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Vineland Research Station Centennial

Publication of Station’s One Hundred Year History

In 2006 the Horticultural Experiment Station at Vineland celebrated its first century of research and service. To commemorate this event several activities were held including the publication of a Centennial History entitled:

“CELEBRATING A CENTURY OF SUCCESS”
1906 – 2006

This soft-covered book, 5 ½ in. x 9 in., 258 pages, is copiously illustrated with black and white and coloured photographs, and includes summaries of most of the Station’s activities over a century of horticultural research, development and extension. Included is a seven-page extract reproduced from “The First Fifty Years 1906 – 1956” published when the Station was half-way to its centennial.

Editors for this centennial volume were Arthur Loughton, coordinating editor, assisted by Richard V. Chudyk and Judy A. Wanner.

Copies of “Celebrating a Century of Success” may be obtained by:

a) picking it up (9 to 12 and 1 to 4, Monday through Friday) at the Station’s office (4890 Victoria Avenue, Vineland Station, ON) for $15.00 (includes GST), or

b) mailing the Vineland Centennial Celebration Committee, University of Guelph, P.O.Box 7000, 4890 Victoria Ave. N., Vineland Station, Ontario, L0R 2E0 for $18.00 (includes GST, postage and packing). Include your name, address, phone number and email. Order forms can be downloaded from www.uoguelph.ca/vcc2006/pdf/100historyorderform.pdf.

U.S. orders - $12.00 plus $5.50 postage and packing for a total of $17.50 U.S.

Cheques should be made payable to “University of Guelph”. Orders without payment will not be processed.

Profits from the sale of “Celebrating a Century of Success” will be added to the Centennial Scholarship Fund designed to support graduate student research that is relevant to the horticultural industry of Ontario and which is, in part, conducted at the Vineland campus. This demonstrates a serious commitment to the next 100 years of the Station’s life and that the future will be one of continuing to move forward.
**How Dry is it?**

**Ken Slingerland, Tender Fruit and Grape Specialist, OMAFRA**

Really, really dry!

The precipitation to date is much lower than normal at Vineland Station and many other grape and tender fruit areas of the province. From May 1 to July 25, there has been a total of 87.4 mm or rain. The 85 year average for the same 3 months is 214.5 mm. In fact, the last main rain event (17.3 mm) took place on May 15th. Fortunately, most of the month of July has been somewhat moderate so vines and trees are better able to cope with the lack of rain.

For more information on daily Ontario weather information, go to the Environment Canada website at [http://climate.weatheroffice.ec.gc.ca/climateData](http://climate.weatheroffice.ec.gc.ca/climateData) Click on “English”, then “Climate Data Online” to locate a particular site such as Vineland or Harrow.

For Niagara Regional Data, go to the Weather Innovations website: [http://www.weatherinnovations.com](http://www.weatherinnovations.com)

Click on “Products and Services”, then “Weather Data”, then click “here” in paragraph two. Choose a location such as “Queenston”. Choose the type of information (e.g. “Daily”). Choose a time period (e.g. “60 days”) and press “enter”.

When the data comes up, you can go to the bottom of the page and select which parameter you want to graph – bars for rains, lines for temps.

**Fruit Tree Leaf Analysis**

**Peter Zwart, Plant Nutrition (Hort.), OMAFRA**

The last 2 weeks of July is the time to take leaf samples from your fruit trees. Foliar sampling is generally the most reliable tool for assessing the nutrient status of orchards. It gives you an idea of actual nutrient uptake and can reveal deficiencies that might not have any other symptoms. It’s not too late to correct deficiencies for many nutrients in fruit trees with foliar sprays. Leaf sampling also gives you the luxury of confidently doing nothing if all is well.

If nutrient levels in an orchard are known to be stable and fertility management practices are unchanged, sampling every two to three years is sufficient. However, if there are known deficiencies or nutrient management practices are changed, sampling should be done every year until foliar nutrient levels are stable and any deficiencies are corrected.

The samples are taken from shoulder-height, mid-shoot leaves of this year’s growth that are fully mature as shown in the picture.

Avoid damaged, abnormal and spur leaves as well as those that are not fully expanded. Approximately 10 leaves from all sides of a tree can be taken from 10 trees to give a total sample of 100 leaves. If your orchard is variable you can break it up into logical management units to sample separately if practical. Otherwise, you could take fewer leaves from more trees to get your 100 leaves. Different varieties have different critical nutrient levels and should be sampled separately. Try to avoid collecting leaves from trees at the outer edges of the orchard. Put the leaves into a labeled paper bag to keep them clean and bring them to an accredited lab. Standard analysis includes N, P, K, Ca, and Mg. If micronutrient excesses or deficiencies are suspected, these can also be analysed at an extra cost. A list of labs with prices can be found on page 280 of Publication 360 and online at [http://www.omafra.gov.on.ca/english/crops/resource/leaf.htm](http://www.omafra.gov.on.ca/english/crops/resource/leaf.htm).

One of the more common nutrition problems found in Ontario orchards is nitrogen level, excesses being more common than deficiencies. Another common one is K excesses or deficiencies. Excess K can lead to Mg deficiency. Zinc, Manganese, and Boron deficiencies are found in isolated cases. Any of these problems can be found by leaf analysis, and most can be corrected in-season with foliar sprays. The cost of analysis is offset many times over by savings in fertilizer costs or increases in yield and/or quality.
Editors note - Grape samples should be collected by September 1st and sent to the lab of your choice from the list of accredited labs. With grapes, only the stems (petioles) of the leaves are selected from mature leaves or bearing grapes. Do not collect young or over-mature leaves. Collect 100 stems for each sample. A good random sample usually requires sampling several rows of grapes in the block.

Samples should be placed in paper bags marked with sample number, name, address, variety and age of tree or grape vine.

1-MCP Applied Preharvest or Postharvest Improves the Quality of ‘Bartlett’ Pears

Dr. Jennifer DeEll, Fresh Market Quality Program Lead, OMAFRA, and Dr. Dennis Murr, University of Guelph

A sprayable formulation of 1-methylcyclopentene (1-MCP) was applied to mature ‘Bartlett’ pear trees 1 week prior to first harvest. Solutions were applied using a 3-gallon sprayer (CO₂ pressure based) and spraying continued until the trees were dripping wet. 1-MCP concentrations were 65.9 or 132.2 mg/L (Harvista™, 3.8% a.i.) within 184.5 gallons of solution per acre, and the amount of 1-MCP applied per acre was calculated to be 46.0 or 92.3 g, respectively. Also included in the solutions were 1% oil and 0.5% surfactant. Fruit firmness at the time of spraying was 19.3 lb-force and soluble solids concentration was 10.8%.

Pears were harvested from three trees per treatment at 1 (optimum), 2, and 3 weeks after spray application.

Fruit drop was substantially inhibited by preharvest 1-MCP application, as only sprayed pears remained on the trees after 2 weeks and consequently these increased in size. All harvested fruit were cooled overnight at 0-1°C. After 3 days at 0-1°C, some pears from the first harvest that received no spray were then treated postharvest with gaseous SmartFresh™ (1-MCP, 300 ppb, 3.3% a.i.) for 24 hours. Three boxes (one per tree) per treatment per harvest combination were held for 4 months in air at 0-1°C.

Ethylene production, firmness loss, and color change (green to yellow) were delayed by preharvest sprayable 1-MCP treatment. These effects were more notable in later harvested fruit and continued during 14 days at 22°C. Immediately after 4 months of storage in air at 0-1°C, pears treated with sprayable 1-MCP or postharvest SmartFresh remained greener and continued to exhibit less firmness loss than control fruit. However, these effects were no longer present after an additional 4 days at 22°C.

Both preharvest and postharvest 1-MCP treatments substantially reduced the incidence and severity of senescent scald, core breakdown, and storage rots. Nonetheless, pears from the later harvests (post-optimum) of all treatments developed high incidences of disorders and rots after 4 months at 0-1°C. There was also some notable color striping in 1-MCP-sprayed pears from the later harvests, as the fruit transitioned from green to yellow during air storage at 0-1°C. This phenomenon was not studied within the reported trials, but it needs to be investigated before any large commercial use of preharvest 1-MCP sprays.

Overall, sprayable 1-MCP applied preharvest (Harvista™) provided similar (or better) benefits to ‘Bartlett’ pear quality as postharvest treatment with gaseous 1-MCP (SmartFresh™).
Effects of SmartFresh (1-MCP) on Tender Fruit Quality in Ontario

Dr. Jennifer DeEll, Fresh Market Quality Program Lead, OMAFRA, Simcoe; and Dr. Dennis Murr, University of Guelph

The use of SmartFresh™ (1-MCP) technology to improve the quality of ‘Shiro’ yellow plums, ‘Redhaven’ peaches, and ‘Fantasia’ nectarines during storage was investigated during the 2006 season (3rd year of project). All fruit were harvested from commercial orchards within the optimum harvest maturity window. Plums, nectarines and peaches were treated with or without postharvest gaseous 1-MCP (1 ppm) for 24 hours at 0°C on the day of harvest and stored for 2 or 4 weeks at 0°C.

‘Shiro’ Plums
- Plums treated with 1-MCP were firmer, retained green color longer and turned yellow-gold more slowly than non-treated fruit.
- Soluble solids concentration (°Brix) was slightly (but significantly) higher in 1-MCP-treated plums than in those not treated.
- 1-MCP reduced ethylene production in plums during holding at 22°C.
- 1-MCP-treated plums had lower CO₂ production (respiration), and this effect was more consistent in fruit from the second harvest.
- Similar results have been found in all 3 years of study and therefore, it appears that 1-MCP can maintain the quality of ‘Shiro’ plums for longer storage and marketing periods than currently possible.

‘Redhaven’ Peaches
- 1-MCP-treated peaches exhibited slightly higher firmness values and less percentage of peel blush compared to non-treated fruit.
- No significant effect of 1-MCP was observed in CO₂ (respiration), ethylene production, soluble solids concentration (°Brix), or chilling injury.
- Since these results are similar to those from the previous year, it can probably be concluded that there is little benefit to using 1-MCP on ‘Redhaven’ peaches.

‘Fantasia’ Nectarines
- 1-MCP-treated nectarines were firmer and produced less CO₂ (lower respiration) than those not treated.
- There was no significant effect of 1-MCP on ethylene production, soluble solids concentration (°Brix), or color.
- Although 1-MCP consistently improved firmness retention in ‘Fantasia’ nectarines in all years of study, the effects on other quality attributes were not consistent, suggesting that there are probably other factors involved in 1-MCP effectiveness.

For more details or copies of the project reports, please contact Jennifer DeEll. This project has been supported by the Ontario Tender Fruit Producers’ Marketing Board, AgroFresh Inc., and the Agricultural Adaptation Council.

Fruit Trees Suffering from Phytophthora may also have Other Diseases

Neil Carter, Tender Fruit and Grape IPM Specialist and Michael Celetti, Plant Pathologist - Horticulture Crops Program Lead

Predictions of Phytophthora root rot occurring in fruit trees as a result of long wet periods last fall were unfortunately proved true this spring. Phytophthora has been covered in some detail in a previous article in Hort Matters (Vol. 7, Issue 2, Feb. 9, 2007).

We continue to see trees suffering from this disease (Figure 1), and have noted that in many cases, Phytophthora is not the only disease in the orchard or indeed even within a single tree. One of those other diseases is Verticillium wilt, caused by a fungus and characterized by dark brown or black streaks in affected sapwood. Sudden wilting on one or more branches along with rapid withering of stunted leaves (although leaves are often retained) is common when Verticillium infects stone fruit (Figure 2). In terms of severity of effects on stone fruit, Verticillium affects cherry most strongly (mature trees can be killed quickly), then apricot (a branch may re-leaf the year after infection, but the tree will decline over time), peach (young trees are seriously affected or killed but some mature trees of certain varieties may “outgrow” the disease), and...
finally plums (disease can be present but is rarely prevalent). A soil test for Verticillium is preferable if replanting where the disease has occurred previously and soil fumigation before planting, though costly and time consuming, may be necessary to ensure long-term tree health.

Another disease appearing in some orchards affected by Phytophthora is Armillaria root rot. Although Phytophthora occurs more frequently in poorly-drained clay soils and Armillaria occurs more often in light well-drained, sandy soils, the two can and do occur in the same sites simultaneously. Armillaria root rot in stone fruit is characterized by sudden collapse of trees in mid-summer. Black ‘shoe string-like’ rhizomorphs (dark strands of the fungus that transport nutrients from one location to another and serve as a survival organ) can be seen on the bark, dead roots, surface of live roots, and in the soil around infected trees. Clusters of golden or honey coloured mushrooms can also be found around the base of dead trees when soil moisture is plentiful in the fall.

Armillaria root rot is most common in orchards planted on former forested ground, so orchards should not be planted into such areas where possible. Although *Prunus* rootstocks vary in susceptibility to Armillaria, none are immune to infection. If replanting into ground where trees were previously infected by Armillaria, work the ground well and remove as much root material as possible; fumigation is not effective to control Armillaria root rot.

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Mealybugs on Plum Trees

*Neil Carter, Tender Fruit and Grape IPM Specialist, OMAFRA*

Mealybugs appear occasionally as pests on plums with heavy infestations potentially contaminating fruit. In addition to mealybugs themselves contaminating fruit, large populations can secrete enough “honeydew” so that sooty mold can grow on fruit. Mealybugs are members of the insect order Homoptera which includes (among others) psyllids and aphids, both of which are known for causing problems with honeydew and sooty mold.

In our climate, most mealybugs likely overwinter in the egg stage. On plums, the eggs are laid in protected crevices and cracks on the bark, but spring oil sprays for other pests may suppress mealybugs somewhat. Ladybeetles, especially a relatively small ladybeetle called the twice-stabbed ladybeetle (it’s a small black round beetle with two brilliant red spots), commonly attack mealybugs as do lacewings, syrphid (hover fly) larvae, and some parasitic wasps. However, predators and parasites can’t keep rapidly expanding mealybug populations such as that shown in Figure 1 in check.

Plums, being a very small acreage crop in Ontario, get the short end of the stick when it comes to pesticide registrations and there are no commercial pesticides registered specifically for mealybug on plum. However, heavy infestations seem to appear in orchards with minimal spray programs, so it’s likely that insecticides applied for plum curculio...
and other plum pests normally keep mealybugs under control. Mealybugs often seek out cracks in the bark and can be found in greater numbers on the underside of limbs. Hence, thorough spray coverage (i.e. high water volume application) is needed to adequately manage this pest.

![Figure 1. Cluster of mealybugs on plum bark.](image1)

Figure 1. Cluster of mealybugs on plum bark.

![Figure 2. Mealybugs (small white blurs in the picture) prefer to congregate in cracks on the underside of limbs on plum trees.](image2)

Figure 2. Mealybugs (small white blurs in the picture) prefer to congregate in cracks on the underside of limbs on plum trees.

**Japanese Beetles Gorge on Grape leaves**

*Neil Carter, Tender Fruit and Grape IPM Specialist, OMAFRA*

Japanese beetles, *Popillia japonica*, adults are now out in great numbers feeding on the leaves of a wide variety of plants. They are especially obvious congregating on wild grape and some cultivated grapes. These beetles are easy to recognize (Figure 1) and spend most of their time, particularly on sunny days, mating and feeding (often both at the same time –Figure 2). Females will lay eggs near the roots of grasses and there is only one generation per year. Dry weather allegedly has a negative impact on both the emergence of adults and on the egg-laying success of females but at least for adult emergence, the dry weather doesn’t seem to have helped so far.

This pest had been gradually increasing its range since introduction into New Jersey in the early part of the last century and anecdotal observations indicate that it is becoming a more serious pest for grapes and tree fruit. Imidan (phosmet) is the only product currently registered in these crops, but observations indicate that other products used for pest management have some effect on Japanese beetles as well. However, with the vast number of beetles out there, there will be a new flush of adults into most affected areas regardless of any insecticide used. Thresholds for application timing have not been developed for this pest, but action should definitely occur well before leaves are completely skeletonized (Figure 3).

![Figure 1. Japanese beetles have a metallic green head and thorax, and coppery coloured elytra (wing covers) with white tufts at the sides and posterior.](image3)

Figure 1. Japanese beetles have a metallic green head and thorax, and coppery coloured elytra (wing covers) with white tufts at the sides and posterior.

![Figure 2. Japanese beetle adults mating and feeding on grape leaf.](image4)

Figure 2. Japanese beetle adults mating and feeding on grape leaf.
In the last 3 issues, we have explored 8 different tactics to manage weeds in the first orchard year. By late summer, we often see weed escapes and some problem areas that need attention. Here are 3 more suggestions to help reduce and manage weeds in young trees:

- **Control weed escapes as needed:** Where residual herbicides were applied, a 2nd application is usually needed after 8 to 12 weeks. Where no residual herbicides are used e.g. using Gramoxone, flaming or tillage, weed escapes will need to be controlled every 2 to 4 weeks. Avoid tree trunks with these treatments, especially if the bark is green. Plastic tree guards can help avoid drift problems but don’t give 100% safety. Using glyphosate is not recommended on first year trees as it can be absorbed through the bark. Gramoxone can also damage green bark trees, especially stone fruits. Grass herbicides like Poast or Venture can be safely applied on tree trunks, and Basagran + Assist or Lontrel are registered on first year trees in Canada for broadleaf weeds.

- **Spot treat perennial weeds:** Investing in spot treatment equipment like a hand sprayer, wick wiper, hand flamer and/or herbicide dripper/selector may be the best use of your money. Be sure to also invest some time in walking and treating patches of weeds. For directed glyphosate treatments, wait for the most sensitive stage of the weed and apply the high rates listed on the label for perennial weeds.

- **Fall orchard cleanup:** Annual fall applications of 2,4-D at a postharvest timing will reduce many broadleaf weeds, and are safe in the fall of planting year. Spot applications of glyphosate on quackgrass are very effective in the fall – but care is needed to avoid tree trunks.

It’s been a busy year, establishing a new orchard, and weeds have likely given you a challenge every month along the way. Remember that your goal is improved tree growth, which will result in earlier yields and better fruit size. These last final touch-up steps will set your orchard up for reduced weed problems next spring and in the following years.
Whiney about Viney Weeds?

Leslie Huffman, Weed Management Specialist (Horticultural Crops), OMAFRA

It’s that time of year – when viney weeds start creeping up and over anything they can get a hold on –trees, windbreaks, trellises, corn stalks and crops in general.

To help identify which viney weed is climbing over your plants or trees, first look to see if the stem is woody or herbaceous (but be careful – it may be poisonous!)

If you have a woody vine, here are 3 likely candidates:

<table>
<thead>
<tr>
<th>Weed</th>
<th>Plant habit</th>
<th>How to identify</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poison ivy</td>
<td>Perennial, woody vine</td>
<td>“Leaves of three, let it be”</td>
</tr>
<tr>
<td></td>
<td>Spread by seed or rhizome</td>
<td>Stalk on middle leaf</td>
</tr>
<tr>
<td></td>
<td>2 forms: ground-hugging or climbing</td>
<td>Oak-like leaves with much variability, smooth margins</td>
</tr>
<tr>
<td></td>
<td>All parts poisonous</td>
<td>Dry, white fruit</td>
</tr>
<tr>
<td></td>
<td>Noxious weed</td>
<td>Red leaves in fall</td>
</tr>
<tr>
<td>Virginia creeper</td>
<td>Perennial, woody vine</td>
<td>Usually five leaflets, but sometimes 3 or 4</td>
</tr>
<tr>
<td>(5-leaf ivy)</td>
<td>Spread by seed</td>
<td>Toothed margin</td>
</tr>
<tr>
<td></td>
<td>Climbing woody vine</td>
<td>No leaf stalks</td>
</tr>
<tr>
<td></td>
<td>Poisonous berries</td>
<td>Soft, blue fruit</td>
</tr>
<tr>
<td></td>
<td>Common garden plant</td>
<td>Red leaves in fall</td>
</tr>
<tr>
<td>Wild grape</td>
<td>Perennial, woody vine</td>
<td>Single leaves, typical grape shape</td>
</tr>
<tr>
<td></td>
<td>Spread by seed (birds)</td>
<td>Tendrils</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dark fruit in bunches</td>
</tr>
</tbody>
</table>

Control of these woody vines is a challenge, depending on where they are climbing. Cutting the vines at ground level and treating the fresh cut with glyphosate or 2,4-D + oil is a good start. Avoid herbicide contact with desirable plants.
If the stems are herbaceous, here are 4 candidates:

<table>
<thead>
<tr>
<th>Weed</th>
<th>Plant habit</th>
<th>How to identify</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field bindweed</td>
<td>Perennial, herbaceous vine</td>
<td>Small arrowhead-shaped leaves</td>
</tr>
<tr>
<td></td>
<td>Spread by seed or extensive roots</td>
<td>Extensive roots</td>
</tr>
<tr>
<td></td>
<td>Grows in patches</td>
<td>Trumpet flowers, 1”</td>
</tr>
<tr>
<td></td>
<td>Common in fields, lawns and roadsides</td>
<td>Bracts on flower stem, but not touching flower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No sheath at node</td>
</tr>
<tr>
<td>Wild buckwheat</td>
<td>Annual, twining stem</td>
<td>Arrowhead-shaped leaves, larger than field bindweed;</td>
</tr>
<tr>
<td></td>
<td>Grows over plants, trees, vines</td>
<td>Sheath (ocrea) at node</td>
</tr>
<tr>
<td></td>
<td>Spread by seed (birds)</td>
<td>Taproot</td>
</tr>
<tr>
<td></td>
<td>Large seed production</td>
<td>Small, green flowers</td>
</tr>
<tr>
<td></td>
<td>Common in cultivated fields</td>
<td></td>
</tr>
<tr>
<td>Hedge bindweed</td>
<td>Perennial</td>
<td>Extensive root system</td>
</tr>
<tr>
<td></td>
<td>Trailing or twining stems</td>
<td>Arrowhead-shaped leaves, up to 6” long;</td>
</tr>
<tr>
<td></td>
<td>Spread by seeds or rhizomes</td>
<td>Trumpet flowers up to 3”</td>
</tr>
<tr>
<td></td>
<td>Usually on field borders or natural areas</td>
<td>2 large bracts at base of flowers</td>
</tr>
<tr>
<td>Ground ivy</td>
<td>Perennial</td>
<td>Square stem</td>
</tr>
<tr>
<td>(creeping Charlie)</td>
<td>Spread by seed or creeping stems</td>
<td>Opposite leaves</td>
</tr>
<tr>
<td></td>
<td>Thickly covers low plants</td>
<td>Blue/purple flowers</td>
</tr>
<tr>
<td></td>
<td>Common in lawns (survives mowing)</td>
<td>Mint-like odour</td>
</tr>
<tr>
<td></td>
<td>Problem in perennial crops</td>
<td>Round leaves may be confused with mallow (which is not creeping)</td>
</tr>
</tbody>
</table>

Wild buckwheat is the only annual weed, easily identified by its small taproot and inconspicuous flowers. It can be controlled by cultivation and most soil-applied herbicides (unless it is germinating late).

Field and hedge bindweed are more difficult to control. A systemic herbicide like glyphosate can be used at the higher rates, and is most effective when weeds are in full flower and actively growing (which doesn’t always happen in hot, dry summers). Repeat treatments over several years are required.

Ground ivy (creeping Charlie) can also be controlled with spot applications of the higher rates of systemic herbicides like glyphosate or amitrole. In turf, it is very difficult to control. Tank-mixes of 2,4-D/mecoprop/dicamba can be applied in early June or September and repeat treatments are required.