Fungicide Resistance Management

Dean Volenberg

The high cost of some fungicides does limit new grape growers from having a well stocked inventory of different fungicide products. This limitation often results in new growers applying the same fungicide more often and repeatedly. The repeated application of the same fungicide product or fungicides with the same mode of action may result in the development of some pathogens developing resistance to certain fungicide products. It is important for you to understand not only the fungicides’ rates and ranges of pests controlled, but also the target site(s) the fungicide product inhibits.

Fortunately, most fungicides have been labeled with a Fungicide Resistance Action Committee (FRAC) code that quickly can inform you about a particular products target site. For example, if you have Rally 40 WSP, Vintage SC, Procure 50WS, and Elite 45DF all these products would have a FRAC code of 3 which represents Demethylation Inhibitors (DMI-fungicides). Although these fungicides are represented by three chemical groups (Table 1), all of these fungicides are DMI fungicides. If you are targeting these products against a particular fungus, for example, powdery mildew, then you should consider not using products with the same FRAC code repeatedly. Instead select products that have a different FRAC code. For example, if your target is powdery mildew, consider Abound 2.08F, Sovran 50WG, or Flint which have a FRAC code of 11 or Quinone outside inhibitors.

Table 1. Selected fungicides that all have the same target site (demethylase in sterol biosynthesis) but belong to various chemical groups.

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Chemical Group</th>
<th>Group Name</th>
<th>Target Site</th>
<th>FRAC code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rally 40 WSP</td>
<td>triazole</td>
<td>DMI</td>
<td>G1¹</td>
<td>3</td>
</tr>
<tr>
<td>Vintage SC</td>
<td>pyrimidine</td>
<td>DMI</td>
<td>G1</td>
<td>3</td>
</tr>
<tr>
<td>Procure 50WS</td>
<td>imidazole</td>
<td>DMI</td>
<td>G1</td>
<td>3</td>
</tr>
<tr>
<td>Elite 45 DF</td>
<td>triazole</td>
<td>DMI</td>
<td>G1</td>
<td>3</td>
</tr>
</tbody>
</table>

¹Demethylase in sterol biosynthesis.

Another way to reduce the potential for selecting for fungicide resistance is to apply fungicide products that have two fungicides with different FRAC codes. For example, Pristine 38WG has two active ingredients that have different sites of action and therefore has two FRAC codes of 7 and 11.
Other ways to reduce the potential for fungicide resistance development is to tank mix products that have different sites of action. For example tank mixing a DMI fungicide such as Procure 50 WS (FRAC code 3) with either Mancozeb 75 DF (FRAC M3) or Captan 50 WP (FRAC M4) or Ziram 76 DF (M3).

By using two fungicide products that have different target sites for a particular pathogen there is less potential for the targeted pathogen to develop resistance.

The high cost of many fungicide products does limit some growers from investing in fungicides of various FRAC codes. At present the cost of investment in numerous fungicide products may seem high, but using fungicides with different FRAC codes is important to prolong the fungicide products life. Because once resistance does develop to a fungicide product in your vineyard there is no more use for that product. If you are unsure of a product’s FRAC code, this information is available on pages 76–78 in the 2012 Midwest Small Fruit and Grape Spray Guide or at the site below.


The differences between grape tumid galls and a phylloxera galls

Dean Volenberg

Last week I mentioned that some grape growers had thought to have identified phylloxera galls already this season in Northeastern Wisconsin. It is still very early for phylloxera and the galls identified as phylloxera were likely the result of a midge species such as the grape tumid gallmaker (see next page). Galls on grape leaves in late May or early June can resemble phylloxera galls. Remember phylloxera galls are open on the top of the leaf. You will need to have a keen eye or a 10X magnifying lens to view the galls for the opening. Remember that galls formed by a number of midges seldom result in any significant damage to the plant. Continue scouting newly emerged leaves for galls caused by phylloxera.
Galls caused by midge spp. with the photo on left showing the top of leaf and the photo on right showing the bottom of the leaf. The galls resemble those of phylloxera, but the galls are not open on the top like phylloxera (See phylloxera photos below).

Galls caused by the grape tumid gallmaker. Compared to the galls directly above these galls are very smooth in texture and appearance. These galls can also be open on the top (see inset photo) like phylloxera but the galls are smooth in texture compared to phylloxera.

Galls caused by phylloxera with the photo on left showing the top of the leaf and photo on right showing the bottom of leaf. The galls are rough in appearance and texture and the galls are open on the top of leaf (see close-up) in inset.
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 6.4.2012
18 to 20 inch shoots

Foch at PARS 6.4.2012
10 to 12 inch shoots

Frontenac at PARS 6.4.2012
18 to 22 inch shoots

Brianna at WMARS 6.4.2012
Buckshot berries

Foch at WMARS 6.4.2012
Buckshot berries

Frontenac at WMARS 6.4.2012
Buckshot berries
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 PARS 6.4.2012
14 to 16 inch shoots

La Crescent at WMARS 6.4.2012
Buckshot berries

La Crosse at PARS 6.4.2012
10 to 14 inch shoots

La Crosse at WMARS 6.4.2012
Buckshot berries

Marquette at PARS 6.4.2012
16 to 20 inch shoots

Marquette at WMARS 6.4.2012
Buckshot berries
Development of wine grapes in the grape variety trials at the Peninsular Agricultural Research Station (PARS) Sturgeon Bay, WI.

- **NY 76 at PARS 6.4.2012**
  - 12 to 14 inch shoots

- **Vignoles at PARS 6.4.2012**
  - 6 to 8 inch shoots

- **Petite Pearl at PARS 6.4.2012**
  - Two year old vines
  - 8 to 12 inch shoots

- **Noiret at PARS 6.4.2012**
  - 8 to 10 inch shoots

- **Leon Millot at PARS 6.4.2012**
  - 12 to 15 inch shoots

- **Wild grapes at PARS 6.4.2012**
Development of wine grapes in the grape variety trials at the Spooner Agricultural Research Station (SARS) Spooner, WI.

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

This is the result of uncontrolled grape flea beetle on wild grapes (left photo) PARS 6.4.2012 and on Marquette (right photo) SARS 6.4.2012. Grape flea beetles are still active in or near vineyards.

Ever wonder just what the home of the grape plume moth larvae looks like (see photo on left). The larvae folds grape leaves together with silk and feed on the leaves within the sheltered home. PARS 6.4.2012 wild grapes.
Degree Day\(^1\) (base 50) Accumulation from April 1 to June 3, 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 6/3</td>
<td>356</td>
<td>265</td>
<td>341</td>
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</tbody>
</table>

\(^1\)Modified method.  
\(^2\)Average from 2007 to 2011.

Degree Day\(^1\) (base 50) Accumulation from April 1 to June 3, 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 6/3</td>
<td>581</td>
<td>537</td>
<td>518</td>
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</table>

\(^1\)Modified method.  
\(^2\)Average from 2007 to 2011.

Accumulated degree days\(^1\) (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>
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<tr>
<td>2008</td>
<td>1</td>
<td>0</td>
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<tr>
<td>2007</td>
<td>90</td>
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<td>2006</td>
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<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/

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