Ozone Damage to Grape Leaves

Dean Volenberg

Ozone contains three oxygen atoms and this makes the compound very reactive to materials that it contacts. In plants, ozone enters through the stomates during gas exchange and then ozone can begin attacking plant cells. In grapes this often results in grape leaves displaying stipples (small darkly pigmented areas). The stippling on grape leaves is confined to the upper leaf surface and the symptoms typically appear on older basal leaves that are located on the exterior of the grape canopy.

In northeast Wisconsin, ozone damage on grape leaves has been observed for a number of years. Typically symptoms of ozone damage appear latter in the growing season. In Door County, ozone symptoms often appear in late August or early September. During this time, there is abundant sunshine, and high temperatures which can lead to ozone formation. It is during these so called “Dog Days of Summer” of bright sunshine, high temperatures, and still air that can result in ozone injury. The level of ozone can also be increased by electrical storms. However ozone produced during electrical storms result in ozone increases in the upper atmosphere and have little impact at increasing ozone levels at the earths surface.

Severe ozone injury to grape leaves can result in leaves senescing and dropping from the vine. As of yet I have never observed severe ozone injury where leaves have dropped from the grape plant. However this summer we are experiencing a number of very sunny days with extremely above normal temperatures that may result in more ozone injury.

The symptoms of ozone injury could be confused with a disease infection or maybe a nutrient deficiency. Ozone symptoms on the leaf are very patterned and uniform. Ozone injury on the leaf results in the small leaf veins remaining green. In contrast, many grape disease infections results in chlorosis (yellowing) or necrosis (browning) of these small veins. Ozone damage can at times look surprisingly like advanced symptomology of potassium deficiency. Early symptoms of potassium deficiency are chlorotic leaf margins that progress to brown/black leaf margins. In vineyards, showing both ozone and potassium deficiency symptoms a petiole test could help confirm potassium deficiency.
Ozone injury can also resemble another grape problem named – “grape blackleaf”. Blackleaf is a physiological disorder that was once thought to be the result of a potassium deficiency. Symptoms of blackleaf typically appear near veraison and like ozone the leaves on the outer canopy that are exposed to sunlight display blackleaf symptomology. The cause of blackleaf has been attributed to drought stress and UV-B radiation. For more information on blackleaf see http://www.extension.org/pages/31678/blackleaf-in-grapes

Lightening Damage to Grape Plants

This week I had the opportunity to examine a lightening strike injury to grape plants. The majority of vine damage was to shoots that were touching training wires in the VSP canopy (A). Damaged shoots had necrotic piths compared to healthy green shoots (B). Leaves displayed dark areas that resembled ozone injury or complete necrosis (see pictures page 3). A dead giveaway that the damage was caused by lightening was that trellis wires were melted apart causing some minor collapse of the trellis. Fortunately the trellis wires were grounded which resulted in the electrical charge grounding out. One unique thing that I noticed walking into the damaged area was the smell of decomposing tissue. Since many of the shoots were damaged and weakened by the lightening, they will be removed to prevent secondary fungal infections. As a reminder botrytis likes to establish on tissues that are dead or decaying.
A variety of injuries caused by a lightening strike
Phenoxy Herbicide Damage

I received some photographs of some vines this week that displayed damage from phenoxy herbicides. I have a good sense that many agricultural crop producers are not using phenoxy herbicides (2,4-D, dicamba) at this time of year. The only need I can see for these herbicides at this time of year may be in a grazing pasture for the control of thistles. On the other hand, many lawn care companies as well as homeowners are using phenoxy herbicide products to control broadleaf weeds. Many of these users are not aware that these products should not be used when temperatures are 80° F or above. With the relatively high temperatures and high dew points many of the phenoxy herbicide products can lift-off of the intended target by volatilization and be carried to areas resulting in damage to non-target plants. Continue informing your neighbors of your grape crop and the sensitivity of grapes to phenoxy herbicides. Remember phenoxy type herbicides are used by more than just agricultural crop producers. These products are used by lawn care companies, parks, golf courses, highway departments, and homeowners. You need to be proactive in informing your community about your vineyard and the impact that phenoxy herbicides can have on your crop.

Injury from phenoxy herbicide(s) on La Crescent (A and B) and Frontenac (C and D). The symptoms are classic 2, 4-D injury. Photos submitted by Dan Dufek.

For more information on herbicide injury to grapes and pictures of other types of herbicide injury, please see http://extension.oregonstate.edu/catalog/pdf/em/em8860.pdf
Development of wine grapes in the grape variety trials at the Peninsular Agricultural Research Station (PARS) Sturgeon Bay, WI and West Madison Agricultural Research Station (WMARS), Madison, WI

Brianna at PARS 7.30.2012
Brianna at WMARS 7.30.2012
Foch at PARS 7.30.2012
Foch at WMARS 7.30.2012
Frontenac at PARS 7.30.2012
Frontenac at WMARS 7.30.2012
Development of wine grapes in the grape variety trials at the Peninsular Agricultural Research Station (PARS) Sturgeon Bay, WI and West Madison Agricultural Research Station (WMARS), Madison, WI

La Crescent at WMARS 7.30.2012
La Crosse at WMARS 7.30.2012
Marquette at WMARS 7.30.2012

La Crescent at PARS 7.30.2012
La Crosse at PARS 7.30.2012
Marquette at PARS 7.30.2012
Development of wine grapes in the grape variety trials at the Peninsular Agricultural Research Station (PARS) Sturgeon Bay, WI.

NY 76 at PARS 7.30.2012

Vignoles at PARS 7.30.2012

Petite Pearl at PARS 7.30.2012
Two year old vines

Noiret at PARS 7.30.2012

Leon Millot at PARS 7.30.2012

Wild grapes at PARS 7.30.2012
Cold Hardy Seedless Table Grape Progression at West Madison Agricultural Research Station

Thanks to Brian Emerson for submitting the pictures.
# Degree Day (base 50) Accumulation from April 1 to July 29, 2012 at Peninsular Agricultural Research Station in Sturgeon Bay, WI

<table>
<thead>
<tr>
<th>Date</th>
<th>2012</th>
<th>2011</th>
<th>5 Year Average$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/1 to 7/29</td>
<td>1473</td>
<td>1272</td>
<td>1289</td>
</tr>
</tbody>
</table>

$^1$Modified method.  
$^2$Average from 2007 to 2011.

## Degree Day (base 50) Accumulation from April 1 to July 29, 2012 at West Madison

<table>
<thead>
<tr>
<th>Date</th>
<th>2012</th>
<th>2011</th>
<th>5 Year Average$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/1 to 7/29</td>
<td>1921</td>
<td>1793</td>
<td>1629</td>
</tr>
</tbody>
</table>

$^1$Modified method.  
$^2$Average from 2007 to 2011.

## Accumulated degree days (base 50) for the month of March in Sturgeon Bay and Madison, WI.

<table>
<thead>
<tr>
<th>Year</th>
<th>Madison WI</th>
<th>Sturgeon Bay WI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GDD (base 50, ceiling 86)</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>252$^2$</td>
<td>106</td>
</tr>
<tr>
<td>2011</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>2010</td>
<td>72</td>
<td>38</td>
</tr>
<tr>
<td>2009</td>
<td>51</td>
<td>12</td>
</tr>
<tr>
<td>2008</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>90</td>
<td>41</td>
</tr>
<tr>
<td>2006</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>2005</td>
<td>40</td>
<td>9</td>
</tr>
<tr>
<td>2004</td>
<td>49</td>
<td>11</td>
</tr>
<tr>
<td>2003</td>
<td>49</td>
<td>15</td>
</tr>
</tbody>
</table>

$^1$Modified method.  
$^2$Data from [http://www.doa.state.wi.us/degreedays/](http://www.doa.state.wi.us/degreedays/)

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
Regional Vineyard Walks
The UW-Extension Fruit Team will be hosting 4 regional summer vineyard walks for 2012, according to Rebecca Harbut, the UW-Extension Fruit Specialist. With the continued growing interest in commercial wine and table grape production in Wisconsin, the Fruit Team decided to host the vineyard walks regionally to reach more growers and those interested in becoming a commercial grower.

Each regional vineyard walk will be hosted by a grape grower with vines in production. The vineyard walk leader will evaluate the vines and answer questions that participants may have about commercial production practices. With the vineyard walks scheduled for 4 different dates, growers can attend the closest walk or attend any of the four if desired. The vineyard walks are held rain or shine so come prepared. Participants are also asked to bring lawn chairs for the grower socializing following the walk.

Northwest Wisconsin-Completed
Sunday, July 15, Spirit Creek Vineyard, 3555 Blom Lake Dr., Frederick, WI 1:00-3:00 p.m. Mike and Sue Jahnke and their family started planting Frontenac and Marquette grapes in 2007. They have added La Crescent, Petite Pearl, Brianne and Summerset. Vineyard walk leader is UW-Extension Fruit Specialist Rebecca Harbut. Registration fee is $5 payable at the vineyard walk. Please email the number attending to kevin.schoessow@ces.uwex.edu or call the Spooner Area UW-Extension Office at 715-635-3506. Attendees may bring a wine to share.

Northeast Wisconsin-Completed
Saturday, July 21 Himmelgarten Vineyard, 10131 Newton Road, Newton, WI 4:00 – 8:00 p.m. Randy and Faye Riester planted their first Baco Noir grapes three years ago so this fall will be their first harvest. Vines are trained on a VSP system with unique in-line posts. Vineyard walk leader is UW-Extension Ag Agent Dean Volenberg. Registration is $20 which will include a catered meal. Attendees may bring a wine to share. Please send payment one week in advance to the Door County UW-Extension Office, Attn. Vineyard Walk, 421 Nebraska St., Sturgeon Bay, WI 54235. If you have question, email dean.volenberg@ces.uwex.edu 920-746-2260

Southwest Wisconsin
Saturday, August 4 Viriditas Vineyard, E8101 Green Acres Rd., Viroqua, WI 4:00 – 8:00 p.m. Jeff and Mary Aderman planted their first Frontenac and Frontenac Gris vines in 2005. Since then they have added La Crescent, Marquette and Brianna. One of the biggest challenges that the vineyard had to experience a couple of years ago was the grape ripe rot infestation. Vineyard walk leader is Mark Hart, a private grape vine breeder from Bayfield, Wisconsin. Registration is $20 which will include a catered meal. Attendees may bring a wine to share. Please send payment one week in advance to the Vernon County UW-Extension Office, Attn. Vineyard Walk, Suite 392, 318Fairlane Dr., Viroqua, WI 54665. If you have questions, email timothy.rehein@ces.uwex.edu 608-637-5276

Southeast Wisconsin
Sunday, August 12, Staller Estate Vineyard and Winery, W8896 County Rd. A, Delavan, WI 10:30 a.m. – 2:00 p.m. Joe and Wendy Staller planted their first Frontenac, Foch and La Crescent vines in 2008 They planted with the plans to open a winery of which they did also in 2008. Vineyard walk leader is UW-Extension Fruit Specialist Rebecca Harbut. Registration fee is $30 which will include a catered wine – food pairing meal. The winery is a state licensed facility so attendees are asked not to bring any wine to share. Wine from the Staller Winery will be supplied. Registration is limited to 40 people. Please send payment one week in advance to the Walworth County UW-Extension Office, Attn. Vineyard Walk, PO Box 1001, 100 W. Walworth St., Elkhorn, WI 53121 If you have questions, email peg.reedy@ces.uwex.edu 262-741-4951