News you can use

Disease management
When fruit clusters become visible, protect them from Phomopsis with a fungicide application.

Insect management
Wild grape bloom was observed on May 20 in SW Michigan. Watch for 50% wild grape bloom within the next few weeks to be able to use the MSU grape berry moth model.

TNRC Pheromone Trapline Data
For growers who use the trapline data from the Trevor Nichols Research Complex in Fennville, here is the link: http://www.maes.msu.edu/tnrc/emergence10curves.htm

Grape insect scouting survey
The Allegan and Leelanau County Conservation Districts will be conducting a survey for potential insect pests of grapes in Michigan. See page 4 for details on how you can help.

Grower meetings in June
Check out the calendar of events on page 12 for the next grower meetings in your area.

GROWING DEGREE DAYS

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>2010</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawton</td>
<td>5/13</td>
<td>312</td>
<td>231</td>
</tr>
<tr>
<td></td>
<td>5/20</td>
<td>371</td>
<td>290</td>
</tr>
<tr>
<td>forecast</td>
<td>5/27</td>
<td>494</td>
<td>417</td>
</tr>
<tr>
<td>Benton Harbor</td>
<td>5/13</td>
<td>293</td>
<td>213</td>
</tr>
<tr>
<td></td>
<td>5/20</td>
<td>351</td>
<td>272</td>
</tr>
<tr>
<td>forecast</td>
<td>5/27</td>
<td>474</td>
<td>394</td>
</tr>
<tr>
<td>Leelanau</td>
<td>5/13</td>
<td>211</td>
<td>138</td>
</tr>
<tr>
<td></td>
<td>5/20</td>
<td>278</td>
<td>188</td>
</tr>
<tr>
<td>forecast</td>
<td>5/27</td>
<td>413</td>
<td>243</td>
</tr>
<tr>
<td>Old Mission</td>
<td>5/13</td>
<td>200</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>5/20</td>
<td>256</td>
<td>167</td>
</tr>
<tr>
<td>forecast</td>
<td>5/27</td>
<td>391</td>
<td>214</td>
</tr>
</tbody>
</table>

See enviroweather.msu.edu for more information.
Temperatures have warmed and wind speeds have dropped over the past week with most of the region still well ahead of our 20-year average degree day accumulations. The region received a much needed ¼-1/2” of rain on May 13. Most varieties are at bud burst with up to 2” of green tissue exposed.

Significant frost/freeze damage is visible on cooler vineyard sites but overall vines look good considering the extreme weather conditions this spring. Most growers report sporadic bud damage regardless of site quality but remain optimistic about the potential crop for this season.

As we move into the season we have spotted some of the usual suspects on our scouting trail and have also observed some interesting newcomers. The first grape berry moth was caught in Leelanau County on 19 May. The grape entomology team has been working to develop and perfect a model for this pest. The model tracks the predicted percent of egglaying and the start of second and third generation egglaying to help identify key treatment timings. Be sure to record the date of wild grape bloom at your location to use this model! As a heads up, the start of wild grape bloom was observed in SW Michigan on 20 May.

This week we also observed forest tent caterpillar in vineyards. It appears that the caterpillars crawled or were blown in from neighboring woodlots and don’t appear to be doing any significant damage to the newly emerging leaves and shoots. At this stage of development the caterpillars are migrating to locate the right place to pupate into adult moths. Management for this pest is not recommended at this time. Forest tent caterpillars follow a boom-bust cycle of population density, and the 2009-10 seasons have seen extremely high populations around northwest Michigan. Forest tent caterpillars are a native species with indigenous natural enemies, diseases, and resource limitations that are expected to naturally control populations in the coming seasons.

Lastly, lecanium scale has been observed at higher than expected levels in area orchards and vineyards. Lecanium scale overwinter as ‘black caps’ that look a lot like lenticels. As they molt and become larger and lighter in color they are more easily visible when scouting. Some high density populations may warrant management. Refer to the article regarding lecanium scale in this report for more management information.
SOUTHWEST

Steve Van Timmeren, Research Technician
Trevor Nichols Research Complex

Most shoots at the Allegan Chardonnay site are around 4-5 inches long with some shoots at 1-3 inches. Shoots at the Berrien Vignoles site are mostly 4-8 inches with some clusters now becoming visible. Primary shoots are around 8 inches long at the Van Buren and Berrien Concord sites with clusters beginning to separate. Frost-damaged vines are just beginning to push out a few new buds.

We found an adult flea beetle this week. As secondary buds start to push after the frosts, growers may be thinking about potential damage the flea beetles might cause. However, given that we’ve seen very few flea beetles this spring there is relatively little risk from this pest. In 2006, we saw no flea beetle damage to late-pushing secondary buds in frost-damaged vineyards, and flea beetle populations were also much higher in 2006 compared to our current season.

We continue to catch steady numbers of grape berry moth (GBM) adult males in traps at the Berrien Concord site and low numbers at the Berrien Vignoles and Van Buren Concord sites. No GBM adults have been caught at the Allegan Chardonnay site (a lower pressure site), but traps set up in a nearby Niagara vineyard have been catching moths. The important thing to remember is that these are just males flying around and they aren’t causing any damage. The larvae won’t hatch and begin feeding until bloom/post-bloom.

If you are planning on using the GBM growing degree day (GDD) model at www.enviroweather.msu.edu, keep a close eye on your wild grape bloom at your farm. Wild grape has begun to bloom on vines adjacent to the Berrien Vignoles site in the past few days. This is one of the warmest sites we track so it’s a good indicator that other sites will have wild grape blooming soon. Write down the date that 50% of the wild grape clusters are blooming (this will be the date you use with the model). See the article in this week’s newsletter for more details on using this model for improved GBM control.

Phomopsis spots have begun to show up on leaves and shoots at most of the sites, indicating that the disease is definitely active. Vineyards that still have primary shoots should be receiving protectant sprays as the clusters are very exposed and vulnerable to Phomopsis infection. Map out where you see frost damage in your vineyards and how severe it is. How many of your primaries and secondaries are still alive should help you determine how intensive your fungicide program should be. Since we won’t know crop levels until after bloom, continue to protect vineyards that have live primaries and/or secondaries.
Grape scouting survey for new insect pests of grapes in Michigan

The Allegan and Leelanau County Conservation Districts will be conducting a survey looking for new pests of grape in West Michigan. The survey is sponsored by the Michigan Department of Agriculture and the USDA's Animal and Plant Health Inspection Service. Farms are most needed in Berrien, Grand Traverse, Leelanau and Van Buren Counties. Farms are also needed in Cass, Allegan, Kalamazoo and Kent Counties farms.

Three visits will be made to each participating farm, and no destructive tests will be required. There is no cost for participation.

The survey will target the following pests:
- Adoxophyes orana (summer fruit tortrix moth)
- Autographa gamma (silver y moth)
- Epiphyas posivitanna (light brown apple moth)
- Spodoptera littoralis (Egyptian cottonworm)
- Spodoptera littura (cotton cutworm)
- Thaumatotibia leucotreta (false codling moth)
- Cernuella virgata (vineyard snail)
- Meloidogyne mali (apple root-knot nematode)
- Heteronychus arator (African black beetle)

Interested in helping with this survey? Please call the Conservation District closest to your farm:

**SW Michigan grape growers:**
Tina Clemons, Allegan Conservation District: 269-673-8965, X3

**NW Michigan grape growers:**
Buzz Long, Leelanau Conservation District: 231-256-9783

Thank you in advance for helping with this survey!

Grape*A*Syst-ance

National Grape Cooperative, the Michigan Grape & Wine Industry Council, and the Michigan Wine Foundation are working cooperatively to have all Michigan grape producers complete the Grape*A*Syst workbook this year. Your participation is confidential and will provide baseline date for the sustainability of grape production in Michigan. Need help completing the Grape*A*Syst workbook and/or action plan? Contact the Grape*A*Syst technician for your area:

Berrien County: Suzy Forraht
269-471-9111 X103
suzanne.forraht@mi.nacdnet.net

Van Buren County: Todd Tapper
269-569-0965
tapp3@yahoo.com

NW Michigan & Paul Jenkins
other regions: 517-648-5099
jenki132@msu.edu
Using the MSU grape berry moth degree day model

Grape berry moth typically has three generations per season in SW Michigan. Predicting when these occur can help growers target management at the right time to reduce infestation by this pest. Prevention of the mid- and late-season infestation is most important, and accurate timing of controls is essential for effective management of GBM.

The MSU degree day model for grape berry moth has been developed to predict the start of egglaying in the second and third generations in southwest Michigan vineyards. It uses growing degree days (GDD) accumulated after wild grape bloom, so it is important to record the date of wild grape bloom in your vineyards to run this model. This pest takes 810 GDD (base 47°F) to complete a generation, and we have found that egglaying starts to increase at around 810 GDD after wild grape bloom for the second generation and 1620 GDD after wild grape bloom for the third generation. This information is the foundation of the model to time sprays to reduce late-season GBM infestation.

For insecticides that work best when applied just before egg-hatch such as insect growth regulators, application at 810 and 1620 GDD are expected to provide superior control of this pest compared to waiting until later. MSU research trials in high pressure vineyards during 2009 found excellent control of GBM using Intrepid (8 oz/ac) applied on July 14 (810) and Aug 18 (1620). In trials at grower farms in 2009, Intrepid (8 oz/ac) at 810 and Altacor (3 oz) at 1620 GDD also provided excellent control.

For insecticides that should be timed at hatch of larvae from eggs, such as most broad-spectrum contact insecticides, application ~100 GDD after these target timings may provide a better level of control. In our 2009 trial, the GDD Broad Spectrum (Sevin on July 21 and Imidan on Aug 25) provided intermediate control. Reapplication of these shorter-active chemicals may be needed to ensure that growers protect their berries from the second and third generation of GBM.

RUNNING THE GRAPE BERRY MOTH MODEL

Step 1. Record when wild grape (Vitis riparia) is in bloom near your vineyard, typically in late May. The date to record is when approximately 50% of the flowers are open on approximately 50% of the wild grape clusters. During 2009, this was around May 28 in Berrien, June 4 in Van Buren, and June 9 in Allegan.

Step 2. Go to www.enviroweather.msu.edu and select the nearest weather station to your farm. Select the Fruit Pages and then Grape Berry Moth model in the Insects section. A new page will appear with a table that has dates and daily degree day totals on the left and wild grape bloom date across the top.

Step 3. Look across the top of the table for the date(s) when wild grape bloomed on your farm. Look down the table for the row where the table cell turns red, indicating 810 (and later 1620) degree days after wild grape bloom (base 47°F). These red shaded boxes indicate the timing of the start of egglaying by the second generation of grape berry moth. Later in the summer, at 1620 GDD after the wild grape bloom dates, another series of red boxes will indicate the start of the third generation.

The example table shown here is for the Berrien Springs site at the Pagel Farm on June 25, 2009. If wild grape bloom was recorded on 5/28 (top line of the table), more than 810 degree days had accumulated on 7/9. The dark cell indicates when egglaying of the second generation was predicted to start. Sites with later wild grape bloom will have later egglaying by the second generation.

Step 4. Make management decisions. The model provides information on timing for the start of second and third grape berry moth generations, at 810 and 1620 GDD. It does not tell you anything about the need for treatment. Those decisions need to be made based on pest scouting and vineyard history. For growers using growth regulator insecticides, application at 810 or 1620 is appropriate. Use 910 and 1720 for broad-spectrum insecticides to target egg-hatch.
If you decide to make an insecticide application to control the second or third generation of grape berry moth, be sure to get the spray well covered on the clusters. This may require higher water volume and spraying every row. If it doesn’t cover the clusters, it isn’t going to work for you!

Please provide feedback on this model and the performance of model-driven spray programs to Dr. Isaacs at (517) 355-6619 or isaacsr@msu.edu

Thanks to National Grape Cooperative, Project GREEEN, the MSU IPM Program, the NorthCentral IPM Program and the Enviroweather Team for support of this project.
Lecanium scale and its management on grapes

Nikki Rothwell1, Rufus Isaacs2, and Erin Lizotte1
1NWMHRS, 2MSU Entomology

We have observed scale on winegrapes over the past few weeks in northwest Michigan. At first, we thought the relatively small number of these minute insects was an anomaly, but upon further scouting, and talking to growers the population affecting vines is significant this year. This is a reflection of 2009 being a year of high scale populations on deciduous trees, and some of the very mobile scale crawlers found a good spot in vineyards last fall before settling down for the winter. Growers should be on the lookout for scale in their vineyards (and other crops) to determine whether they have similar infestations. Some of the scale populations may have reached numbers that warrant control, particularly on young or weak vines.

At this time, the scales appear as either small flat black oval or a bit larger and tan colored. They tend to be on the lower or protected areas of the shoot. Growers should look in these locations to see the scale. Some infestations have only a few scales per vine, while others are well-covered. Another tell-tale sign is the shiny film of honeydew that the scales excrete (similar to aphids), onto surfaces beneath the scales giving them a wet appearance. This shiny residue can help you find scale infestations, but in rainy weather the honeydew can be washed off rather quickly.

The scale species found this spring has been identified as Lecanium scale, which is a pest of many deciduous plants. Last season was a bumper year for Lecanium scale in many parts of Michigan, particularly in hardwoods. We surmise that the crawlers that emerged last August have settled down and survived the winter in orchards, vineyards, and field adjacent to infested woody areas. Lecanium scale has one generation per year and is currently growing through molts from the overwintered scale (small black one in the photo), to a larger tan scale, and will then molt again before becoming a mature female. This female stage will lay eggs under a ‘turtle-like’ exoskeleton, the eggs then hatch and the crawlers disperse from the protective covering to find new places to feed. If infestations are high, growers should take precautionary measures before the female forms this more hardened off, ‘turtle-like’ scale where insecticides will be less effective.

As mentioned above, the scales’ feeding creates honeydew that can act as a substrate for sooty mold (black fuzzy mold visible on most hardwood trees throughout the region). Sooty mold does not cause damage, but the scales’ sap removal when feeding can weaken shoots. We do not know the threshold for control measures, but recognize the negative effects of this scale species observed in hardwood trees over time. The rule of thumb is that vigorous and healthy trees and plants can tolerate some scale infestation, but if high populations of Lecanium scale are found, control programs should be considered.

Natural enemies usually regulate scale populations and prevent outbreaks of these pests. This week, we have observed parasitic wasps emerging from Lecanium scale collected this spring (remember the Alien movie?). Growers with high populations should consider control options. At this time, it is too late for oil applications to suffocate the scale; this control would typically be at the early spring dormant timing. Esteem 0.86 EC is registered for Lecanium scale on grape at 16oz per acre. Esteem is an insect growth regulator that acts by disrupting the scale’s normal molting. If control is warranted, application of Esteem should be planned soon, to disrupt their development before they reach the mature adult stage. Esteem’s effects may take some time to see, but with good coverage and timely application, it should prevent the scales reaching the stage where crawlers will be produced. This product is also highly selective so it will cause no disruption of biological control. Movento is also labeled in grape at 6-8oz, and a current trial underway at MSU on blueberries is showing activity on this scale species. Movento is mobile in the vine which will help get the product into the insect, and it has had been effective on San Jose Scale in tree fruit. Consequently, it is expected to provide adequate suppression against Lecanium scale. This product should be applied soon and again 21 days later if scale remain alive. Scouts can assess scale survival after a vineyard treatment by lifting the hard shell after a week or so, and looking to see whether a soft yellow/orange sac remains underneath. If the scale is dead it will be dry/dusty inside, and if a parasitic wasp has emerged there will be a small round hole in the scale covering. Most other insecticides that are active on scale are used at the crawler stage, later in the season, after the young scale crawlers have emerged from the waxy covering. Many broad-spectrum insecticides registered in grape are expected to have activity on the crawlers. Crawlers are much more vulnerable to insecticides than the mature scales, and we will be monitoring the infested vineyards to identify when we see crawler emergence. Growers can scout for crawlers by placing some double-sided sticky tape near to scales on infested shoots, and checking with a hand lens until you see tiny dots (the young crawlers) on it.

We will continue to monitor this situation and update growers as we learn more about Lecanium scale control based on our ongoing research and scouting. If you detect high populations of scale, please contact Erin or Nikki at the research station 231-946-1510.
Disease control after spring freeze injury in grapes: What are the options?

It is unfortunate that the Michigan grape industry has been hit with widespread freeze injury once again. In addition, there was hail damage in the Lawton area. A more accurate estimate of yield will not be possible until after fruit set. However, based on the number of surviving flower clusters and proportion of secondary buds, an initial assessment can probably be made. In previous years, the crop turned out to be harvestable in some vineyards that growers had given up on. One thing that is clear is that growers will need to reduce inputs, including fungicides. There are basically three different reduced cropping scenarios:

1. **There is no crop worth harvesting and you don't care about inoculum build-up:** In this case, protecting the fruit from infection by black rot or Phomopsis is not necessary. If you've had good black rot control in previous years, you probably won't have too much disease. If you've had black rot problems in the past, one more year of inoculum production won't make much of a difference because you already have an “inoculum bank” in the vineyard. We have shown that even under conditions of high disease pressure, it is possible to produce an excellent crop with a standard spray program, which you would implement next year. As far as foliar diseases are concerned, vines with a low crop can tolerate more disease than vines with a full crop. Powdery mildew may infect Concord and, to a lesser extent, Niagara leaves, but if there is no crop, the vine can tolerate quite a bit of disease without ill effects. However, there is a risk that a severe downy mildew outbreak may defoliate Niagara, which may predispose vines to winter injury, even if there is a low or no crop. If downy mildew comes in early in the season (based on scouting) and if it looks like the weather will continue to favor downy mildew, a fungicide spray may be needed to knock back the disease to the point that it does not lead to serious defoliation.

2. **There is no crop worth harvesting, but you want to limit inoculum build-up.** In this case, we don’t want to protect the vine to preserve fruit quality as much as we aim to apply fungicides at a few critical times to knock back diseases to acceptable levels. In this case, we can also opt for less expensive fungicides that have good to excellent disease control efficacy. This would include at least one protectant fungicide application (e.g., before a rainy period) to protect the young shoots and exposed flower clusters from Phomopsis. An SI spray could be applied at first postbloom if you are concerned about black rot. Scouting-based management of downy mildew in Niagara would occur as described above. If powdery mildew becomes severe on Concord leaves, you may consider an eradicant spray (e.g., JMS Stylet Oil) to knock down colonies and cleistothecium formation.

3. **There is a harvestable but reduced crop.** In this case, protecting the fruit from black rot and Phomopsis is the most important activity and will require a few more sprays than the two scenarios above, e.g., one or two pre-bloom protectant sprays to protect against Phomopsis, one or two postbloom sprays to protect against black rot and Phomopsis (while also controlling powdery and downy mildew), and curative/protectant sprays against foliar powdery and downy mildew only if scouting indicates a need.

To cut input costs, you can use lower-cost fungicides (e.g., generics, older protectant fungicides, phosphites) and reduce the number of fungicide applications only to critical times. Watching the weather and stretching spray intervals during dry periods also helps to lower the number of sprays. It is important to also take labor and fuel costs for applying fungicides into account. The fewer times you have to drive through the vineyard, the better. One way to reduce the number of applications is to tank-mix fungicides with insecticides (most growers are already doing this) or materials at higher rates or with longer-lasting residuals for extended coverage. Adding a sticker-extender (e.g., NuFilm) can be a low-cost way to make a fungicide last longer and obtain better coverage. Ensuring thorough coverage by spraying every row at an appropriate spray volume (at least 50 gpa after the canopy fills in) will increase the “bang for your buck” of the fungicides you use. This is especially important for protectants like Ziram, Captan, and Manzate.

*Continued next page*
### Scenario 1: No crop worth harvesting, don't care about inoculum build-up

**ACTION RECOMMENDED**

<table>
<thead>
<tr>
<th>Bud break to pre-bloom</th>
<th>Bloom to 4 weeks after bloom</th>
<th>Mid to late season</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>Scout Niagara for downy mildew, if lesions found and there is threat of severe outbreak and defoliation, apply systemic fungicide* with curative action. Continue scouting until harvest.</td>
<td></td>
</tr>
</tbody>
</table>

*Phostrol, ProPhyt, Revus Top, Ridomil Gold Copper, etc.

### Scenario 2: No crop worth harvesting, but want to limit inoculum build-up

**ACTION RECOMMENDED**

<table>
<thead>
<tr>
<th>Bud break to pre-bloom</th>
<th>Bloom to 4 weeks after bloom</th>
<th>Mid to late season</th>
</tr>
</thead>
<tbody>
<tr>
<td>A spray of an EBDC* or Ziram or Captan (can be tank-mixed with ProPhyt or Phostrol) to reduce Phomopsis cane infections at a critical time (eg. at 4-8 inches of shoot growth).</td>
<td>SI** plus Ziram at 1st post-bloom to control black rot. Add Phostrol or ProPhyt or Ziram for Phomopsis and downy mildew control if needed.</td>
<td>Scout Niagara for downy mildew – apply systemic fungicide*** if threat of severe outbreak. Scout Concord for powdery mildew; to limit cleistothecium formation, apply JMS Stylet Oil to knock down existing colonies. An SI will prevent new infections but will not visibly reduce existing colonies. Continue scouting until harvest.</td>
</tr>
</tbody>
</table>

*EBDC = Dithane, Penncozeb, Manzate. **SI - sterol inhibitor, eg. Elite, Tebuzol, Orius, Rally, Vintage, Mettle. ***Phostrol, ProPhyt, Revus Top, Ridomil Gold (MZ or Copper).

### Scenario 3: Harvestable but reduced crop

**ACTION RECOMMENDED**

<table>
<thead>
<tr>
<th>Bud break to pre-bloom</th>
<th>Bloom to 4 weeks after bloom</th>
<th>Mid to late season</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 or 2 sprays of an EBDC* or Ziram or Captan or ProPhyt or Phostrol to reduce Phomopsis cluster infection at critical times (e.g., 4-8 inches of shoot growth, 12-16 inches of shoot growth)</td>
<td>SI** (+ Ziram) or Revus Top at 1st and 2nd post-bloom to control black rot, powdery and downy mildew. Tank mix Phostrol or ProPhyt for Phomopsis control as needed.</td>
<td>Scout Niagara for downy mildew – apply systemic fungicide*** if threat of outbreak. Scout Concord for powdery mildew; if it comes in early, apply inexpensive SI** to prevent new infections. JMS Stylet Oil can be used to knock down existing infections. Continue scouting until harvest.</td>
</tr>
</tbody>
</table>

*EBDC = Dithane, Penncozeb, Manzate. **SI - sterol inhibitor, eg. Elite, Tebuzol, Orius, Rally, Vintage, Mettle. ***Phostrol, ProPhyt, Revus Top, Ridomil Gold (MZ or Copper).
Revus Top, a new cost-effective fungicide for grapes

Annemieke Schilder
Department of Plant Pathology, Michigan State University

A new fungicide, Revus Top (Syngenta Crop Protection, Inc.), recently received a supplemental label for use in grapes. The supplemental label must be in the possession of the user at the time of fungicide application. This fungicide is sold as a “suspension concentrate” and has two active ingredients: mandipropamid and difenoconazole. The pre-mix of two active ingredients ensures ease of use and broad-spectrum activity. Mandipropamid is a new chemical compound in the class of carboxylic acid amides (Fungicide Resistance Action Committee [FRAC] group 40) with strong activity against downy mildew of grapes. It is also sold separately as the product Revus. The difenoconazole component belongs to the sterol inhibitor class (FRAC group 3) and has activity against powdery mildew, black rot, anthracnose, leaf blight, and rotbrenner. The latter two diseases are not a problem in Michigan. Phomopsis cane and leaf spot is not listed on the label.

Revus Top has preventative, systemic and curative properties. The curative properties are mostly due to fungistatic effects which prevent sporulation. The application rate of Revus Top is 7 oz per acre at an approximate cost of $15/acre. No more than two sequential applications should be made before alternating with another fungicide with a different mode of action. For powdery mildew control, Revus Top can be applied on a 10-21 day interval, and effective rotation partners are Pristine, Quintec, and Flint. For downy mildew control, a 10-14 day interval should be used. Examples of effective rotation partners are Ridomil Gold (MZ or Copper), Presidio, Gavel, Ranman, ProPhyt, Phostrol, and the EBDCs. In each case, use the shorter interval under high disease pressure.

Thorough coverage is necessary to provide good disease control. A spreading/penetrating type adjuvant such as a non-ionic surfactant, crop oil concentrate, or blend is recommended at the manufacturer’s recommended rates. Do not apply more than 28 fl oz/acre (= four applications) of Revus Top per season. The restricted entry interval is 12 hours. The pre-harvest interval is 14 days.

Upon application, Revus Top rapidly bonds to the waxy layer of the leaf, becoming rainfastness as soon as spray droplets have dried. Through translaminar movement within the leaf, Revus Top is able to provide disease control on both upper and lower leaf surfaces. In efficacy trials in New York and Virginia, Revus Top has had outstanding performance against powdery and downy mildew. In a small plot efficacy trial in cv. Concord in Fennville, Michigan in 2009, Revus Top also provided excellent disease control (statistically similar to Pristine) as part of a spray program including Dithane and Ziram against black rot, powdery mildew, and downy mildew (Table 1). It should be noted that downy mildew was more severe than normal in this Concord vineyard in 2009. Pristine appeared to have better activity against Phomopsis, which would be expected. Revus Top can be applied anytime during the growing season; however, for juice grapes, the best fit would be from bloom onwards, when multiple diseases need to be controlled.

Revus Top is low risk to beneficial insects. However, it is toxic to aquatic organisms. This product has a potential for run-off into ground and surface water for several months or more after application. Poorly draining soils and soils with shallow water tables are more prone to produce such runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours. Sound erosion control practices will reduce this products’ potential to reach surface water.

Table 1. Evaluation of disease control efficacy of Revus Top in Concord grapes in Fennville, MI, 2009.

<table>
<thead>
<tr>
<th>September 2009</th>
<th>% of leaf area or cluster area infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment, rate/A</td>
<td>Application timing</td>
</tr>
<tr>
<td>untreated</td>
<td></td>
</tr>
<tr>
<td>Dithane Rainshield 3 lb</td>
<td>Revus Top 4.17SC 7 fl oz</td>
</tr>
<tr>
<td>Dithane Rainshield 3 lb</td>
<td>Pristine 38 WG 8 oz</td>
</tr>
</tbody>
</table>


Column means followed by the same letter are not significantly different according to Fisher’s Protected LSD test (P≤0.05).
How juice grape vines compensate frost damage

Unfortunately, spring freeze is a common hazard in our climate. Crop protection technologies utilizing overhead irrigation are available and under investigation at the MSU Southwest Michigan Research & Extension Center (SWMREC). However, economic considerations limit their application. Most growers know well that the best tool is the selection of vineyard site that has low susceptibility to freezes. That is no consolation to growers who repeatedly endure the large crop losses from spring freezes. Fortunately, there are some viticultural tools with moderate cost that can be used on frost-vulnerable vineyard sites. These include: a) vineyard row middle management - the best row middle management to reduce the risk of a spring freeze is to create a firm, dark soil surface. Do this by cultivation early in the spring. Cultivating just prior to a freeze event is counter-productive because it aeraates the soil and instantaneously releases soil heat. A grass sod is less capable of capturing solar radiant than bare soil. A grass sod should be mowed short prior to freeze episodes as this will keep the lowest temperatures during a radiation freeze closer to the ground and further away from the fruiting zone of the vine; b) Buds along a grape cane progressively break bud from the tip of cane to its base. Long cane pruning can help to slow down bud break of buds near the base of a cane and this may help to avoid freeze damage. Growers are often aware of highly hazardous “frost pocket” areas in their vineyards. Ongoing research at MSU-SWMREC indicates that delaying pruning until late in the spring (and pruning mechanically) can be an effective strategy for avoiding freeze damage.

Cold air is heavier than warm air and it will settle and form layers with the coldest air near the ground. If the site is flat, or worse, if it is in a low spot with high ground around it the cold air will settle or flow there.

No one has better knowledge of the level of damage that the frosts we experienced in the last few weeks made on the vines than the grower. Freeze damage varies significantly between and within vineyards. Moreover, grapevines have mechanisms to compensate for freeze damage. Secondary buds can restore some of the vine’s fruitfulness that was lost with primary bud loss.

How much do these secondary buds produce? If we consider that a primary bud has the capacity to produce 100% of a crop at that node, then the secondary bud (for Concord and Niagara) could produce about 35-40% of a crop. If both primary and secondary buds are killed by the spring frost, then a tertiary bud will produce a shoot (and a canopy) for next year's crop. This is why it's important to remember that it is premature to forget this year's crop. Further, vines have this ability to compensate. When such losses occur vines may compensate for reduced cluster number by increasing the number berries set per cluster and compensate for reduced berry number by increasing berry size. All compensations are increasing yield per acre.

Another important thing to remember is that this season’s potential crop is based on last season’s vine performance. A balanced vine (not over-cropped in 2009), with a good summer canopy management (mainly shoot positioning) had the opportunity to develop fruitful secondary buds last year, setting the potential for good productivity in any vineyard where the spring frost killed the primary buds. However, a vine that was over-cropped last season (with over-shaded canopy) may not have been able to develop fruitful secondary buds. The bottom line reality to all this is that it won’t be possible to make a reasonable estimate of the crop level in a vineyard with spring freeze damage until after bloom and fruit set.

Canopy management this summer in the form of mechanical shoot positioning may be more important than in a normal year for vineyards that experienced a spring freeze. Sunlight penetration to the portions of shoots near the cordon that will be next year's fruiting canes is important for flower bud initiation for the 2011 crop. When grapevines carry a reduced crop, they tend to become over-vegetative, increasing shade in the fruit zone. Balanced nutrition will play also an important role. Therefore, a reduction (or elimination) of nitrogen fertilization could be appropriate for the 2010 season. However, nitrogen applications should be specific for each block or section of the vineyards; 2010 may be an opportunity to build larger vine size in blocks with weak vines.
2010 NW Wine Grape IPM Updates
More information:
Erin Lizotte, 231-946-1510.

June 4
3-5PM
NWMHRS
Speaker: Duke Elsner

July 9
3-5PM
2Lads Winery, OMP
Speakers: Paul Jenkins and Paolo Sabbatini

August 6
3-5PM
Ligon Farm, OMP
Speaker: Paolo Sabbatini

September 3
3-5PM
L. Mawby
Speaker: Rufus Isaacs

2010 NWMHRS Annual Open House
More information:
Nikki Rothwell, 231-946-1510.

August 19
3-5PM
NWMHRS

2010 SW Wine Grape grower meetings
More information:
Diane Brown-Rytlewski 269-944-4126 X4012.

June 16
12PM
Location TBD

August 4
12PM
Location TBD

2010 SW Juice Grape Grower Meetings
More information:
Mark Longstroth 269-330-2790
or
Diane Brown-Rytlewski 269-944-4126 X4012.

June 15 - Crop Estimation
1:30-3:30PM
Location TBA
Speaker: Paolo Sabbatini

August 17
1:30-3:30PM
Location TBA
Speakers: Rufus Isaacs, Annemiek Schilder, and Paul Jenkins

2010 SW Viticulture Field Day
More information:
Tom Zabadal, 269-944-1477.

July 29
9AM-5PM
SWMREC

Please note this event is on a Thursday this year.

35th Annual ASEV-Eastern Section Conference
More information:
http://www.nysaes.cornell.edu/fst/asev/index.php

July 13-15, pre-conference tour July 12
Geneva, New York
Hobart and William Smith Colleges

National ASEV Conference
More information:
http://asev.org/national-conference-2010/

June 20-24
Seattle, WA

This meeting is in conjunction with the 7th International Cool Climate Symposium (June 20-22).