New England Grape Notes

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Phenology: Grapes are in various stages of bloom and post-bloom now. Shoots on many varieties are quite long and require shoot positioning with catch wires (VSP) or tying to lower wires (HWC and GDC). This is especially important to help spread the shoots and allow air circulation and light and spray penetration into the canopy.
The persistent wet weather has made disease management more important than ever. Mistakes now will can have increasing consequences as the rest of the growing season goes on. See below for more information on how to approach this task.

Vine Nutrition: bloom petiole analysis is a key element of verifying and adjusting your fertilizer program. See the last issue of Grape Notes for more information on grape tissue sampling. Tissue samples can be analyzed at the UMass Soil & Tissue Testing Lab or Brookside Farm Laboratory, New Knoxville, Ohio, Plant Analysis Lab/ICP, Cornell Univ., Ithaca NY, or Agricultural Analytical Service Lab, Penn State Univ., University Park, PA, Spectrum Analytic Labs, Washington Court House, OH.

Any nitrogen applications should be made soon (before mid-July) to avoid stimulating late season growth that will not adequately harden off for winter. A very good discussion on "Optimizing Nitrogen Use in Vineyards" by Jamie Hawk and Tim Martinson can be found at: http://www.vinebalance.com/pdf/newsletters/SustainableViticulture1.pdf. Foliar applications of other nutrients (e.g., epsom salts or Solubor) can be made as needed throughout the season. For some good information on fertilizing grapes visit Spectrum Analytic Library at:
http://www.spectrumanalytic.com/support/library/rf/A_Guide_to_Fertilizing_Grapes.htm.

Conservation Practices: The frequent rains this year have pointed out a critical need to implement good soil and water conservation practices to avoid problems within and outside the vineyard. Poor drainage can cause soil saturation which is detrimental to vine health, run-off can cause soil erosion in the vineyard as well as buffer areas around the vineyard. It is best, of course, to address all these issues before planting the vineyard (actually before selecting a vineyard site), but sometimes issues become evident after the vineyard is in place. For an excellent discussion of "Soil and Water Conservation Practices for Vineyards" go to http://www.vinebalance.com/pdf/newsletters/SustainableViticulture2.pdf.

Disease Management: The report below is from Michigan but contains some pertinent information for New England. To view the disease model predictions for southern New England go to http://www.hort.uconn.edu/ipm/grapes/htms/09diseaseriskupd.htm. Vermont's IPM Updates can be seen at http://pss.uvm.edu/grape/newsletters/. New York has some grape disease models available at http://newa.nrcc.cornell.edu/newaDisease/grape_dis.

Disease Control in Grapes Critical During and After Bloom

Annemiek Schilder, Michigan State University

As most grapes are in bloom now, we should remember that the bloom and the post-bloom periods are critical for disease control in grapes. During these growth stages, the young clusters are highly susceptible to diseases, including black rot, downy mildew, powdery mildew and Phomopsis, and most of the fungi are active at this time of year. The risk is especially great if we have a lot of rain, like we've had recently, and moderate to warm temperatures during this time. Prolonged wet conditions during bloom can also allow Botrytis to get a foothold in the clusters of susceptible varieties by promoting growth on senescing flower parts.

The main aim for fungicide sprays at this time is to protect the clusters from infection by these pathogens while simultaneously protecting the foliage as well. Some infections that occur during this period may remain dormant (invisible) until the berries are close to veraison (black rot) or ripen (Phomopsis, Botrytis). As the berries grow and mature, they become naturally resistant to black rot, downy mildew and powdery mildew, and the need for protection diminishes after the susceptible period ends. This happens quite rapidly for downy mildew (two to three weeks after bloom), whereas for powdery mildew it is about three to four weeks after bloom. Concord grapes become resistant to black rot four to five weeks after bloom, but some wine grape varieties may remain susceptible to black rot for up to eight weeks postbloom.

However, be aware that the cluster stem (rachis) and berry stems can remain susceptible longer than the berries in most cases. The only disease to which berries remain susceptible throughout their development is Phomopsis, but the risk of infection diminishes after bunch closing because inoculum levels drop off then. Botrytis is just the opposite in that berries actually become more susceptible as they get closer to harvest, especially in tight-clustered varieties. In general, aim to protect the clusters from the major diseases from immediate pre-bloom until four to five weeks after bloom.

Black rot

Temperatures in the high 70's and low 80's are perfect for black rot. At these temperatures, only six to seven hours of wetness are needed for infection. Black rot is a tricky disease because infections can remain latent (invisible) for a long period of time, so you won't know that you have the disease until is it too late to do anything about it. However, one can scout for the small, round leaf spots – a lot of black rot leaf lesions indicate high disease pressure from ascospore inoculum and also contribute to fruit infections. In a field with a history of black rot, old fruit cluster remnants left hanging in the trelli
are major contributors to infection. Fruit infections can take place anytime from bloom onwards, but only become apparent

sometime between bunch closure and veraison. The period from immediate pre-bloom through early fruit development is crucial to protect grapes against black rot infection.

The approach to black rot control now focuses primarily on protecting the clusters from infection. EBDC sprays applied earlier in the season for Phomopsis will also control black rot leaf infections, and therefore no sprays are recommended specifically for black rot on the foliage early in the season. In five years of trials in New York, good black rot control was achieved with one immediate pre-bloom and one to two post-bloom fungicide sprays. A second post-bloom application is strongly advised if black rot has been a problem in the vineyard the previous year, and should be considered prudent if wet weather is anticipated. During three years of fungicide trials in a 'Concord' vineyard in Fennville, Michigan, just two post-bloom applications of sterol-inhibitor fungicides (Nova, Elite) have provided very good control under high black rot pressure. An immediate pre-bloom application is advised only if black rot was severe in the vineyard in question in previous years.

Sterol-inhibitor (SI) fungicides (e.g., Nova and Elite) continue to provide outstanding control of black rot, and provide several days of post-infection activity. Currently, there are various "generic" tebuconazole products on the market, e.g., Orius and Tebuzol, that may be more cost-effective. When using SI fungicides on a post-infection schedule, use the highest label rates because post-infection activity is strongly rate-dependent, particularly when extended "kickback" activity is required. The strobilurin fungicides (Abound, Flint, Sovran, Pristine) are excellent protectants, but provide only limited post-infection activity (probably less than 24 hours). Flint and Pristine should not be used on Concord grapes because of potential phytotoxicity.

Phomopsis

Cane and leaf lesions have been showing up in high numbers in susceptible varieties. Each rainfall event will lead to spore dispersal and can also lead to successful infection if the tissue remains wet for a sufficient amount of time. The optimum temperature for infection is 59 to 68ºF, at which time about six to 10 hours of wetness are needed for infection. The longer the tissue stays wet, the more severe the symptoms will be. Since rachis and flower clusters are now fully exposed, we should be concerned with preventing Phomopsis infection of the rachis and fruit, especially in mechanically pruned vineyards and vineyards with a history of the disease. Rachis infections are most closely correlated with yield losses at harvest.

If at this time you find a lot of lesions on the leaves and canes, infection pressure will be high for the fruit also. It is not too late to apply fungicides for cluster protection from Phomopsis. Best fungicide options for control of Phomopsis during and after bloom are Abound, Sovran or Pristine (do not use Pristine on Concord grapes). Phosphorous acid fungicides, such as ProPhyt and Phostrol, are also good and cost-effective alternatives. These are systemic and will most likely provide some kick-back activity. In trials done in Michigan, ProPhyt provided very good control of Phomopsis when sprayed on a 14-day schedule. Tighten the schedule and increase the rate if disease pressure is high. Ziram is a moderate to good protectant against Phomopsis and can be a tank-mix partner with any of the phosphorous acid fungicides. EBDC fungicides are good protectants, but cannot be applied after bloom has started in grapes grown for the National Grape Cooperative. EBDC's have a 66-day pre-harvest interval.

Powdery mildew

No powdery mildew has been sighted in vineyards yet. However, we have had multiple occasions for primary ascospore release this spring and trap plants placed in a high disease-pressure vineyard showed evidence of infection. Ascospore discharge is initiated in the spring if 0.1 inch or rain at an average temperature of 50ºF or more. This results in thorough wetting of the bark where the cleistothecia have overwintered. When the cleistothecia are sufficiently wetted, infectious ascospores are discharged within four to eight hours and are carried by wind to susceptible plant tissues. They can infect any green surface on the developing vine and do not need water for infection. The fungus then grows on the plant surface and produces a second type of spore (conidia) that are windborne and cause secondary infections. Under optimal conditions, the disease can spread rapidly, as the time from infection to production of conidia can be as short as seven days. Although infections can occur at temperatures from 59 to 90ºF, temperatures between 68 and 77ºF are optimal for disease development. Temperatures above 95ºF inhibit spore germination, and the fungus may be killed at temperatures above 104ºF.

Berry age has a marked effect on susceptibility to powdery mildew. Researchers in New York showed that when clusters of 'Chardonnay,' 'Riesling,' 'Gewürztraminer' and 'Pinot noir' were inoculated from pre-bloom to six weeks post-bloom, only fruit inoculated within two weeks of bloom developed severe powdery mildew. Berries became substantially resistant to infection by three to four weeks after bloom, resulting in diffuse, non-sporulating colonies on berries, and were virtually immune at six to eight weeks after bloom. Therefore, early sprays (from immediate pre-bloom until three to four weeks after bloom) are critical for preventing powdery mildew on the clusters. This usually coincides with critical sprays for black rot. For wine grapes, control of diffuse infections is also important as these can predispose the grapes Botrytis bunch rot and sour rot later in the season.

Sulfur remains an effective and inexpensive protectant fungicide for powdery mildew control on non-sulfur-sensitive grape varieties. The most effective systemic fungicides for powdery mildew control are the sterol inhibitors (Nova, Elite, Vintage, etc.) and the strobilurin fungicides (Pristine, Sovran, Abound and Flint). Luckily, we do not have any reports of fungicide resistance to strobilurins in the powdery mildew fungus in Michigan, but in some vineyards where sterol inhibitors have been heavily used for many years, they appear to be less effective than they used to be. Newer fungicide options that provide excellent control of powdery mildew are Quintec, Endura, and Adament. Therefore it would be best to not entirely rely on SI's during the most critical period for fruit infection (immediate pre-bloom until three weeks after bloom), but alternate or tankmix with other effective fungicides. Over the past two years, we have noticed that Ziram as a tank-mix partner did improve control of powdery mildew in a spray program.

Downy mildew

Downy mildew has already been sighted several weeks ago in Chancellor and wild grapes. Currently, 'Chancellor' clusters in

an unsprayed vineyard in Fennville (MI) are showing heavy infection pressure. We have had several opportunities for primary infection already. These occur with rain (at least 0.4 inches) and temperatures are above 50ºF over a 24-hour period. Check the recent weather conditions at or near your location at Enviro-weather. It takes seven to 12 days for the lesions to form after infection has taken place, so keep an eye out for downy mildew. Early in the season, downy mildew lesions may be confused with low-concentration Gramoxone and possibly Chateau herbicide injury, which also cause yellow spots on leaves. However, if no herbicide was used and no herbicide spots are present on lower leaves, the spots may be downy mildew. To confirm that, you can enclose a leaf with lesion in a ziplock bag with a moist paper towel and leave it out in the dark overnight. If white sporulation appears on the underside of the leaf, it is downy mildew.

A spray for downy mildew before or just after bloom is recommended for susceptible varieties, especially in vineyards with a history of disease. Early infections can lead to severe downy mildew infection and premature defoliation of the vine. Ridomil Gold MZ and Ridomil Gold Copper have excellent curative and protectant activity against downy mildew. Under moderate infection pressure, they will provide three to four weeks of protection. Of the strobilurins, Pristine, Abound, and Sovran are good choices. Other effective fungicides are mancozeb, ziram, and fixed coppers. ProPhyt and Phostrol are also good alternatives: they provides excellent curative and about seven to 10 days of protective activity. Under high disease pressure or when spraying after an infection period, use higher rates. (***Source:*** *Michigan Fruit Crop Advisory Team Alert, June 23, 2009*)

Downy Mildew Management

Anne DeMarsay, Univ. of Maryland

Downy mildew is often difficult to manage because it requires specific weather conditions to become a serious threat, and because it can develop into an epidemic very quickly in favorable weather. While fruit become immune to infection within 4 weeks after bloom, vines remain vulnerable to defoliation throughout the season. Premature loss of leaves can jeopardize yield and increase the danger of winter injury.

Downy Mildew Basics

- The downy mildew (DM) pathogen, *Plasmorpara viticola*, is a fungus-like organism that overwinters in the soil of the vineyard as resting spores (oospores) produced from infections in last year's fallen leaves.
- Overwintering infections may become active in the spring as soon as the 5th or 6th leaves emerge (about 10-inch shoot length). Oospores germinate to produce sporangia (fruiting bodies) during rainy periods at temperatures of 52˚F or higher.
- Primary infections occur when sporangia are blown or splashed onto shoots, leaves, or developing clusters. Sporangia release "swimming" spores (zoospores) onto wet tissue. Zoospores migrate to stomata and may cause infection within a few hours.
- Secondary cycles of infection begin when these primary infections produce sporangia, visible as cottony white fibers on the undersides of infected leaves and on clusters. These sporangia may be blown long distances.
- Rapid secondary spread requires warm, humid nights (65-77˚F, > 95% RH) followed by cloudy weather and frequent showers. Under ideal conditions, each new infection can develop and produce spores in 4 to 5 days. Disease levels can escalate quickly from minimal to devastating.

Managing Downy Mildew

- DM epidemics are driven by moisture in the air and soil, and on the vine. Improving soil drainage and air circulation and speeding up vine drying will help to prevent primary DM infections and slow secondary spread if infections do appear.
- **Prevention of primary infections is key**. Begin protectant fungicide sprays when shoots are 6-10 inches long in wet spring (especially after warm, wet winters) and in vineyards where DM was a problem in the previous years. Otherwise, add a protectant no later than the pre-bloom spray.
    - Mancozeb, copper, and captan offer good protection against DM when applied at 7-14 day intervals.
    - Strobilurin-resistant strains of DM have been found in Maryland, so do not rely on Abound or Pristine alone for protection.
- **After bloom, scout regularly for DM on leaves, shoots, and clusters**. Infected clusters may fail to set fruit or turn brown, shrivel, and become covered with white, cottony spores. Early leaf symptoms are reddish or yellow "oil spots" on the upper sides that soon produce white, cottony spores on the undersides. Late lesions turn brown, and severely infected leaves may drop.
- **If no DM is present in your vineyard**, continue protectant sprays through the 1st cover spray (2nd post-bloom spray) to fully protect fruit, then adjust your cover sprays according to the weather. Berries become immune to direct infection about 2 weeks after bloom but may be infected via the rachis for about 2 more weeks.
    - Captan, copper, and phosphites (Phostrol, ProPhyt, Topaz) are options after you reach the seasonal limit or 66-day PHI for mancozeb. Phosphites should be applied every 7 days for the best protective activity and rotated with other materials so they do not loose effectiveness.
- **If you see symptoms of DM**, apply a fungicide with post-infection and anti-sporulant activity as well as protective activity **as soon as possible.**
    - Ridomil Gold is now available only as a premix with mancozeb (66-day PHI) or copper (42-day PHI). It is very

effective on serious outbreaks but highly resistance prone - and expensive. Make no more than 2 (preferably 1) application per season, and rotate to another DM fungicide between applications.
    - Phosphites (0-day PHI) offer good post-infection and anit-sporulant activity, especially on "oil spot" lesions that are not yet sporulating. As noted, they must be applied weekly for good protection and rotated with other DM materials.
- Two vegetable DM fungicides with new chemistries have recently been labeled for grape DM, and trials are underway to determine their efficacy. Revus (mandipropamid) is a Group 40 funcide from Syngenta with a 14-day PKI, and Presidio (flucopicolide) is a Group 43 fungicide from Valent with a 21-day PHI. both are reported to have protective and at least limited curative activity. These new materials may be useful in later-season DM management.

(***Source**: Maryland Timely Viticulture, Early July 2009*)

POWDERY MILDEW ALERT

Serious outbreak of Powdery Mildew on Chardonnay in WINDSOR, CT. 23 July 2009

336 of 842 (~40%) leaves on 50 sampled stems from 10 Chardonnay grape vines were observed to be infected by powdery mildew. The median infected leaf had 4-5 colonies of the fungus covering 8-12% of the leaf surface. Due to the recent cold wet weather, 95% of the colonies were on the underside of leaves and had a dusky, light brown appearance. Often, theses colonies were associated with discoloration of vascular tissue (leaf veins) and yellow patches on the opposite, upper surface of the infected leaf. Thus, scouting for this disease is difficult ... each leaf must be turned over and examined closely.

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Powdery Mildew Post Infection Control

Alice Wise and Wayne Wicox, Cornell Univ.

There are several options to clean up powdery mildew infection including JMS Stylet Oil; Nutrol (monopotassium phosphate); potassium bicarbonate products like Kaligreen and Armicarb 100; and Oxidate (hydrogen peroxide). Organic options are organic formulation JMS, Kaligreen, and Oxidate. Sulfur has good activity against very young infections, but is not great once it's easy to see that you have a problem to deal with. There are organic formulations of sulfur. None of these materials will clean up and sanitize infected fruit. At best, they will only kill the PM colonies, leaving scarred fruit but halting the spread of infection to clean fruit or uninfected parts of the individual cluster or berry. Regardless of strategy, it is probably wise to check fruit closely (look at cluster backsides, clusters jammed up against posts, etc.) shortly after treatment and retreat at the proper interval if PM infection persists. These materials work strictly by contact, and it's virtually impossible to contact every square inch of every berry. That being said, the more coverage you get, the greater the effect you'll obtain.

Stylet Oil: Of the products listed, Stylet Oil has provided the best eradication of active infections and is the only material that provides any forward protection. In addition to its post-infection and eradicative activities, the best information available indicates that Stylet Oil provides at least 3 days, sometimes more, of forward protection under dry weather conditions. However, the oil residue apparently washes off in as little as 1/3" of rain, after which most of the protective activity is gone. Thorough coverage is absolutely essential for this or any of the other post-infection PM materials to work. Direct spray at the fruit zone with lots of water. Experience dictates that Stylet Oil works if it makes contact with the infected berries. If the clusters are packed in, if leaf pulling hasn't been done, spray coverage will be compromised and PM will persist. If choosing Stylet Oil, read the label thoroughly as it is incompatible with a number of key materials including sulfur. Note that JMS Stylet Oil has both a standard and an organic formulation. They differ in the inert ingredients. Also be aware of warnings about application in hot weather (phyto risk).

Oxidate: If sulfur has been a regular part of the schedule and the proper interval has not passed, Oxidate is an option. The Oxidate label calls for consecutive sprays at 128 fl. oz per 100 gallons. This is not a cheap program. Time also may be a factor - getting the leaf pulling done and getting consecutive cluster sprays on is time prohibitive for some growers. There have been several questions on tank mixing Oxidate. BioSafesystems feels that tank mixing Oxidate with either DF or a liquid sulfur should be no problem. To be sure, you might do a jar test first as per the Oxidate label.

MKP, potassium bicarbonates: These are alternatives to Oxidate when the use of sulfur precludes the use of oil. According to Wilcox, Nutrol, Kaligreen and Armicarb function in the same topical, eradicative,

"salt on a slug" mode. Again, these do not provide forward protection and they work best when PM infection is in the very early stages. Our experience with Kaligreen in 2008 verified that coverage was directly related to the efficacy of the spray. Also, remember that these materials are post-infection only so that forward protection of young berries is still necessary. (***Source**: Long Island Fruit & Veg Update, No. 15, June 19, 2009*)

Insect Management: Potato Leafhopper, Grape Leafhopper, Grape Berry Moth, Two-Spotted Spider Mites and European Red Mite, and Japanese Beetles are all insects that can become problematic at this time of year. Of these, Grape Berry Moth is the one that will cause direct damage to fruit. The others cause damage to leaves by feeding. This can affect yield by weakening the vines and reducing the leaves' ability to provide carbohydrates and other compounds to the fruit. Thorough scouting of the vineyard to determine the presence and abundance of any of these pests is important for making informed spray decisions.

See last weeks Grape Notes for more on Grape Berry Moth.

Weed Management: The effectiveness of weed management programs is easy to assess at this time of year. If all is well, congratulations. If you are seeing weed problems emerging, it is important to ensure that you have a record of what was done (cultivation, herbicides used, rate, date of application, weather conditions at the time of application, etc.), where weeds are becoming established (map), and what those weeds are (annual grass, perennial grass, annual or perennial broadleaf weeds, weed species if known), in order to rectify the problem this year and avoid the same problem next year.

An excellent discussion of alternative weed management systems in New York, go to: http://www.vinebalance.com/pdf/newsletters/SustainableViticulture3.pdf.

Weather data: compiled from various sources for 6/16/09 (*6/21/09)

Region/Location	2009 Growing Degree Days		Precipitation 1-week gain
	1-week gain	total accumulation for 2009	
Cape Cod	76	535	0.80"
Southeast MA	67	561	0.99"
East MA	70	636	1.10"
Metro West (Waltham) MA	68	610	1.90"
Metro West (Hopkinton) MA	--	--	--
Central MA	72	561	2.45"
Pioneer Valley MA	80	617	3.16"
Berkshires MA	112	664	5.42"
South Hampton, NH	88*	652*	2.40"*

Vermont Weather Data can be found at: http://pss.uvm.edu/grape/2009DDAccumulationGrape.html.
Connecticut Weather Data can be found at: https://www.hobolink.com/s/d0696313715dd96f86b25f3552cc1f47

FYI - check out the newly formed Massachusetts Farm Winery and Growers Association and New Hampshire Winery Association and the Vermont Grape and Wine Council. These associations are of, by and for you! Join today!!

For Massachusetts residents, check out the new Massachusetts "Ag Tag" license plate. Each purchase can yield $15 for the

Massachusetts Farm Winery and Grower's Association through a check-off plus pooled funds available for various programs or competitive grants. Get yours today!

This message is compiled by Sonia Schloemann from information collected by:
Arthur Tuttle, Dan Cooley, Hilary Sandler, Bill Coli and students from the University of Massachusetts
and Richard Kiyomoto from the University of Connecticut. We are very grateful for the collaboration with UConn.

We also acknowledge the excellent resources of Michigan State University, Cornell Cooperative Extension of Suffolk County, and the University of Vermont Cold Climate Viticulture Program. See the links below for additional seasonal reports:

University of Vermont's Cold Climate Grape Growers' Newsletter
UConn Grape IPM Scouting Report

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