



ORCHARD NETWORK

For Commercial Apple Producers

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Orchard Management

Preparing for Winter This Year

Amanda Green, Tree Fruit Specialist, OMAFRA

This year has been a very hard year as most of the province has experienced extreme cold winter temperatures and/ or a late spring frost. As a result of the extreme winter temperatures you may be dealing with winter damage, in which case you may be giving your orchard plenty of irrigation and fertilization to prevent your trees from collapsing. From the spring frost there are plenty of russeted fruit (Figure 1). With this in mind it is important to ensure that trees this year harden off in enough time for winter by following these tips:

- Don't fertilize too late into the season
- Don't irrigate too late into the season
- Don't prune too late
- Pick the crop off, even if you have damaged fruit.



Figure 1: Fruit with a russeted frost ring

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What to do About Winter Damage

Amanda Green, Tree Fruit Specialist, OMAFRA

This past winter we experienced temperatures as low as -37 in some areas of the province. These temperatures were low enough to damage the trees, weakening them and even causing death. Some trees that were less damaged by the cold would have leafed out, flowered and collapsed later in the season after a period of high temperatures and no rain. These trees needed to be well irrigated because the xylem, which is responsible for water and nutrient transport, is injured and not as effective to function.

If you suspect that your trees have winter damage, cut away at the bark on the limbs or trunk down to the cambium layer (Figure 1 and 2). It should be greenish yellow. The cambium is responsible for producing new cells in the xylem and phloem which increases the diameter of the trunk, limbs and branches each year. If the cambium layer is dead, there will be no production of new cells and eventual death will occur in the tree.



Figure 1: Dead cambium layer
(Photo credit: Leslie Huffman)



Figure 2: Trunk cross section with
dead cambium layer
(Photo credit: Leslie Huffman)

It will be best to take out dead and collapsing trees because the winter damaged tissue is more susceptible to being colonized by secondary fungal pathogens. Also make sure to burn these trees so that these pathogens don't spread throughout your orchard. Agricorp Production Insurance will cover for trees that are 90% dead, with a 7.5% of the orchard deductible. If you have more than 80% of the trees dead, the whole block will be covered for insurance. Contact Agricorp for further information. Trees that have been injured will generally remain weaker for the remainder of their life



Figure 3. Trees collapsing from winter damage.



Figure 4. Trees with very little foliage that have been affected by winter damage.

References:

- Sundin, G., A. Irish-Brown, P. Schwallier and N. Rothwell. 2014. [Tree death and dieback are evident in apple following Michigan's hard winter.](#)
- Marini, R. 2015. [Assessing Low Temperature Injury in Peach.](#)

Ontario's 2015 Experience with Frost on Apples Survey

This year much of Ontario experienced an unusual frost because it was late into the season and had a low dew point between -1 and -5. Because this frost event was unique, it would be a good opportunity to collect information from Ontario apple growers on what they observed this year. This information could help predict what the extent of damage would be if a similar frost event were to happen again in the future. It will also be helpful for developing frost mitigation strategies. The information collected in this survey will be confidential.

Please scan and email your answers to Amanda.Green@ontario.ca or mail to: Amanda Green, Tree Fruit Specialist, OMAFRA, P.O. Box 587, Simcoe ON N3Y 4N5

A link to an online survey will also be sent by email through Kelly Ciceran with the Ontario Apple Growers, if you would prefer to complete the survey electronically.

Which county or region is your orchard located? _____

How much precipitation did you get in the two weeks prior to May 22nd? _____

Did you irrigate in the two weeks prior to May 22? If so, how much? _____

How low did the temperature get that night? What was the height above the ground and location of the thermometer (e.g. 3ft above the ground at the house)? _____

Please complete the chart to the best of your knowledge.

Temperature (°C)	2	1	0	-1	-2	-3	-4	-5	-6
Total # of hours below this temperature									

What was the dew point, if known? _____

What did you use as a strategy for frost mitigation? Examples include, but not limited to: site selection, heaters, wind machines, sprinklers, smudge pots, etc. _____

What was the extent of frost damage in your orchard? Please describe the damage you had and the percentage of fruit that was affected. For each area that you used a different frost mitigation strategy please describe the extent of the damage separately.

What frost mitigation strategies would consider for use in your orchard in the future?

Thank you very much for completing the survey.

Crop Protection

Different Pests, Similar Damage

Erica Pate, Pome Fruit IPM Specialist, OMAFRA

Having trouble identifying pest damage on your fruit? As we approach harvest assessments and picking, growers will be trying to identify damage on their fruit. Towards the end of July we began seeing small, red inflamed spots on fruit. The two main culprits for these spots have been bitter rot and San Jose scale. These are two very different pests with very different management practices, and yet the symptoms are similar enough to confuse us.

More bitter rot has shown up in Ontario apple orchards over the past 5 years, which creates another possible cause to fruit damage. On yellow skin varieties, such as Golden Delicious, early bitter rot symptoms appear as a red halo surrounding the lesions (Fig. 1). These spots have sometimes been confused with San Jose scale (SJS) fruit injury, which also appears as a red halo surrounding the insect on the fruit (Fig. 2). As the symptoms progress it becomes easier to distinguish between bitter rot and other damage, but this initial damage is very similar to SJS injury, and the initial injuries both occur around the same time in the season.

Recognizing bitter rot symptoms is an important first step towards control. The pathogen can infect fruit at any time during the growing season, from bloom right up until harvest, but the most severe infections occur between midseason and harvest. Symptoms typically show up mid to late season after a period of warm to hot weather accompanied with rain.

Management for this disease begins with good orchard sanitation. Removing mummified fruit and rotten fruit on the orchard floor will remove sources of the primary inoculum. Allegro and Pristine fungicides are both registered for control of bitter rot in Ontario apple orchards. This disease has not been a major issue for Ontario apple growers up until a few years ago, when bitter rot began showing up in orchards around 2012. For more information about bitter rot refer to the June 2015 Hort Matters article "[Bitter Rot Symptoms and Management in Apples during 2015](#)".

To differentiate between bitter rot and San Jose scale look for damage close to the calyx. Scale damage typically appears near the calyx or stem end of the fruit, while bitter rot can appear anywhere. If a grey patch in the centre of the inflamed area can be found, this is scale damage, as this patch is the actual body of the scale insect.

Like bitter rot, San Jose scale has also not been a traditional pest in Ontario orchards until recently. Perhaps due in part to warmer temperatures or changing IPM

programs, this pest is now a concern for growers. Heavy infestations reduce tree vigour, growth, and productivity; will injure fruit with a red inflamed spot where each scale settles. Severe infestations of scale can result in small, deformed fruit, or the fruit may not colour properly. There are two generations of scale crawlers and monitoring is ongoing to learn more about this pest. This year the first crawlers were observed on June 22nd in Norfolk County, and continue to be found regularly. This indicates that there is a risk of fruit injury once crawlers emerge and continues until harvest.

If scale is detected in your orchard, the best method of control is an annual dormant oil application to target overwintering immature scales before they develop a protective waxy layer. To control scale at the crawler stage, Movento, Closer, and TwinGuard are registered for control. These products should be used in addition to a dormant oil spray, and not as a substitute. Control of SJS is difficult as they are well protected under the waxy scale. For more information on SJS management see the June 2014 Hort Matters article "[Predicting San Jose scale crawler emergence in apple orchards](#)".

Bitter rot and San Jose scale are very different pests, yet when damage first appears they can easily be confused, leading to a misdiagnosis. With vastly different control methods, ensuring correct identification is vital so proper management methods can be used. It is important to identify these pests now so that next season's management methods can be planned.



Figure 1. Bitter rot damage on fruit.



Figure 2. San Jose scale damage on fruit.

Weed Control in the Fall is Worth the Money

Kristen Obeid, Weed Management- Horticulture

Weed control this season has been very frustrating and challenging for most growers. At this time of year weeds take a lot less yield away from crops than early season weeds. It is still worth the money to clean up your fields and field borders of unwanted weeds now, to save you time and money next spring.

Fall is an excellent time to apply residual and systemic herbicides for control of difficult and persistent weeds in perennial crops. Many of the residual herbicides labeled for tree fruit are recommended for fall application. Fall application will improve control of difficult perennials, biennials and winter annuals. In addition, fall-germinating annuals, such as Canada fleabane are vulnerable in the fall. Dandelion is also controlled more easily in the fall. An application of glyphosate plus a residual herbicide can give two to three months of very good control in the spring.

Alion (indaziflam), Casoron (dichlobenil), Chateau (flumioxazin), Princep (simazine) and Sinbar (terbacil) labels allow for spring or fall application. All of these herbicides have long residual activity if applied in the fall. They should be rotated to avoid the use of the same mode of action more than once a year. A combination of pre- and post-emergence herbicides will give the most effective weed control program.

An example of an effective weed control program might include Alion (Group 29) plus glyphosate (Group 9) or Ignite (Group 10) in the fall, followed by a photosynthesis inhibitor; such as: Princep Nine-T, Sencor, Sinbar (Group 5) in the spring. In crops where there is minimal danger of crop injury (i.e., mature apple trees), an application of a foliar-active herbicide; such as: glyphosate, Gramoxone (Group 22), Ignite, etcetera during the season will help control most annual and perennial weeds.

Table 1. Biology of Common Weeds Found in Perennial Crops

Annuals	Winter Annuals	Biennials	Perennials
Barnyard grass	Canada fleabane	Garlic mustard	Bindweed, field
Crabgrass	Common chickweed	Mullein	Chickweed, mous-eared
Fall panicum	Field pennycress (Stinkweed)	Wild carrot	Dandelion
Foxtails	Shepherd's-purse	Yellow rocket	Goldenrod
Witchgrass			Grape, wild
Sandbur			Ground-ivy (creeping charlie)
Canada fleabane			Mallow
Common chickweed			Milkweed
Lady's-thumb			Nightshade, climbing
Lamb's-quarters			Nutsedge
Mustards			Plantains
Pigweeds (red, green, smooth)			Poison-ivy
Ragweed (common, giant)			Quackgrass
			Sow-thistle
			Stinging nettle
			Thistle, Canada
			Vetches
			Virginia creeper

Reference

Zandstra, B. 2011. Control weeds this fall to improve fruit crop fields next spring. Michigan State University Extension, Department of Horticulture.

Postharvest

Effects of Multiple SmartFresh™ Treatments on Apples

Dr. Jennifer DeEll, Fresh Market Quality Program Lead - Hort Crops, OMAFRA

Postharvest treatment of apples with SmartFresh™ (1-MCP) is typically done within a few days of harvest. The current Canadian label registration for SmartFresh of apples allows up to four applications within 240 days of harvest. As a result, apple storage facilities can apply multiple SmartFresh treatments when storage rooms are being filled, or after a few months in storage.

The objective of this study was to investigate the effects of multiple SmartFresh treatments, once 2 days after harvest and again after 4 months of controlled atmosphere (CA) storage, on fruit quality and disorder development in 'McIntosh', 'Empire', and 'Northern Spy' apples during long-term storage. 'Northern Spy' apples were also used to determine if a single SmartFresh treatment after 4 months of CA storage is similar to a single SmartFresh treatment prior to CA storage at 2 days after harvest. To date, there are no scientific reports of SmartFresh treatments in combination with CA storage of 'Northern Spy' apples.

'McIntosh', 'Empire', and 'Northern Spy' apples were harvested from commercial orchards and cooled overnight to 3°C. SmartFresh (1 ppm) was applied 2 days after harvest and then again to half of the fruit after 4 months of CA storage. 'Northern Spy' apples also received a single SmartFresh treatment after 4 months of CA storage, and similar fruit from all cultivars were not treated with SmartFresh. 'McIntosh' and 'Empire' were held at 3 °C and 'Northern Spy' at 0 °C for 9 months in CA storage (2.5% O₂ + 2% CO₂ for 'Empire', 2.5% CO₂ for 'Northern Spy', and 2.5 up to 4.5% CO₂ for 'McIntosh').

Results

- SmartFresh (as a single or multiple treatments) reduced internal ethylene production, and improved firmness and acidity retention in all apple cultivars.
- The addition of a second SmartFresh treatment after 4 months of CA storage further improved firmness retention in 'McIntosh' and late harvested 'Empire' apples after 7 days at room temperature.
- 'Northern Spy' apples treated with SmartFresh had lower incidence of external CO₂ injury, regardless of SmartFresh treatment timing.
- Multiple SmartFresh treatments had varying effects on the incidence of core browning; late-harvested 'McIntosh' treated twice with SmartFresh exhibited the highest incidence of core browning, while late-

harvested 'Empire' treated twice had less core browning than those not treated. 'Northern Spy' treated only at harvest time had more core browning compared to those treated only or also after 4 months of CA storage and non-treated fruit.

- SmartFresh treatment had no significant effect on the incidence of internal browning in 'McIntosh' or 'Empire' apples.

These results suggest that a second application of SmartFresh after 4 months of CA storage may improve firmness retention in some cultivars during holding at room temperature, but it can also have variable responses associated with susceptibility to disorders, especially when holding apples in long-term CA storage.

Weather Conditions during Apple Growth Stages Influence Fruit Quality at Harvest and in Storage

*Dr. Gaétan Bourgeois, Agriculture and Agri-Food Canada, St-Jean-sur-Richelieu, Québec
Dr. Jennifer DeEll, Fresh Market Quality Program Lead - Hort Crops, OMAFRA*

Inter-annual variability in apple fruit quality at harvest and in storage is often associated with weather conditions during specific growth (phenological) stages prior to harvest. A number of bioclimatic models have been developed and implemented in a computer weather system to help apple producers of Eastern Canada in their storage and marketing strategies.

Apple fruit firmness is one of the main attributes indicating fruit quality at harvest. Rainfall from 61 to 90 days from bloom (DFB) and air temperature from 31 to 60 DFB explained 39% and 12%, respectively, of 'McIntosh' apple firmness variation at harvest time.

Weather conditions prior to harvest also influence the incidence of many storage disorders. Low temperatures and high rainfall from 0 to 30 DFB explained 20% and 13%, respectively, of the variation in soft scald incidence in 'Honeycrisp' apples (Figure 1). Low temperatures and high rainfall from 91 DFB to harvest explained 36% and 13%, respectively, of the variation in soggy breakdown incidence in 'Honeycrisp' apples, while high temperatures during this period were associated with superficial scald incidence in 'Cortland' apples

Low temperatures and low solar radiations from 31 to 90 DFB were associated with higher vascular browning incidence in 'McIntosh' apples. Recent evaluations of internal browning and core browning incidences in 'Empire' and 'McIntosh' apples revealed that 'Empire' apples are more sensitive to these disorders than 'McIntosh'.

Even though many of these storage disorders are part of a group called “Low temperature disorders”, characterized by browning of internal apple flesh and/or vascular bundles, each disorder seems not only to be cultivar specific but also responds differently to weather conditions at specific phenological periods prior to harvest. Weather based predictions of apple firmness at harvest and risks of physiological disorders before storage are quite useful tools for apple producers in their marketing and storage strategies in order to provide high quality apples to their consumers.

Additional co-authors include – Dominique Plouffe, Maude Lachapelle, and Marie-Pier Ricard, Agriculture and Agri-Food Canada, St-Jean-sur-Richelieu, Québec.

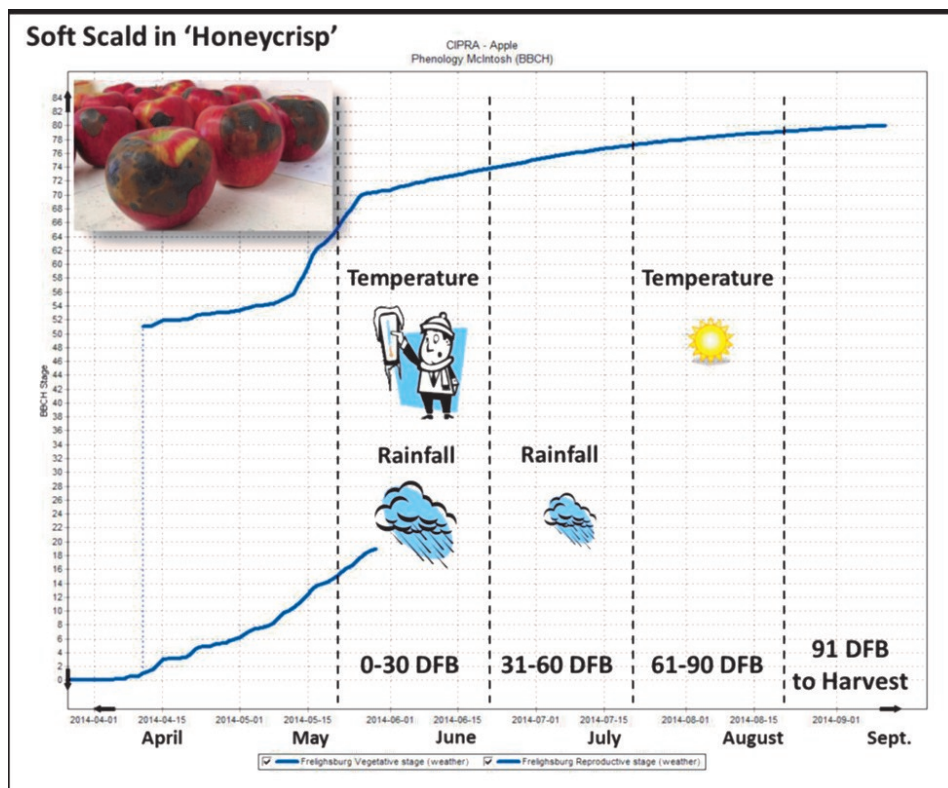


Figure 1. Effect of temperature and rainfall during specific apple phenological stages on soft scald incidence in 'Honeycrisp' apples (DFB: Days from bloom).

Announcements

Assessing and Managing Food Safety Risks in Apple Cider Production Workshop

Are you a small-to medium-sized producer of fresh apple cider? Ensuring the safety and quality of your cider is in everyone's best interest. To maintain your products' safety, as well as a trusted business reputation, it is important to take steps to minimize or eliminate contamination risks.

To learn how to identify and manage potential food safety risks in your operation, plan to attend an upcoming *Assessing and Managing Food Safety Risks in Apple Cider Production* workshop.

This full-day workshop, held by OMAFRA, will provide essential information and effective tools to help producers of fresh apple cider identify and minimize food safety risks.

Workshop dates and locations:

- ⇒ St. Jacobs: Wednesday, August 26th
- ⇒ Milton: Thursday, August 27th

For more information on the workshops and how to register, please call 1-877-424-1300 or visit the [OMAFRA website](http://www.omafra.ca).



New apple varieties available for Canadian nurseries and growers

Five new apple varieties are now available for commercial propagation licensing through Vineland Research and Innovation Centre.



Crimson® Gala Brand Alvina cv.

- Extremely high colouring
- Approximately one to two weeks earlier harvest than Royal Gala (Washington State data)
- Retains internal characteristics of Royal Gala; quite productive
- Early stage test trees at Vineland



Fuji Supreme™ CABp Fuji cv.

- Developed in New Zealand
- Retains the fruit and storage qualities of the standard Fuji
- Characterized by its dark red colouring and bold stripe
- Test trees planted at Vineland have been performing well



Morning Mist™ Fugachee cv.

- Better colour than the standard Fuji and ripens at least two weeks ahead of the standard Fuji (Washington State data)
- Has been observed in the U.S. to remain stable and consistent over successive generations
- Test trees planted at Vineland have been performing well



Wild Pink™ Maslin PLMASg8 cv.

- A sport of Pink Lady® Cripps Pink cv.
- Retains the same qualities of its parents but matures three to four weeks earlier (Washington State data)
- Early stage test trees at Vineland



Wild Pink™ Barnsby PLBARB1 cv.

- Good stability for tree vigour, cropping and fruit traits including maturity, skin colour and taste
- Matures three to four weeks earlier than its parents Cripps Pink (Washington State Data)
- Early stage test trees at Vineland

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