Vineyard IPM Scouting Report for week of 14 June 2010
UW-Extension Door County and Peninsular Agricultural Research Station
Sturgeon Bay, WI

Disease Warning-Downy Mildew

The yellow green spots are young lesions caused by Downy mildew. The brown spots are older lesions caused by Downy mildew. The grape cultivar is La Crosse.

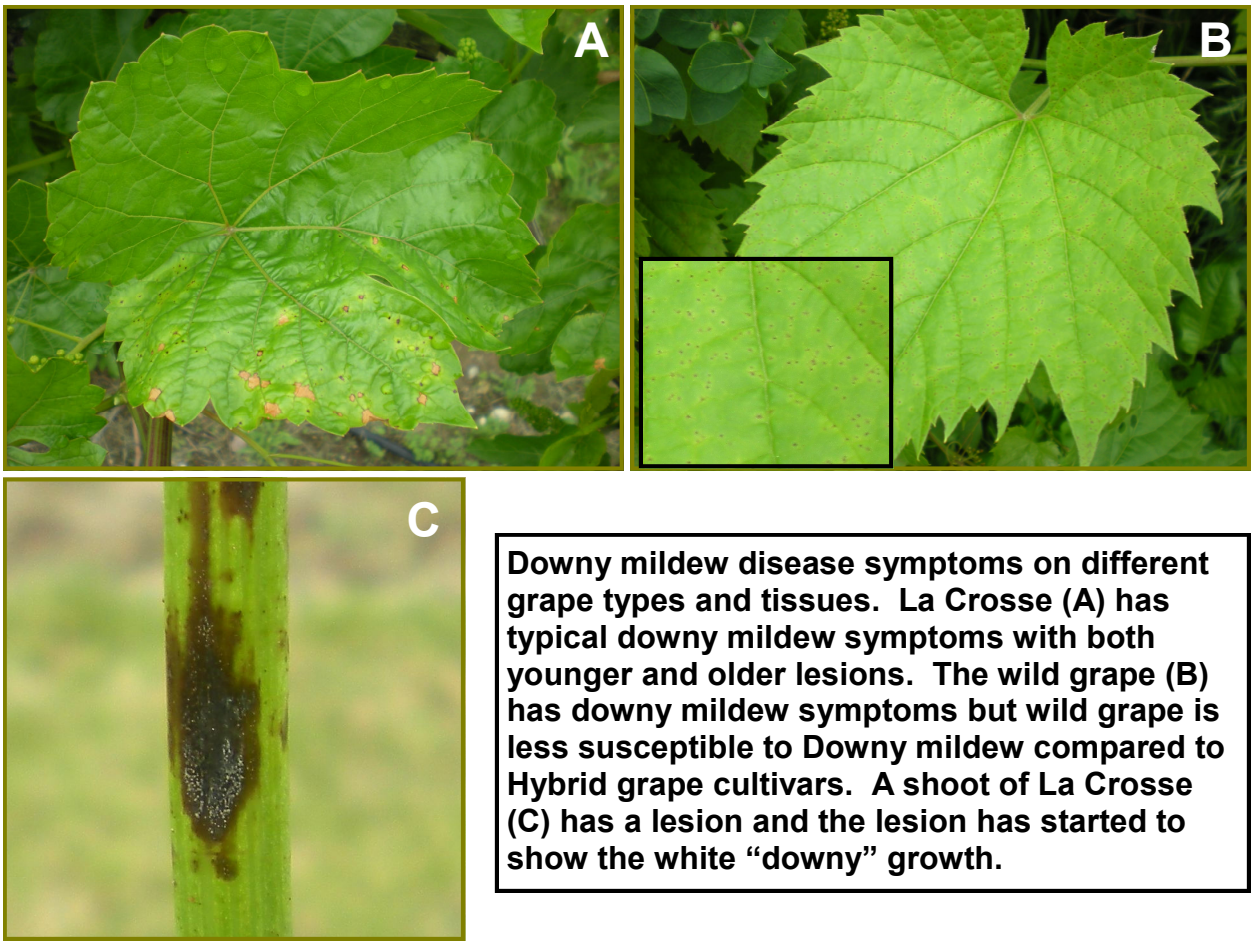
Vineyards the last five days throughout most of Wisconsin have experienced rainy, cloudy weather that has been conducive to disease development. This type of weather is ideal for Black rot, Phomopsis, and Downy mildew infection. There have been reports throughout the state of Downy mildew infection. If you are unfamiliar with Downy mildew, please read Steve Jordan's report on the following pages. For those growers who have been using Captan for Downy Mildew management, be aware that Captan is a protectent fungicide that is easily washed off from plant tissue surfaces. One study has shown that as little as 0.04 inches (1 mm) of rain can remove 50% of Captan from plant surfaces[1]. Captan is often tank mixed with sterol inhibitors (Elite, Procure, Rally, or Rubigan) to increase the spectrum of diseases under management. Be aware that sterol inhibiting fungicides are highly effective in managing Powdery mildew, but have little to no activity against Downy mildew.

If you notice Downy mildew symptoms in your vineyard, what should you do? First identify the problem correctly. Take a leaf showing disease symptoms and place in a Ziploc bag in the dark, within a short period of time, you should observe the white patches that are characteristic of Downy mildew on the bottom of the leaf. Once Downy mildew symptoms are present, a fungicide that has reach-back or curative properties needs to be applied. You have a few product options to choose from. Ridomil Gold MZ and Ridomil Gold Copper have both curative and protectant activity. The strobilurin fungicides Pristine, Abound, and Sovran are locally systemic and should help get Downy mildew under control. Other products that you may want to consider are some of the phosphorous acid products (ProPhyt, Phostrol) that also have some curative and protectant activity against Downy mildew.

Be aware of your grape cultivars susceptibility to Downy mildew. If you have table grapes, scout these first, since many of the cold hardy table grape cultivars are highly susceptible to Downy mildew. Examples of table grape cultivars highly susceptible to Downy mildew are Reliance, Canadice, Marquis, and Swenson Red.

If you suspect Downy mildew in your vineyard be prepared to manage the problem. Once Downy mildew becomes established it can spread very rapidly. With favorable environmental conditions Downy mildew can produce a new generation every 4 to 5 days. Favorable conditions for Downy mildew growth and development are humid nights (>95% RH) and rainy conditions. Temperature also is an important component in growth and development of Downy mildew. The optimum temperature is 77° F. Downy mildew will spread less at lower or higher temperatures than the optimum. From this description on environment and Downy mildew development, the last few rainy, humid, warm days have been ideal for Downy mildew infection.

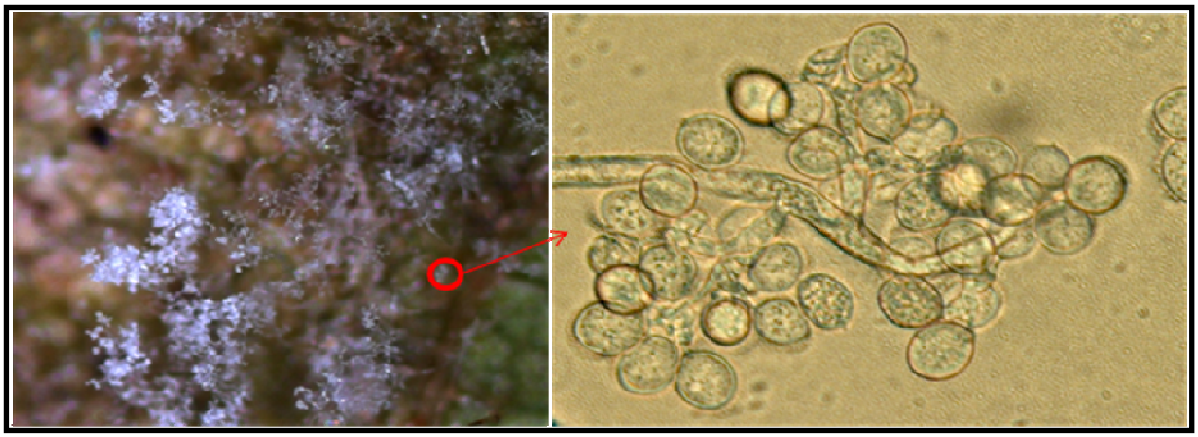
[1]XM, Xu, RA Murray, JD Salazar, and K Hyder. 2008. The effects of temperature, humidity, and rainfall on captan decline on apple leaves and fruit in controlled environment conditions. Pest Management Science, 64:296-307.



Downy mildew disease symptoms on different grape types and tissues. La Crosse (A) has typical downy mildew symptoms with both younger and older lesions. The wild grape (B) has downy mildew symptoms but wild grape is less susceptible to Downy mildew compared to Hybrid grape cultivars. A shoot of La Crosse (C) has a lesion and the lesion has started to show the white "downy" growth.

Downy Mildew-Steve Jordan

With the cool, wet weather we are currently experiencing in Wisconsin, conditions are ideal for the development of downy mildew, one of the most devastating diseases of grape. Just this week, I found downy mildew on grapes in Dane and Vernon County. Downy mildew is caused by the fungal-like organism, *Plasmopara viticola,* which overwinters primarily as resting spores (oospores) in leaf debris on the vineyard floor. Warmer weather in the spring (68-77° F) causes oospores to germinate and produce a second spore type, called sporangia. Sporangia are blown by wind or rain-splashed onto susceptible tissue where they can either directly infect or release a number of infectious swimming spores (zoospores). Infection can occur rapidly, in as little as 30 minutes. Once tissue is infected, symptoms develop within 7-12 days. New sporangia are then produced on branched, tree-like structures called sporangiophores.

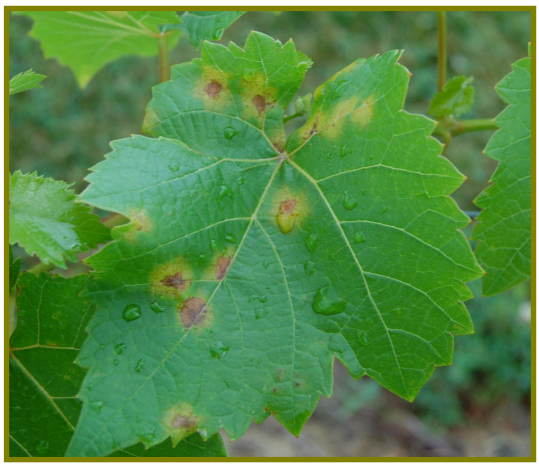


Sporangiophore and sporangia of downy mildew on the underside of a wild grapevine leaf from Vernon County on June 14. The image on the right was taken using a microscope and shows a sporangiophore bearing sporangia.

The sporangia are produced under conditions of high humidity with peak production early in the morning. New sporangia are wind-blown or splash-dispersed to nearby susceptible tissue, restarting the disease cycle. If free water is present on the surface of the tissue, the sporangia can germinate, releasing the swimming zoospores, causing multiple infections from a single sporangium. Ideal temperatures for the development of downy mildew are 64-76°F, with a minimum of 54°F, and a maximum of about 86°F. Wisconsin is currently experiencing such moisture and temperature conditions.

Symptoms

Leaf lesions first appear as small yellow spots, turning brown in the center as the lesions expand. Lesions are often refered to as “oily” spots due to their slick appearance. The sporangiophores and sporangia appear as fuzzy white/grey growth on the underside of lesions. Later in the season, the downy mildew will often appear as small, brown-red flecks. Severe downy mildew infection can cause a leaf to become brittle and drop.



Downy mildew lesions on top of a 'La Crescent' leaf (image on the left). Close up of 'La Crescent' leaf underside (image on right) exhibiting "downy" white/grey growth.

Berries can become infected from early bloom to 3-4 weeks post bloom, after which they become resistant to infection (though the pedicels, or berry stems, remain susceptible). Usually the first indicator of berry infection is the production of sporangia on the surface of the berry under high humidty. The berry will turn light brown to purplish brown soft and will have a greater chance of shattering. Lesions on infected shoots and rachises appear sunken and water-soaked, producing sporangia (sporulation) under humid conditions . Severe infection can cause stunting of the shoot.

Downy mildew on a table grape cultivar from West Madison Agricultural Research Station, June 15. Note how the infected berries are yellow to slightly brown and smaller compared with the healthy berries.

Downy mildew on 'Valiant' clusters taken last summer. Note the thick, white growth and the purplish-brown appearance of the infected berries. Darkened, water-soaked lesions with white/grey growth can be seen on the rachis at the top of the

Management

Due to the multiple generations of downy mildew that occur during a single growing season, significant disease pressure should be expected every growing season. Timely management is critical to avoid loss of yield and fruit quality. Good sanitation practices such as raking and destroying leaves in the fall and pruning out infected shoots and berries are recommended. Any practice that improves air flow within the canopy (e.g. canopy thinning, weed control), will help. Also, opening the canopy through shoot thinning and positioning will help improve penetration of fungicides.

Fungicides are an essential part of grape downy mildew control. The critical period for protecting the fruit is from pre-bloom to 3-4 weeks post bloom, the time when fruit are susceptible to infection. Fungicide applications should continue after 3-4 weeks post bloom as the disease can quickly build up in a vineyard, limiting the photosynthetic capability of a vine and delaying ripening. Protectant fungicides effective for controlling downy mildew include mancozeb, captan, ziram, and coppers (fixed copper and Bordeaux mixture).

A number of systemic fungicides are available for downy mildew management. The strobilurins are very effective. Abound and Pristine have excellent activity and are the most effective for downy mildew control. Sovran is moderately effective if used at the highest labeled rate. Flint is also registered for downy mildew management. The strobilurins have limited kick-back activity for downy mildew (~48 hrs), but act as excellent anti-sporulants, stopping spore production on infected tissue. Strobilurin-resistant downy mildew has popped up in several states. When resistance develops, the fungicide will no longer be effective and disease increases in the vineyard. To manage fungicide resistance, strobilurins should always be tank-mixed with a broad-spectrum fungicide like captan or mancozeb. The phosphorus acid fungicides (ProPhyt, Phostrol, Agri-Fos, Aliette) are good protectants and have some curative activity, but should be used at the highest label rate if downy mildew infections are already present.

Ridomil (Ridomil Gold MZ and Ridomil Gold Cu) is the silver bullet of downy mildew control, having curative activity up to 72 hrs after an infection has occurred as well as having excellent protectant properties. The downside to Ridomil is that it is expensive and should not be applied if any sporulating lesions are present, as this can cause a quick build-up of Ridomil-resistant downy mildew. Ridomil Gold MZ has mancozeb as a component, making it also suitable for black rot control. Ridomil Gold Cu has copper as a component, making it suitable for powdery mildew control.

The SI fungicides (Rally, Elite, Procure, and Rubigan) while extremely effective for black rot control, have no activity against downy mildew.

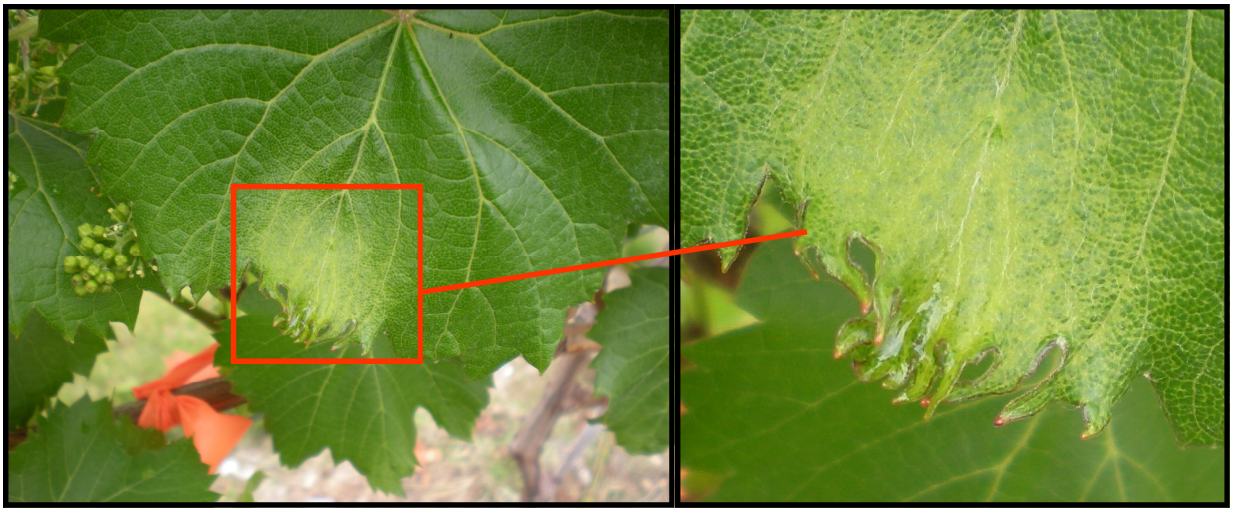
This article was based on information found in the following:

Midwest Small Fruit and Grape Spray Guide 2010
http://www.ag.purdue.edu/hla/Hort/Documents/ID-169-2010.pdf

Downy Mildew of Grape Fact Sheet (HYG-3013-08), Michael A. Ellis, Department of Plant Pathology, The Ohio State University
http://ohioline.osu.edu/hyg-fact/3000/pdf/HYG_3013_08.pdf

Options for late-season disease control in grape vineyards, Annemiek Schilder, Dept. Plant Pathology, Michigan State University
http://www.isaacslab.ent.msu.edu/grapescout/meetings/fungicides.pdf

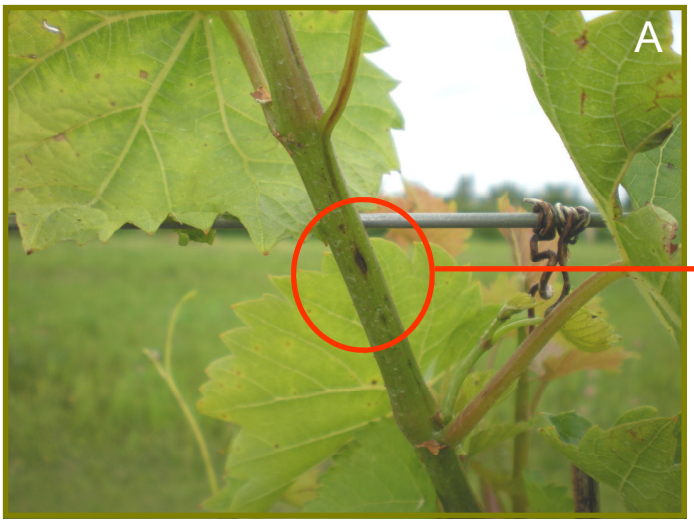
What's lurking in or near the vineyard this week?

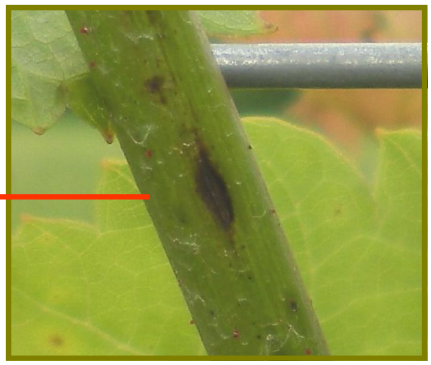


Growth regulator herbicide injury on the leaf of La Crosse (left image). Close-up of characteristic growth regulator symptoms showing "fingering" of leaf margins (right image).

What's lurking in or near the vineyard this week?

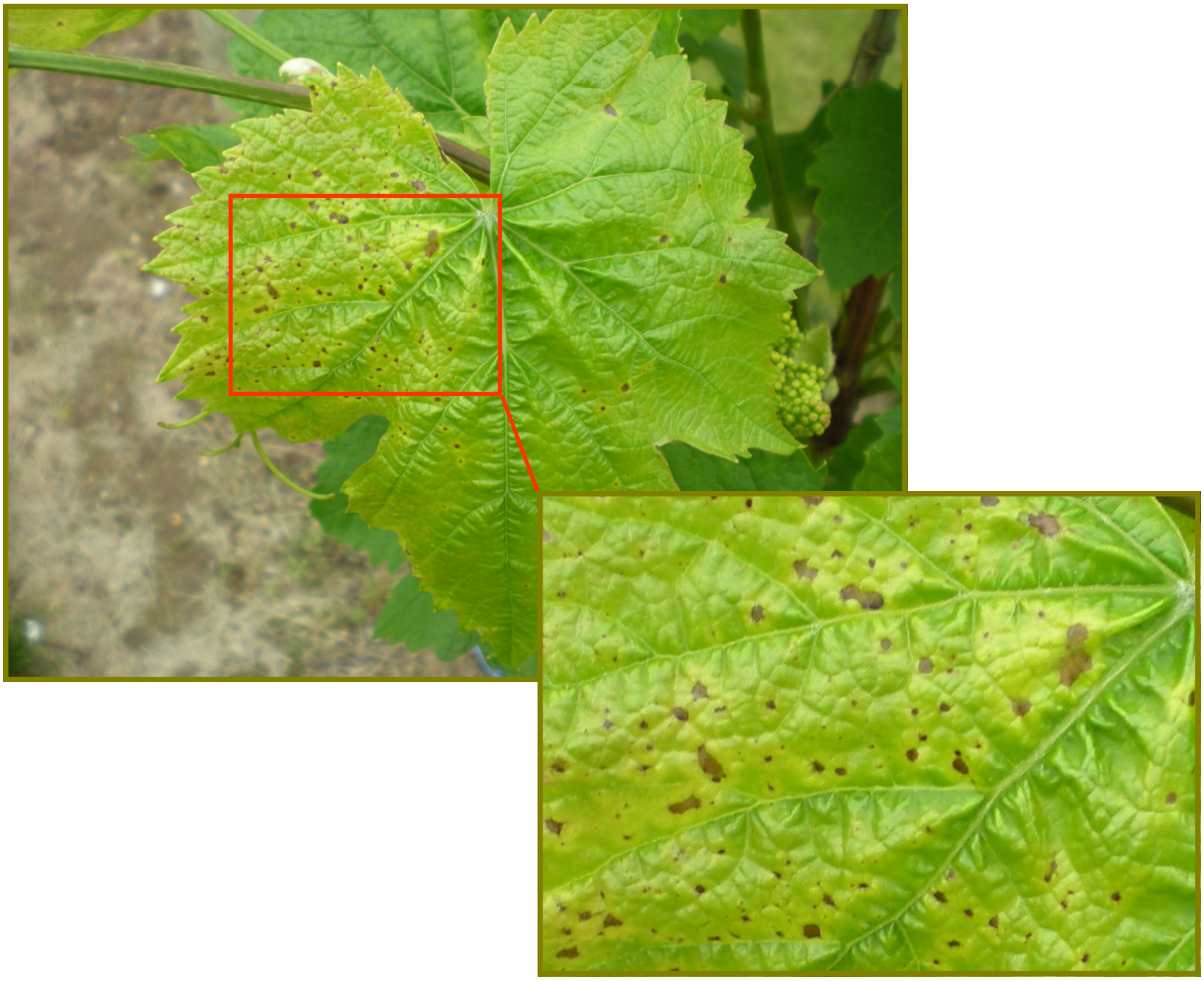
This grapevine shoot (left) was browsed by a deer.





Anthracnose on shoot (A) and leaves and tendrils (B) of the cultivar La Crosse.

What's lurking in or near the vineyard this week?



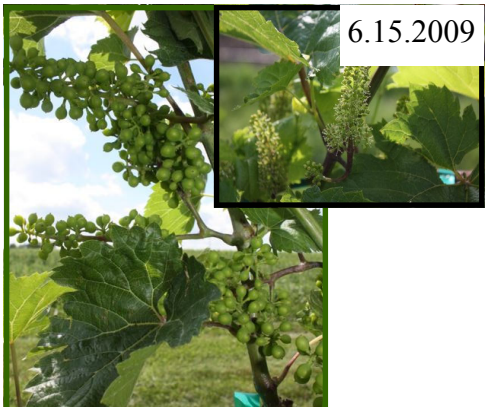
The grape leaf of La Crosse (above) has a disease problem. The "oily", yellow-green patches are symptoms of Downy mildew.

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[1].

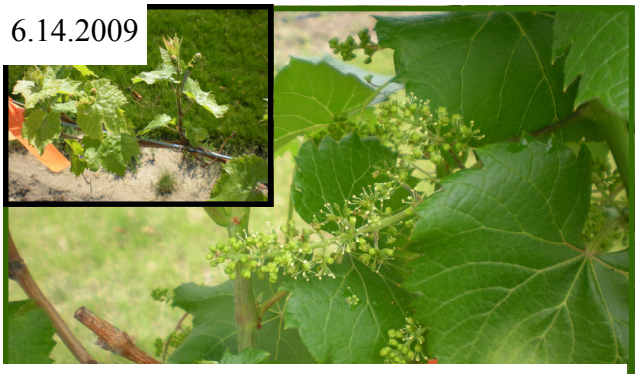
Brianna Flowering at PARS 6.14.2010

Brianna at WMARS 6.16.2010

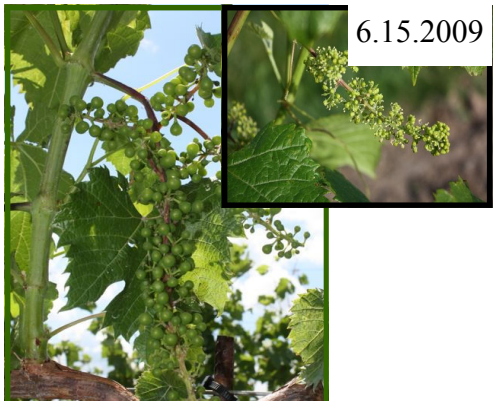
Foch Flowering at PARS 6.14.2010



Foch at WMARS 6.16.2010



La Crescent Flowering at PARS 6.14.2010



La Crescent at WMARS 6.16.2010

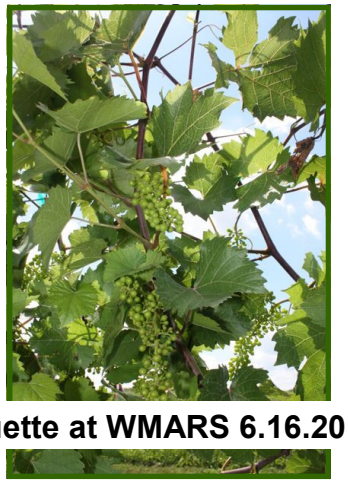
[1]New buds selected at PARS this week for following phenology since buds featured in previous issue (week of 5.10.2010) of the IPM report were damaged by frost.

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[1].

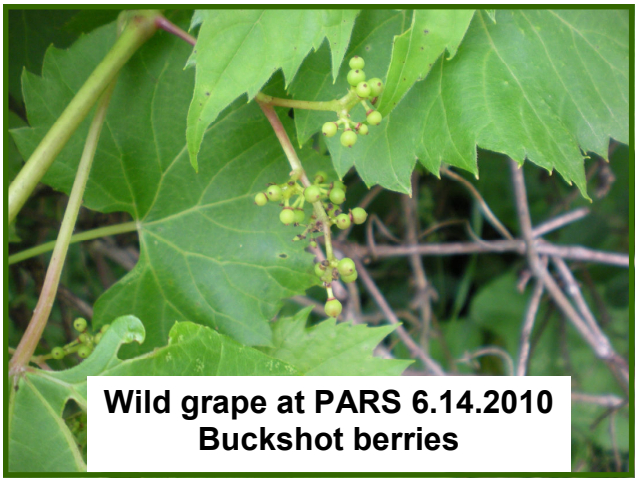
La Crosse at PARS 6.14.2010

La Crosse at WMARS 6.7.2010

Marquette at PARS 6.14.2010



Marquette at WMARS 6.16.2010



Wild grape at PARS 6.14.2010
Buckshot berries

[1]New buds selected at PARS this week for following phenology since buds featured in previous issue (week of 5.10.2010) of the IPM report were damaged by frost.

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]
6/13/2010	546	372	472

[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]
6/13/2010	774	556	648

[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