensitivity to a fungicide. Reduced sensitivity is thought to be a result of genetic mutations which occur at low frequencies (one in a million or less) or of naturally occurring subpopulations of resistant individuals. Once a fungus becomes resistant to a fungicide in your vineyard, use of that fungicide will favor establishment of the resistant population by only killing susceptible individuals. This shift toward resistance occurs at different rates, depending on the number of genes conferring resistance. When single gene mutations confer resistance, a rapid shift toward resistance may occur, leading to a population that is predominantly resistant and where control is abruptly lost. When multiple genes are involved, the shift toward resistance progresses slowly, leading to a reduced sensitivity of the entire population. The gradual shift with the multiple gene effect may result in reduced fungicide activity between sprays, but the risk of sudden and complete loss of control is low.

Fungicides are grouped by similarities in chemical structure and mode of action. Site-specific fungicides disrupt single metabolic processes or structural sites of the target fungus. These include cell division, sterol synthesis, or nucleic acid (DNA and or RNA) synthesis. The activity of site-specific fungicides may be reduced by single or multiple-gene mutations. The benzimidazole, phenylamide, and strobilurin groups are subject to single-gene resistance and carry a high risk of resistance problems. Because of this, we refer to these fungicides as at-risk. The most common fungicides labeled for grapes that fall into these groups include Abound, Flint, Sovran, Topsin, and Ridomil. Other fungicide groups with site-specific modes of action include dicarboximides and sterol demethylation inhibitors (DMIs). Fungicides labeled for grape in these groups include Rally, Rubigan, Elite, Procure, and Mettle. Resistance to these fungicides appears to involve slower shifts toward insensitivity because of multiple-gene involvement. Many of the site-specific fungicides also have systemic mobility. However, systemic mobility is not necessary for resistance development.

Multi-site fungicides interfere with many metabolic processes of the fungus and are usually protectant fungicides. Once taken up by fungal cells, multisite inhibitors act on processes such as general enzyme activity that disrupt numerous cell functions. Numerous mutations affecting many sites in the fungus would be necessary for resistance to develop. Multi-site fungicides form a chemical barrier between the plant and fungus. The risk of resistance to these fungicides is low.

There are two codes currently used to classify fungicides by mode of action. The mode of action group (A, B, etc.) refers to the general target site such as nucleic acid synthesis, cell wall synthesis, respiration, etc. Sub-groups (A1, A2, etc.) within a mode of action group refer to specific biochemical target sites of fungicide activity. The FRAC (Fungicide Resistance Action Committee) code is used on the fungicide label (but not required by the manufacturer). The FRAC code refers to fungicides that have same site-specific mode of action and share the same resistance problems across members of the group (cross-resistance). FRAC groups are currently numbered from 1 to 43 in order of their introduction to the marketplace. FRAC groups and mode of action subgroups are mostly the same.

Fungicide resistance management programs rely on reducing selection pressure by keeping disease pressure low through cultural practice, applying at-risk fungicides in mixtures or alternation with a fungicide from a different mode of action group, and limiting the number of applications per crop season. Using at-risk fungicides below the minimum label rate is also a potential contributor to developing resistance in the vineyard. A sub-lethal dose exposes the fungus to the chemical without killing it, favoring any mildly resistant individuals in the fungal population that would normally not survive a full rate application.

The proper choice of a partner fungicide in a resistance management program is critical. Generally, good partner fungicides are multi-site inhibitors that have a low resistance risk (e.g. chlorothalonil, mancozeb, captan, etc.) and are highly effective against the target disease. However, the use of an unrelated at-risk fungicide with no potential for cross-resistance problems also may be effective. Several fungicides, including Pristine and Adament, are actually a formulation of 2 at-risk fungicides, a strobilurin with a DMI fungicide, that when combined, reduces the possibility of resistance to either one occurring. By tank-mixing or alternating with a fungicide from a different FRAC group, the chance for developing a resistant fungal population goes down dramatically.

A table of commonly used grape fungicides and their FRAC group code is included below (from 2010 Midwest Small Fruit and Grape Spray Guide). Another resource is the FRAC website at http://www.frac.info/frac/index.htm. For more detailed information about fungicide resistance management, see the Oklahoma Cooperative Extension Service fact sheet EPP-7663 entitled Fungicide Risk Management by John Damico and Damon Smith http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2317/F-7663web.pdf

Table 8. Fungicide Harvest Restrictions and Restricted-Entry Intervals (REI)

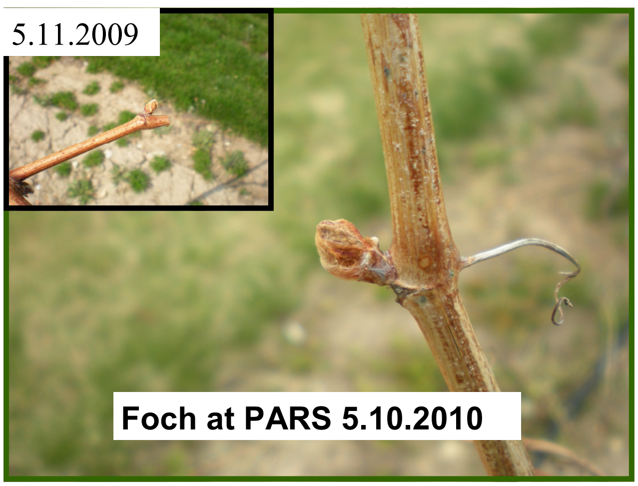
Trade Name	Common Name	Harvest Restrictions Days before harvest and limitations (Maximum amount/ acre/season)[a]				REI[b]	FRAC[c] Code
		Grape	Blueberry	Brambles	Strawberry		
Abound	azoxystrobin	14*	0	0	0	12 hr	11
Adament	tebuconazole + trifloxystrobin	14*	-	-	-	24hr	11 3
Aliette	fosetyl-AL	15*	0*	60	0 (30 lb)	12 hr	33
Basic copper sulfate	copper sulfate	0	-	0	0	24 hr	M
Bayleton	triadimefon	14 (18 oz)	-	-	-	12 hr	3
Cabrio	pyraclostrobin	-	0 (56 oz)	0 (56 oz)	0 (56 oz)	24 hr	11
Captan	captan	0 (24 lb)	0 (70 lb)	3[d]	0 (48 lb)	See note[e]	M
CaptEvate	captan plus fenhexamid	-	0 (21 lb)	0 (21 lb)	0 (21 lb)	24/72 hr[e]	M 17
Dithane M-45, others	mancozeb	66*	-	-	-	24 hr	M
Elevate	fenhexamid	0*	0	0	0*	12 hr	17
Elite	tebuconazole	14	-	-	-	12 hr	3
Endura	boscalid	14*	-	-	-	12 hr	7
Ferbam	carbamate	7	-	-	-	24 hr	M
Flint	trifloxystrobin	14*	-	-	-	12 hr	11
Indar	fenbuconazole	-	30	-	-	12 hr	3
JMS Stylet Oil	oil	0	-	-	0	12 hr	-
Mettle	tetraconazole	14	-	-	-	12 hr	3
Orbit	propiconazale	-	30	30	0	12 hr	3
Presidio	fluopicolide	21	-	-	-	12 hr	43
Pristine	pyraclostrobin plus boscalid	14*	0*	0*	0*	12 hr[i]	11 7
Procure	triflumizole	7 (32 oz)	-	-	-	24 hr	3
ProPhyt, Phostrol, Agri-Fos, Topaz	phosphorous acid	0	0	0*	0	4 hr	33
Quintec	quinoxyfen	14*	-	-	1*	12 hr	13
Rally	myclobutanil	14 (1.5 lb)	-	1 (10 oz)	1 (10 oz)	24 hr	3
Revus	mandipropamid	14	-	-		12 hr	40
Ridomil Gold SL	mefenoxam	-	0	45	0	48 hr	4
Ridomil Gold MZ	mefenoxam plus mancozeb	66	-	-	-	48 hr	4 M
Ridomil Gold Copper	mefenoxam plus copper	42	-	-	-	48 hr	4 M
Rovral	iprodione	7*	0*	0*	-	24 hr[f]	2
Rubigan	fenarimol	21 (19 oz)	-	-	-	12 hr	3
Scala	pyrimethanil	7	-	-	1	see note[g]	9
Sovran	kresoxim-methyl	14*	-	-	-	12 hr	11
Sulfur	sulfur	0	0	0	0	24 hr	M
Switch	cyprodinil plus fludioxonil	-	0 (56 oz)	0 (56 oz)	0 (56 oz)	12 hr	9 12
Topsin M	thiophanate	14 (4 lb)	-	-	1	see note[h]	1
Thiram	thiram	-	-	-	3	24 hr	M
Vangard	cyprodinil	7*	-	-	-	12 hr	9

*Limited number of applications allowed, or other restrictions apply. REFER TO LABEL DIRECTIONS.
- Not registered or recommended for the crop listed.
[a]Amounts shown in parenthesis are the maximum amounts of the fungicide permitted per season.
[b]All fungicides have a Restricted-Entry Interval (REI). The restricted-entry interval is the time immediately after a pesticide application when entry into the treated area is limited. Check labels for REI. Restrictions in REI may prohibit the use of certain pesticides during harvest.
[c]FRAC code represents the mode of action of the fungicide.
[d]See comments on captan formulations and registrations on page 33.
[e]Captan 80WDG has a 3-day REI on grapes, raspberries, blackberries and blueberries. All captan formulations have a 24-hour REI on strawberries. CaptEvate has a 72-hour REI on blueberries and raspberries, and a 24-hour REI on strawberries.
[f]REI for Rovral is 48 hours on grapes.
[g]REI for Scala is 24 hours on grapes, 12 hours on strawberries.
[h]REI for Topsin M is 7 days on grapes.
[i]REI for Pristine is 5 days when conducting cane tying, cane turning, or gane girdling.

Development of wine grapes at the Peninsular Agricultural Research Station (PARS) Sturgeon Bay, WI and the West Madison Agricultural Research Station (WMARS), Madison, WI. Buds damaged by frost at PARS on 5/8 and 5/9/2010.

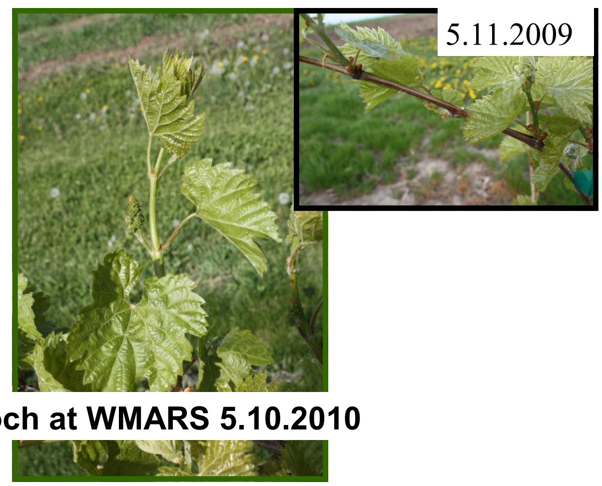
Brianna at PARS 5.10.2010

Brianna at WMARS 5.10.2010



5.11.2009

Foch at PARS 5.10.2010

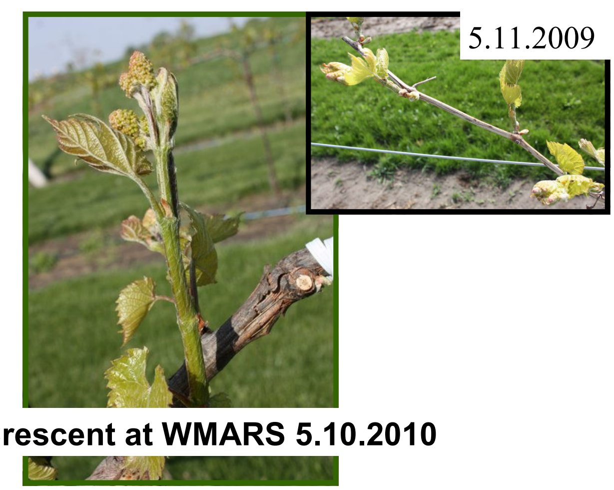


5.11.2009

Foch at WMARS 5.10.2010

5.11.2009

La Crescent at PARS 5.10.2010



5.11.2009

La Crescent at WMARS 5.10.2010

Development of wine grapes at the Peninsular Agricultural Research Station (PARS) Sturgeon Bay, WI and the West Madison Agricultural Research Station (WMARS), Madison, WI. Buds damaged by frost at PARS on 5/8 and 5/9/2010.

La Crosse at PARS 5.10.2010

La Crosse at WMARS 5.10.2010

Marquette at PARS 5.10.2010

Marquette at WMARS 5.10.2010

Wild grape at PARS 5.10.2010

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

Date	2010	2009	5 Year Average[2]
5/9/2010	197	144	159

[1]Modified method.
[2]Average from 2005 to 2009.

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

Date	2010	2009	4 Year Average[2]
5/9/2010	260	194	210

[1]Modified method.
[2]Average from 2006 to 2009.

Accumulated degree days[1] (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

[1]Modified method.

Low temperatures reported at Peninsular Agricultural Research Station, Sturgeon Bay, WI.

Date	Low °F
5/3/2010	44
5/4/2010	48
5/5/2010	41
5/6/2010	37
5/7/2010	32
5/8/2010	29[1]
5/9/2010	29[1]

[1]Frost damage reported to some grape varieties in grape variety trial.

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