Updated Tools from Weather INnovations Inc.
Wayne Heinen, Weather INnovations Inc.

A new Weather INnovations Incorporated (WIN) website for grape and tender fruit growers and industry partners within the 3 grape growing appellations – Niagara, Prince Edward County and Lake Erie North Shore, is now available at www.vineandtreefruitinnovations.com. The new program provides all of the data previously found at www.weatherinnovations.com plus more maps, tools and information to any user who creates an account and signs in. Sample maps are available for the products that will be available for the 2010 growing season. A limited amount of information is available without signing in, so be sure to create your own personal account.

Continued on page 3
New products for sign-in users include:

**Additional management tools**
- Region maps with sub-appellations and terroir information; user can zoom into a sub-appellation to view a map with road names and place names to assist in identifying station locations
- Disease Pressure Map
- Disease Pressure Tool
- ET Map
- Forecast Data
- Hourly: 5 day forecast
- Daily: 10 day forecast
- GDD Map
- GDD Tool
- Overnight Low Map
- Rain Map

**Current and historical weather data:**
- 15 minute Data: the past month
- Hourly Data: the past 6 months
- Daily Data: since January 1st; however, data is not archived until the beginning of April, so more than a yearly dataset will be accessible from January-March

"My Favourites" Tool - the ability to save user preferences to expedite viewing time on subsequent visits
- Daily Data Comparisons
  - Various parameters over the past 2 weeks

Visit [www.vineandtreefruitinnovations.com/userguide.cfm](http://www.vineandtreefruitinnovations.com/userguide.cfm) to learn about each of the outlined products and how to access them.

This new program is currently sponsored by the Grape Growers of Ontario, OMAFRA and Ontario Tender Fruit Producers. WIN thanks these sponsors for their assistance in providing tools and resources to the industry. Please contact WIN at 519-352-5334 ext 223 or email [inichols@weatherinnovations.com](mailto:inichols@weatherinnovations.com) to explore additional sponsorship opportunities to serve the grape and tender fruit sector. Any questions regarding the new website or additional weather monitoring services, can be directed to Wayne Heinen, WIN Operations (Niagara or PEC) 289-241-6338 or Ian Nichols (Lake Erie North Shore) 519-352-5334.

**How cold did it get in Niagara on the night of January 9-10, 2010?**
On Saturday, January 9, conditions were suited to an extreme temperature drop. The day was marked by relatively clear skies, yet temperatures remained well-below 0°C. As the sun lowered during the early evening hours, there was a simultaneous drop in wind speeds. Consequently, radiational cooling occurred rapidly, as skies remained clear and wind speeds were low. A very strong temperature inversion developed, ranging from a 5°C to 8°C difference between temperatures at vine-level and at a height of 20m. This sudden drop in temperature resulted in the coldest temperatures experienced yet in the 2009/2010 winter season. Some areas experienced relief as wind speeds rose above 7km/hr (the approximate wind speed at which there is enough natural mixing to begin to break up inversions). Alternatively, wind machines were started to perform the same action, bringing warm air down to vine-level. Temperatures at vine-level fluctuated greatly until morning, in sync with natural wind speed fluctuation and/or mixing generated from wind machines. A map outlining the minimum hourly average temperature that occurred at each location during this event is shown on page 1. (These maps are posted daily on our website for anyone who signs in). View this map and much more at [www.vineandtreefruitinnovations.com](http://www.vineandtreefruitinnovations.com)
### 2009 Cultivar Evaluations - Peaches

Ken Slingerland, Tender Fruit & Grape Specialist, OMAFRA

<table>
<thead>
<tr>
<th>Location</th>
<th>Cultivar</th>
<th>Yr</th>
<th>Cr</th>
<th>Rd</th>
<th>Un</th>
<th>Sf</th>
<th>Co</th>
<th>Bl</th>
<th>At</th>
<th>Fl</th>
<th>Fr</th>
<th>Qu</th>
<th>RF</th>
<th>Sp</th>
<th>LS</th>
<th>Fs</th>
<th>Or</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jordan Station</td>
<td>HW 269</td>
<td>99</td>
<td>8</td>
<td>20</td>
<td>6.5</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Vic Farm</td>
<td>V92301</td>
<td>04</td>
<td>7.5</td>
<td>29</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>8</td>
<td>8</td>
<td>7.5</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>8.5</td>
<td>7</td>
</tr>
<tr>
<td>Jordan #2</td>
<td>V92301</td>
<td>06</td>
<td>6</td>
<td>30</td>
<td>7</td>
<td>6</td>
<td>7.5</td>
<td>8</td>
<td>8</td>
<td>7.5</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>8.5</td>
<td>8.5</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>Fonthill</td>
<td>HW 274</td>
<td>05</td>
<td>5</td>
<td>31</td>
<td>7</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>5</td>
<td>6</td>
<td>6.5</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>Fonthill</td>
<td>PF 7</td>
<td>05</td>
<td>6</td>
<td>Aug 1</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>6.5</td>
<td>7</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Fonthill</td>
<td>V853914</td>
<td>00</td>
<td>7</td>
<td>4</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7</td>
<td>7.5</td>
<td>5.5</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>9</td>
<td>5.5</td>
</tr>
<tr>
<td>Fonthill</td>
<td>V85384</td>
<td>00</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7</td>
<td>7.5</td>
<td>5.5</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>9</td>
<td>5.5</td>
</tr>
<tr>
<td>Vic Farm</td>
<td>HW274</td>
<td>98</td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>8.5</td>
<td>8.5</td>
<td>9</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>Risingstar</td>
<td>98</td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>7.5</td>
<td>6.5</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>6.5</td>
<td>8.5</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>Fonthill</td>
<td>PF 15A</td>
<td>00</td>
<td>7.5</td>
<td>14</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>HW 272</td>
<td>98</td>
<td>7</td>
<td>17</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>Redhaven</td>
<td>92</td>
<td>7</td>
<td>18</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>6.5</td>
<td>7.5</td>
<td>7.5</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>HW271-W</td>
<td>98</td>
<td>7</td>
<td>17</td>
<td>6.5</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>6.5</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>8.5</td>
<td>9</td>
<td>8</td>
<td>9.5</td>
<td>9</td>
</tr>
<tr>
<td>Vic Farm</td>
<td>Redstar</td>
<td>98</td>
<td>7</td>
<td>21</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>Starfire</td>
<td>98</td>
<td>7.5</td>
<td>21</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7</td>
<td>7.5</td>
<td>9</td>
<td>8.5</td>
<td>8.5</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>Blazingstar</td>
<td>98</td>
<td>7.5</td>
<td>22</td>
<td>7</td>
<td>7.5</td>
<td>8</td>
<td>8</td>
<td>7.5</td>
<td>8.5</td>
<td>7.5</td>
<td>8.5</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>V92131 - W</td>
<td>02</td>
<td>7</td>
<td>26</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>7.5</td>
<td>8</td>
<td>7</td>
<td>7.5</td>
<td>9</td>
<td>8.5</td>
<td>9</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>HW 267</td>
<td>98</td>
<td>6.5</td>
<td>26</td>
<td>7.5</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>8.5</td>
<td>7.5</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>PF 17</td>
<td>98</td>
<td>7.5</td>
<td>29</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7</td>
<td>9</td>
<td>7.5</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>Allstar</td>
<td>98</td>
<td>6.5</td>
<td>30</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>8</td>
<td>7.5</td>
<td>8.5</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>Coralstar</td>
<td>98</td>
<td>7</td>
<td>Sept 4</td>
<td>7</td>
<td>8</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>8</td>
<td>7</td>
<td>8.5</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>7.5</td>
</tr>
<tr>
<td>Vic Farm</td>
<td>PF 23</td>
<td>98</td>
<td>7.5</td>
<td>5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>8</td>
<td>7.5</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vic Farm</td>
<td>Bounty</td>
<td>98</td>
<td>7.5</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>8.5</td>
<td>7.5</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Vic Farm</td>
<td>Glowingstar</td>
<td>98</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>9</td>
<td>7.5</td>
<td>8.5</td>
<td>8.5</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Vineland</td>
<td>PF 24-007</td>
<td>04</td>
<td>3</td>
<td>12</td>
<td>7.5</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>9.5</td>
<td>8.5</td>
<td>9</td>
<td>8.5</td>
<td>8.5</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- **W** = White Flesh; **Starfire** – Slight ridge at suture; V92301 was under-thinned; HW269 had some winter injury and canker; HW274 discarded; PF7 had a spring frost; Glowingstar – odd block shape with ridge on suture; Bounty – underthinned

**Key to the Cultivar Ratings**

A standard scoring for most categories, unless otherwise listed, is defined as the following: 9 = exceptional, 7 = good, 5 = commercial acceptable, less than 5 is unacceptable. A 5 rating or less is occasionally acceptable in one category when other category ratings are much higher ie. Freeness for early season nectarine is sometimes too clingy to the pit but that is normal for early season nectarines.

**Yr** – The year the cultivar was planted.

**Cr** – The amount of crop at harvest for Niagara, actual harvest weights are used for the Cedar Springs plantings.

**Rd** – Ripe date when the first commercial harvest occurs. Days before (-) or after (+) Redhaven.

**Un** – Uniformity of fruit on the tree, i.e. 1 harvest = 9, 2 harvests = 8, 3 harvests = 7, 4 harvests = 6, etc.

**Sf** – Size of Fruit, e.g. 3” = 9, 2 ¾” = 8, 2 ½” = 7, 2 ¼” = 6, less than 2 ¼” = 4

**Co** – Colour of fruit exterior, background colour, etc.

**Bl** – The percentage of the blush on most of the fruit; 90% = 9, 70% = 7, 50% = 5, etc.

**At** – Attractiveness of fruit, brightness, concentration of colour, contrast, free from blemishes, etc.

**Fi** – Firmness of fruit at harvest

**Fr** – Freeness of the flesh from the pit

**Qu** – Quality of fruit, flavour, texture, sugar/acid ratio

**Rf** – Red in flesh; no red = 9, slight discoloration and some red at pit = 7, flesh heavily streaked from centre = 5, etc

**Sp** – Split pits; none = 9, 5% = 7, 10% = 5, 25% = 3.

**Fs** – Fruit spot; very resistant = 9, moderately resistant = 7, somewhat susceptible = 5, very susceptible = 3

**Fs** – Fruit spot; same as above

**Or** – Overall rating; considers above ratings and also includes susceptibility to diseases, skin pubescence, etc.
Perennial fruit tree crops including stone fruit and pome fruit may grow poorly and become less productive when replanted on a site where the same crop was grown previously. In some orchards, the population of a single pathogen or parasitic nematode that builds up around the roots of mature trees over time can overwhelm young two year old trees planted on the same site. As a result, young replanted trees become severely stunted with poor growth and sometimes die prematurely. However, over 200 years of studies and research on the “replant problems” of fruit crops have found that a combination of several factors including nutrient deficiencies and toxicities, soil pH, soil conditions, poor plant soil water relationships, root and vascular pathogens as well as parasitic nematodes contribute to poor growth. Most studies have shown that when soil from orchards suffering from “replant problems” is pasteurized or fumigated, the deleterious affects disappear or are greatly reduced. This suggests that a biological component is often, but not always, the primary cause of this complex phenomenon. In some studies, no specific pathogen was associated with the poor growth of the replanted perennial fruit trees; however, the researchers proposed that microbes that breakdown the roots of the previous fruit trees release products into the soil that are phytotoxic to root growth and development of young replanted trees of the same species. Removing as much of the old root system from sites that are to be replanted to stone fruit is important.

Since plant parasitic nematodes have been found to be associated with replant problems in some orchards, a soil test for nematode analysis before replanting is always a good practice. Although “Bailey” rootstocks are considered some what tolerant to root lesion nematodes, young trees on “Bailey” rootstocks can be overwhelmed by high populations of these pests left from old trees grown on the site previously. The Tomato ringspot virus can be vectored by dagger nematodes and has an extensive host range including many crops such as grape, tomato, pepper, raspberry, as well as weeds including dandelion, sheep sorrel and common chickweed. Keeping land fallow and controlling weeds that could act as a reservoir, lowers nematode populations and results in better replanted tree growth. Unfortunately fallowing land is not a sustainable practice and can result in the loss of soil to erosion.

Verticillium wilt is a soil-borne vascular disease, not usually associated with replant problems that can cause significant decline in stone fruit trees. The pathogen can persist in soil for many years and has a large host range including many vegetables particularly potatoes, tomatoes, eggplant and some small fruit crops such as strawberries and raspberries. Planting stone fruit on land that was previously grown with susceptible crops may pose a risk of Verticillium infection and should be avoided.

Several species of the water mold “Phytophthora” can cause severe root, crown and collar rot of stone fruit. The Phytophthora species that infected stone fruit trees has a very large host range including many other fruit trees and some small fruits such as strawberry. This pathogen is often associated with the replant disease complex, but can cause significant damage to stone fruit on its own. It is frequently found in heavy soils but can infect trees growing in poorly drained sandy soils. Planting a grass cover crop prior to planting stone fruit may help reduce the pathogen population in soil. Avoid replanting stone fruit trees in low areas were water remains standing for extended periods of time. Selecting sites that are well drained or installing good drainage in fields where water accumulate will help to reduce the environmental conditions required for Phytophthora infection.

Fumigating land prior to planting young trees is one of the most consistent practices that reduce the potential of replant problems. Several studies using seed meal from brassica crops such as mustards that are incorporated into soil as a green manure prior to replanting fruit trees have been shown to reduce populations of both parasitic nematodes and root rot pathogens associated with replant disease. Many brassica crops produce chemicals in their leaves, flower parts and seed coats that, when broken down by soil microbes, release biofumigants which suppress pathogens and nematodes.

There is no silver bullet to control replant problems; however, testing soil for nematodes and integrating several practices including site selection, crop rotation with cover crops and fumigating prior to replanting will significantly reduce biological agents that can negatively impact the establishment and growth of young stone fruit trees.
Crop diseases are caused by a variety of pathogens, but it’s the fungal pathogens that are the primary cause of crop loss worldwide. Fungicides are pesticides that manage fungal disease by specifically inhibiting or killing the fungus. Fungicides are most effective when the application is timely and achieves good coverage. Coverage gets mentioned a lot when talking about good spraying practices, but what is it exactly?

Target coverage describes the percentage of a target’s surface that has spray on it, but it also describes the size and distribution of droplets. Consider a leaf with three large droplets and another leaf with 80 small droplets. Both can have the same volume of pesticide and the same percent-area coverage, but the leaf with more droplets is better protected. Consider further, two leaves with 80 droplets each: now they have the same “coverage”, but one was sprayed using more water than the other and therefore has less active ingredient per droplet.

Fungicides have different chemistries and should be applied according to their mode of action. Locally systemic products have limited movement within the plant, often as little as a few millimetres and rarely throughout a leaf or into growing tissue. Contact products have to physically touch the pathogen, so there’s very little margin for error. It is debatable, but good coverage generally equals good efficacy and the best results are achieved when susceptible surfaces have about 80 to 90 droplets per square centimetre, sprayed with fine-to-medium droplets, with a concentration no less than label rate (see Figure 1).

Coverage can sometimes be improved through the use of adjuvants (e.g. spreaders, stickers, etc.) but be aware that many products include adjuvants in the formulation: don’t add any unless indicated on the label. Further, don’t rely on kickback, systemic movement or rain-redistribution of any product to make up for poor timing or poor coverage.

To get a better sense of what adequate fungicide coverage really looks like, consider Figure 2. These are water-sensitive papers used for evaluating relative spray coverage and canopy penetration. The paper is yellow and is stained blue by exposure to aqueous spray droplets. It is perhaps surprising that paper #2 represents the ideal: just over 80 discrete droplets per square centimetre, with droplets between fine and medium (200-300 micron diameter).

Water sensitive paper is relatively cheap and can be obtained from any nozzle supplier; it provides immediate feedback as to the quality of the application and you should always have a packet (and a few clothespins) handy for a quick evaluation.

So, when you take the sprayer out of the barn at the beginning of the season, don’t just set it and forget it. Take the time to consider each spray application before you start filling the tank. Make adjustments with an eye to achieving good coverage every time. For more information, check out the Factsheet “Six Elements of Effective Spraying in Orchards and Vineyards”: 

![Figure 1 - There will always be exceptions, but generally these are ideal relative droplet sizes and deposit densities for fungicides and insecticides.](image)

![Figure 2 - Spray coverage of water-sensitive paper from least to greatest.](image)
Here is a summary of the Best Management Practices which make up part of the 36 page report recently completed by the above researchers who are grateful for all the support of many partners. The project was sponsored by the Grape Growers of Ontario (GGO) and the Wine Council of Ontario (WCO). This project was partially funded by CanAdvance, through the Agricultural Adaptation Council of Agriculture and AgriFood Canada (AAFC), and by CRESTech through the Ontario Centres of Excellence. Other funding partners included: Vailmount Vineyards, 1340226 Ontario Ltd, KCMS Applied Research and Consulting, Agricorp, Ontario Tender Fruit Producers’ Marketing Board (OTFPMB), and the Niagara Peninsula Fruit and Vegetable Growers’ Association (NPFVGA). In-kind contributions supporting the project included Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), Brock University (CCOVI), University of Guelph (UG), GGO, KCMS and Agricorp.

The objective of this on-farm research project was to provide the Ontario grape and tender fruit industry with best management practices for operation of wind machines to use them more effectively and minimize nuisance noise for neighbours.

**Crop hardiness**
- Plants should be managed to maintain optimum health to ensure they are as healthy as possible going into winter
- The most up-to-date plant hardiness information and critical temperatures should be taken into account when decisions are made to operate a wind machine
- Wind machines should operate only when there is the possibility of cold injury to crops within the area of influence of the machines

**Placement**
- Wind machines should be located to take into account the expected skewing effects on their areas of influence by topography and wind direction
- Wind machines should be located to take into account the location of other adjacent wind machines and other features which might provide some additional cold injury protection such as roads, warm buildings, streams, bush
- Growers should consider planting crops that are more sensitive to cold injury as far as practical from neighbours, so wind machines can be located further from homes

**Monitoring**
- Growers should use best local weather forecasts available such as [http://www.vineandtreefruitinnovations.com/](http://www.vineandtreefruitinnovations.com/)
- Growers should continually monitor for a strong temperature inversion, greater than 3°C (5.5°F), as close as practical on or near their farm, so they know if operating their wind machine(s) might provide some plant protection from cold injury. This would include a tower at least 10 m (33 ft) high to monitor temperatures high above the crop
- Growers should set start-up temperatures for their wind machines based on sensors located within 15 m (50 ft) of each machine, and below the fruiting wire height
- Growers should monitor and automate the start up/operation/shut down of their wind machines using a combination of real-time remote temperature/wind speed/wind machine operation sensing devices and monitoring via cell phones/computers/pagers, etc.
- Growers should set start-up temperatures as close as practical to expected critical air temperatures:
  - Spring frost: 2 to 3°C (36 to 37.5°F)
  - Fall frost: 1 to 2°C (34 to 36°F)
  - Winter: Variable based on latest bud hardiness data from freezing trials
- Growers should set the differential (wind machine stop) temperature on their wind machines 2°C - 3°C (3.5°F – 5.4°F) higher than start temperatures
Wind
• Growers should monitor wind speeds before and during expected cold injury events
• Growers should not operate wind machines if wind speeds are much higher than 7 km/h (4 mph) as there is unlikely to be a strong temperature inversion or ‘heat’ above the field to pull down anyway
• Growers should not operate wind machines if wind speeds are 13 km/h (8 mph), or higher, as this can damage their long, thin blades
• Growers should never operate wind machines if wind speeds are 21 km/h (13 mph), or higher, as this can seriously damage their wind machines

Maintenance
• Growers should maintain machines in good condition with checkups at least annually by;
  ∗ changing gearbox oil (at tower base and top)
  ∗ lubricating drive lines and inspecting seals
  ∗ checking tension of all bolts on tower
  ∗ inspecting blades and attaching hardware
  ∗ performing regular engine maintenance; and
  ∗ keeping booster cables handy for quick use

Noise
• Wind machines should be located as far as practical from the edge of neighbouring homes within agricultural areas, but not closer than 125 m unless best management practices are in use
• For neighbours living within 125 m of a machine, growers should:
  ∗ discuss the need for wind machines and how and why they operate
  ∗ consider creating an early warning system about possible machine use on certain nights
  ∗ give them a 24-hour cell phone number to call
  ∗ use a ‘Last On, First Off’ principle for machine(s)
• Growers should be more diligent in operating wind machines on farms where they do not live, as they are not always there to hear if and how their machines are operating
• All wind machine engines should have mufflers

On-going learning
• Growers should train and educate all employees who will operate wind machines on the latest best management practices to minimize machine operation

New OVTP funding and deadline change

As the Canada-Ontario Orchards and Vineyards Transition Program (OVTP) nears its funding limit, the Ontario government is providing an additional $2 million to the program. OVTP provides compensation to grape, apple and tender fruit producers who wish to remove unproductive and/or uneconomic vines and trees.

To allow as many producers as possible to participate before funding runs out, the application deadline has been moved up to March 31, 2010. The new deadline also helps ensure that accepted growers have enough time to complete their removals by November 30, 2010. Applications are processed on a first come first served basis, so growers are encouraged to apply early.

Eligible producers may receive up to $1,618.74 per qualifying acre towards the cost of removing and disposing of orchard and vineyard stock. As of February 1, 2010, Agricorp has received more than 1,300 OVTP applications and verified 11,543 acres for a total of $18.7 million in funding. We have already issued more than $10.7 million in OVTP payments.
Canada fleabane (Conyza Canadensis), also known as horseweed was found to be resistant to group 22 herbicides (bipyridiliums), specifically Gramoxone (paraquat) in Essex County in 1993. Approximately 5 acres were infested at 5 orchard sites. Over time, the area of infestation has declined significantly and no new cases have been reported largely due to the use of Roundup (glyphosate) to control the resistant populations.

Canada fleabane has been documented to develop resistance to Roundup (glyphosate) – glycin (group 9), as well as, ALS inhibitors (group 2 – Classic, First Rate), photosystem II inhibitors (group 5 – Gesagard, Sinbar), ureas and amides (group 7 – Betamix, Karmex) and bipyridiliums (group 22 – Gramoxone). Several cases of herbicide multiple resistance have occurred around the world. Herbicide multiple resistance refers to a weed or crop biotype that has evolved mechanisms of resistance to more than one herbicide and the resistance was brought about by separate selection processes. For example, after a weed or crop biotype developed resistance to herbicide A, then herbicide B was used and resistance evolved to herbicide B. The plant is now resistant to herbicides A and B through two separate selection processes. (Gunsolus, J.L., 2002)

Glyphosate resistance is of particular concern to Ontario producers, due to the reliance of this product in perennial horticulture production systems. There have been no known cases of glyphosate resistance in Ontario; however, the following American States have confirmed glyphosate resistant Canada fleabane populations:

- 2000 - USA (Delaware); 2001 - USA (Kentucky); 2001 - USA (Tennessee); 2002 - USA (Indiana); 2002 - USA (Maryland); 2002 - USA (Missouri); 2002 - USA (New Jersey); 2002 - USA (Ohio); 2003 - USA (Arkansas); 2003 - USA (Mississippi); 2003 - USA (North Carolina); 2003 - USA (Ohio); 2003 - USA (Pennsylvania); 2005 - USA (California); 2005 - USA (Illinois); 2005 - USA (Kansas); 2007 - USA (Michigan); 2007 – USA (Mississippi). Source: www.weedscience.org

In Ohio and Michigan, researchers have found Canada fleabane with resistance to ALS herbicides (i.e. Classic, FirstRate) in a number of fields. Also, in Michigan resistance has been found to ureas and amide herbicides (i.e. Betamix, Karmex). There have been no known cases of ALS or urea and amide herbicide resistance in Ontario.

Canada fleabane is a weed that occurs in all parts of Ontario. Traditionally, it was a problem in pastures, and road sides, but is increasing in “popularity” because it thrives in no-till fields. It has always been a problem in perennial crops like orchards, vineyards, berries, nursery crops and asparagus where soil is not tilled.

Controlling Canada fleabane in the spring is usually not difficult. Applications of Roundup (any glyphosate product) are usually effective for the over-wintering rosettes. High rates will be required later in the season. Gramoxone or Ignite can also be effective, but Gramoxone should be used on cloudy days. All products are more effective if applied before the fleabane gets too big.

Rotating between herbicide groups or modes of action is essential to prevent resistance development. If you have any plants that are not being controlled by your current herbicide program and you suspect resistance please contact the Agriculture Information Contact Center: 1-877-424-1300. The University of Guelph "Weeds Lab" can test for resistance of suspected weed species.

References

Acknowledgements
Thank-you to Peter Smith, Department of Plant Agriculture, University of Guelph for the use of his pictures.