The UNIVERSITY of VERMONT EXTENSION
Cold Climate Grape Production

Cold Climate Grape IPM News

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Critical Period for Disease Management - *3 Key Sprays*

Immediate Pre-Bloom/Trace Bloom — 1st Post-Bloom Spray — 2nd Post-Bloom Spray

We are approaching a critical period in disease management for a number of diseases including **Phomopsis, black rot, downy mildew**, and **powdery mildew**. **The immediate pre-bloom through 3 to 4 weeks after bloom period is the most critical time for protecting the fruit from infection**. This is the time to use the "big guns" for disease management.

What do I mean by "big guns"? These are fungicides that are rated *highly* effective against these diseases (see last week's newsletter) and, even though you may normally want to minimize their use for resistance management, they (e.g., SI and strobilurin fungicides) are usually warranted at this time because of the susceptibility of the fruit to infection.

The sterol-inhibiting (SI) fungicides such as Nova and Elite are highly effective against powdery mildew and black rot and if one of these materials is tank-mixed with a mancozeb fungicide which is highly effective against downy mildew and Phomopsis, then you should be protected. In addition, the SI fungicides can provide "post-infection" or "reach-back" activity for black rot. In other words, infection may have already taken place but if the material is applied within a certain number of days after infection (i.e., up to one week) and symptoms have not developed yet, the material will suppress disease development. [This is in contrast to fungicides that are primarily "protectants" such as the mancozeb fungicides (e.g., Dithane, Manzate, Penncozeb). They provide a protective barrier against germination and infection and are not considered "post-infection" materials.]

Since last year was a bad year for black rot in some vineyards, it might be wise to use the above tank mix (Nova or Elite with mancozeb) for at least two applications, i.e., immediate pre-bloom and then 10-14 days after immediate pre-bloom (=1st post-bloom spray), because

of the high potential for overwintering inoculum this year before switching to another fungicide. Note that the mancozeb products have a pre-harvest interval of 66 days (i.e., cannot be applied within 66 days of harvest) and thus, may not be an option for the 2nd post-bloom spray (7-14 days after first post-bloom spray) depending when this occurs and when you expect to harvest a particular variety. If this is the case, a potential option for the 2nd post-bloom spray would be Sovran, a strobilurin fungicide, if black rot and powdery mildew are of particular concern in your vineyard.

Note that in grape growing regions where the SI fungicides have been used over a number of years, resistance to them has developed in the powdery mildew population and they do not provide the level of management desired. In an effort to delay resistance development, it is recommended that SI fungicides not be used more than three times per season, regardless of which SI product is used.

The powdery mildew fungus has also developed resistance to strobilurin fungicides where they have been used over a number of years. For example, in vineyards with a overall history of more than 15 to 20 applications of strobilurins, the risk of resistance is high and they may not provide the level of management desired. When resistance develops to one of the strobilurins, it means that there will be resistance to all of the strobilurins.

The bottom line is to use the SI, strobilurin, and other fungicides which have a high risk for resistance development judiciously to extend the “effective life” of the materials.

There are a number of other fungicides that would be effective against Phomopsis, black rot, downy mildew, and powdery mildew. As mentioned in a previous newsletter, selection of a fungicide(s) involves a number of considerations. Please refer to the following publication for fungicide options, rates of application and other specific cautions for their use during this critical time of disease management:

2006 New York and Pennsylvania Pest Management Guidelines for Grapes

Read All Pesticide Labels Carefully Before Purchase and Use to Determine if Appropriate for your Vineyard Situation

There are a number of websites on which pesticide labels can be viewed. One example is the Crop Data Management Systems (CDMS) website: http://www.cdms.net/manuf/manuf.asp?t=1 There is a search feature where you can type in the brand name of the product. You will have the option of seeing the label and/or the Material Safety Data Sheet for the product. However, be aware that the label that comes with the product you purchase is the legal document for its use.

Organic Fungicides - Disease management in organic vineyards presents significant challenges because of the susceptibility of grapes to various diseases, because our wet weather is favorable for disease development, and because there are relatively few effective, organically-approved fungicides for certain diseases. The following table is from

"Organic Small Fruit Disease Management Guidelines -- Integrated Management of Grape Diseases"

by Dr. Mike Ellis and Mizuho Nita at Ohio State University. It provides the relative effectiveness of some of the fungicides that are potentially acceptable in certified organic programs.

Note: Before using any product, its organic approval should be confirmed.

The Guidelines also provide valuable information on each material and potential options for specific time periods during the growing season, including the critical time of immediate pre-bloom to 3 to 4 weeks after bloom. It is recommended reading if you are involved in organic grape production.

5E) Table 3: Relative effectiveness of organically approved fungicides for controlling grape diseases.

		Disease				
Material	**Anthracnose**	**Black rot**	**Powdery mildew**	**Downy mildew**	**Phomopsis cane and leaf spot**	**Botrytis bunch rot**
Lime sulfur	H	W	H	W	M	W
Sulfur	W	W	H	W	W	W
Copper fungicide	M	M	H	H	W	W
Horticulture grade spray oils	W	W	H	W	W	W
Salts: Monopotassium Phosphate Potassium bicarbonate (Kaligreen, Armicarb)	W	W	H	W	W	W
Hydrogen peroxide (oxidate)	W	W	M	W	W	W

H= highly effective

M= moderately effective

W= weak or not effective

Webbing of the grape berry moth larvae.

Substantial damage caused by grape berry moth larvae.

Arthropod Management —

The time immediately before bloom and 10-14 days post-bloom are key times to manage important grape insects such as the **Grape Berry Moth, Grape Leafhoppers**, and **Grape Phylloxera (leaf form)**

Similar to fungicides, the following are some considerations in selecting insecticides:

- Efficacy
- Spectrum of Activity
- Applicator Risk from exposure to material
- Resistance Management
- Label Restrictions
- Sensitivity of plants to material, i.e., risk of phytotoxicity
- Cost of material

In addition, non-target, negative impacts to beneficial insects should be considered. For example, Danitol (a pyrethroid insecticide) is considered harsh on natural enemies important in biological control which, when used, may increase the risk of additional pest flare-ups. In integrated pest management the goal is to develop a sustainable approach to managing pests which combines biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. It is not easy and it takes a significant amount of knowledge and effort but, in my opinion, it is a worthy goal.

Grape Berry Moth (GBM) - This insect is considered one of the most important insect pests in the Northeast. Above are pictures taken in Vermont where it has caused considerable damage when not managed. The following is a synopsis of some important points about this insect:

GBM

- Overwinters as pupae in fallen leaves
- Usually two generations per growing season
- Adults emerge in mid- to late- May; moths peak in late June
- Second flight starts in late July, peaks in early August and continues in September
- Adult moth spends day resting on vine; active mid- to late- afternoon to dusk, has rapid, zig-zag flight
- Eggs are deposited singly on buds, stems or on berry; late in season, they are deposited directly on berry
- First larvae in spring feed on tender stems, blossom buds and newly set berries --- damage can be significant since single larva can damage a dozen or more berries by feeding on buds, flowers and newly set fruit
- Second generation larvae feed only on berries; red spot where larva enters berry; enter where berries touch each other or where berry is joined to stem; up to 7 berries can be destroyed by single larva
- Larvae produce silken threads that tie several berries together; injured berries ripen prematurely, split, become infected with fungal rot organisms
- Management:
  - -Cultivate overwintered leaves on vineyard floor to help reduce resident population
  - -In light infestations, single berries can be removed by hand
  - -Conduct Risk Assessment to determine risk category of vineyard.
  - -Scout vineyard to determine need to spray.

As indicated above, one way to reduce the resident population in a vineyard is to cultivate overwintered leaves and bury them with at least one inch of soil or compost; adult moths will not emerge if this is done at least 15 days before the bloom period. However, moths will come into the vineyard from the surrounding area so it is important to conduct a Risk Assessment to determine the need for management.

Further details about GBM biology and pictures of the insect and damage can be found at:
http://www.nysipm.cornell.edu/factsheets/grapes/pests/gbm/gbm.pdf

The Risk Assessment protocol developed by Martinson, et al., can be found at:
http://www.nysaes.cornell.edu/pubs/fls/OCRPDF/138a.pdf

The Risk Assessment article describes how to evaluate the GBM risk (low, medium, high) of vineyard blocks. If you had GBM damage last year (e.g., over 6% damaged clusters in July), portions of your vineyard are adjacent to wooded areas or hedgerows, or if the vineyard had prolonged periods of snow cover, you should consider the vineyard a “High Risk” vineyard and incorporate an insecticide into your **1st Post-Bloom spray**.

The insecticide Sevin is a common material used for GBM management and is also effective against grape leafhoppers (assuming resistance has not developed). Dipel is an organic option for GBM but timing is critical; it should be applied when larval feeding begins and repeated after 5-7 days.

Insecticide options and important details concerning those options can be found in the 2006 New York and Pennsylvania Pest Management Guidelines for Grapes .

Also, Dr. Greg English-Loeb of Cornell University has written a review of grape insect management for 2006 which contains valuable information on the GBM and other arthropods. It can be viewed at: http://pss.uvm.edu/grape/IPM/EnglishLoeb06GrapeInsectReview.pdf

Grape Leafhoppers - More than one species of leafhoppers can be found on grapes. Leafhoppers have mouthparts that pierce and suck out cell contents. Their feeding causes a stippling on the leaf, i.e., whitish yellow "dots" that coalesce into larger areas (see picture below). The following is a quick synopsis of some important points about this insect:

- Overwinters as adults in leaf litter in or around vineyard
- Adults begin feeding in early June usually on the underside of basal leaves; generally these adults do not cause serious damage
- Depending on how hot the growing season is, there can be one to two generations
- Nymphs first appear in mid-June and require 20-30 days to develop into adults
- New adults appear in mid-July and continue to produce offspring throughout the rest of the season
- Extensive leafhopper damage may result in pre-mature leaf drop, lower sugar content, increased acid and poor color of the fruit
- 'Honeydew' from the insect can cover fruit and foliage and support the growth of sooty molds
- High populations over multiple years can negatively impact vine health

Leafhopper Damage

Further details about leafhopper biology and pictures of the insect and damage can be found at: http://www.nysipm.cornell.edu/factsheets/grapes/pests/glh/glh.pdf

Please note that the **potato leafhopper** does not overwinter in Vermont and is blown in from the south in warm air currents. Feeding damage is different from the stippling caused by other leafhoppers. When the potato leafhopper feeds, it injects a toxin which causes the leaves to cup and become misshapen. Damage usually occurs at the end of vines.

The risk assessment article referred to for GBM also includes guidelines for Eastern grape leafhopper as the title indicates:

"Risk Assessment of Grape Berry Moth and Guidelines for Management of the Eastern Grape Leafhopper"

The following table is from this publication and outlines sampling times and treatment thresholds for Eastern Grape Leafhopper (and GBM).

Again, insecticide options and important details concerning those options can be found in the 2006 New York and Pennsylvania Pest Management Guidelines for Grapes.

Table 3. Management Procedures for Grape Berry Moth and Eastern Grape Leaf hopper.

GBMrisk category	Recommended Sampling Times and Treatment Thresholds				Recommended Time to Spray[2]	
	Grape Berry Moth		Eastern Grape Leaf hopper[1]		Grape Berry Moth	Eastern Grape Leafhopper
	Sampling	Threshold[1]	Sampling	Threshold		
High risk	•4th week of August	•15% damaged clusters	•4th week of August	^10 per leaf	•Ten days post bloom •Early August • BOS Late August	BOS Late August
Intermediate risk	•3rd week of July	•6% damaged clusters	•3rd week of July •4th week of August	•5 per leaf •10 per leaf	•10 days post-bloom •BOS Early August	•BOS Early August •BOS late August
Low risk	•3rd week of July	•6% damaged clusters	•10 days post-bloom •3rd week of July •4th week of August	•Stippling + adults •5 per leaf • 10 per leaf	•BOS Early August	•BOS 10 days post-bloom •BOS Early August •BOS Late August

[1] An insecticide treatment is recommended if damage levels exceed the stated threshold. Consult Cornell Pest Management Recommendations for selection of appropriate insecticide.

[2] BOS = Based On Sampling. BOS sprays are those made only when the results of sampling confirm that damage exceeds the stated threshold. Sampling often will demonstrate that a BOS treatment is not needed.

Grape Phylloxera - This aphid-like insect has a very complex life cycle. There are two forms of phylloxera — the root gall form and the leaf gall form. Loss due to the root gall form can be significantly reduced by using phylloxera-resistant rootstocks. Grape varieties vary in their susceptibility to both forms of the insect. Observations in Vermont over the last two years indicate that some of the MN varieties can show high levels of foliar damage if the foliar form is not managed (see pictures below).

Details about phylloxera biology and pictures of the insect and damage can be found at:
http://ohioline.osu.edu/hyg-fact/2000/2600.html

Infestations can be spotty in a vineyard. Foliage should be examined on a weekly basis before and after bloom. Unfortunately, I was not able to find a specific threshold of damage to initiate treatment; apparently, many grape varieties can withstand extensive leaf galling. However, if damage in your vineyard is increasing each year and you are concerned that foliar damage is impacting overall vine health, particularly on grape varieties which have low vigor, you should consider spraying at **immediate pre-bloom** and then **10-12 days later**. This is the critical time to manage this insect; late-season treatment is not considered effective.

Insecticide options and important details concerning those options can be found in the 2006 New York and Pennsylvania Pest Management Guidelines for Grapes.

Note: Looking at the potential non-target impact on beneficial organisms in the vineyard with the use of Danitol and the Signal Word on the label of some Thiodan products ("DANGER") plus its potential for phytotoxicity on certain grape varieties, Assail should be considered as an insecticide option. It has been recently labeled for use on grapes.

Extensive foliar damage by Phylloxera

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