



ORCHARD NETWORK

For Commercial Apple Producers

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Upcoming Event: Lunch N' Learn Ontario Crop Protection Hub – Spring Training for Apple Growers

Grab your lunch and join Kristy Grigg-McGuffin, OMAFRA on **Monday, March 27th at noon** to see updates that have been added to enhance the Ontario Crop Protection Hub. Real-time examples will be used to gain experience on using this new resource. Bookmark the [Ontario Crop Protection Hub](#) to follow along and ask questions where needed.

When: Mar 27, 2023 12:00 PM Eastern Time (US and Canada)

Register in advance for this meeting:

<https://us06web.zoom.us/join/register/tZUzd--gpz4uHdKN152qfpR-WJzO2oz2GAXp>

After registering, you will receive a confirmation email containing information about joining the meeting. ***This webinar will be recorded and available for reference at a later date.***

Stay tuned to future Orchard Network Newsletters for updates and quick tips for the Ontario Crop Protection Hub!

This newsletter is made possible by the generous support of the following sponsors:



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Orchard Management

Bud to Bin - Targeting Your Crop Load

Erika DeBrouwer, Tree Fruit Specialist, OMAFRA, Simcoe

There have been many developments in how to target your crop load over the past few years. Extensionists and researchers are working hard to make this critical task as simple as possible for apple growers. This article will go over the resources at your disposal to make more informed data driven decisions regarding your thinning strategy.

Overview

These actions, tools and additional resources can be used in unison to give you a better feel for what works with you and your crew. Please take these into consideration and apply them in the orchard to get a better idea of your thinning strategy. The more tools you try, the more familiar you are with what you have on hand, allowing you to be more adaptable for the ever-changing season.

Actions

Record Keeping

- This is a critical step to adjust your thinning year to year to get a consistently good crop from the ever-changing apple landscape (weather, climate, pollination etc.)
- Keep track of growth staging (bud break and bloom are critical), target crop load, thinning strategies, weather, yields etc.

Calculating Your Target Crop Load

- Whether it be per acre, per tree or per branch – be sure to have an idea of what you want your expected yield to be
- This could be based on your market:
 - o Is there an ideal size or ideal volume that is expected?
 - o Is there a certain price point you want to reach?
 - o Would a larger fruit be worth the decrease in volume? Which is more important and/or what is the balance of volume to size that makes sense for your operation?

Precision Pruning

- Although time consuming in the beginning, once you have the experience and are comfortable with pruning to a certain bud count, this strategy can pay off year to year.
- This is suggested to be done in the winter, but I want to highly stress the importance of checking the forecast when dormant pruning. Fluctuations in the weather can be detrimental to trees if there are open wounds – whether that be down swings or upswings in temperatures. This is most critical when trees are coming out of dormancy in the late winter/early spring.

Branch Assessments

- This is a great and simple way to determine your fruit to vegetative bud ratio. This strategy can give you a better idea of where you stand for your target crop load after precision pruning during the winter.
 - o Gather at least 10 representative branches, with varying years of growth (3rd, 2nd and 1st year) per block in the spring before bud break and place into buckets inside. The buds will then break and allow you to establish a fruit to vegetative bud ratio to better determine pruning and thinning strategies.

Bud Thinning

- This is a time consuming and labour-intensive way to lower your bud counts. That being said, using this method for highly biennial apples or return apples to make the cost of this method worth it.

Hand Thinning

- Although highly utilized, this common method of thinning should only be used as a last resort. All of you know the high costs associated with using hand thinning, and therefore methods that can be utilized in advance are suggested. Dr. Terence Robinson from Cornell University suggests that only 5% of your thinning strategy should be reliant on hand thinning (Figure 1).

Hedging

- Hedging can be performed in the winter and/or in the summer. Creating a box can be easier for some growers to better manage future pruning. Although hedging isn't necessarily precision, it enables you and your employees to see trees more clearly when making decisions regarding pruning, training and thinning.

Tools

Trunk Thinning Gauge

- Utilize this to get an idea of what your target crop load should be per tree, although this may change based on your ideal market and the tree architecture you have in your orchard
- Commonly utilized during fruitlet thinning, but can be used earlier for an estimated target crop load

Equilifruit Disk

- Utilize this to get an idea of what your target crop load should be per branch.
- Commonly utilized when hand thinning, but can be used earlier for an estimated target crop load

Mechanical Thinners

- The Darwin thinner is the only mechanical thinner that I am aware of available in Ontario. Ideally the Darwin would be utilized during king bloom or a little earlier as later use could result in dented fruitlets.

Weather Conditions	Prediction
Warm Conditions (>18°C)	All thinners work best
Dark Cloudy Weather	Greater stress Greater thinning response Greater drop
High Night Temperatures (>18°C)	Great stress High demand and use of energy for night respiration Greater drop
Very High Day-Time Temperatures (>29°C)	Great stress High energy demand Greater drop
Very Cool Temperatures (<18°C)	Reduced stress Reduced energy demand Greater set
High Light	Increased supply: harder to thin
Low Light	Reduced supply: easier to thin
Low Temperatures	Low demand: harder to thin
High Temperatures	High demand: easy to thin
Low light and warm temperatures	Worst

Table 1. Thinner Effectiveness Table, *Adapted from Cornell University and Michigan State University*

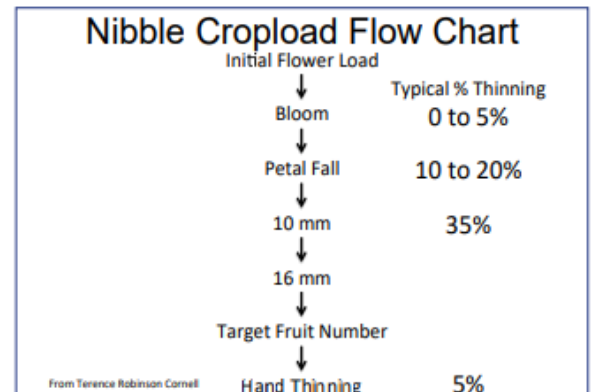


Figure 1. A flow chart demonstrating thinning strategies during chemical and hand thinning

Chemical Thinners

- These include bloom and fruitlet thinners
- If you have no experience utilizing chemical thinners and are considering changing/adding a chemical thinner to your thinning toolbox, please do this cautiously. This should be done on a small trial basis until you are more comfortable with the product(s).
 - These products can be great for nibble thinning and can significantly reduce the cost of hand thinning. There are various products available – please check out the [Crop Protection Hub](#) for more details – and can be utilized from king bloom to fruitlet sizing.
 - Timing is different for each product and variety, but ideal timing usually ranges from 7 to 10mm based on king fruitlet sizing. Consider the weather conditions in Table 1 to further aid your application timing.

A few final notes about chemical thinning:

- The earlier you start, the more opportunity you have to get to your ideal crop load
- The earlier you start, the less chance of over thinning later on
- Trying a new tool on each variety will vary in its effectiveness
- Start small with each new product

Apps

Ferri App

- This app was developed by Joe & Tom Ferri, which incorporates the fruitlet growth model
- The app allows you to input fruitlet measurements over time after each chemical thinner application and give you an estimation of persisting and abscising fruit
- More information can be found here: <http://jmcectman.blogspot.com/2023/01/the-fruit-growth-fg-app.html>

Orchard Tools App

- This app was developed by Perennia, which is the first step to determining persisting and abscising fruit
- The app allows you to input fruitlet measurements over time and download an excel file
- You would then transfer the excel file data in the Schwallier & Ferri Excel Sheet for an estimation on chemical thinner efficacy
- To download the app follow this link: <https://apps.apple.com/ca/app/perennia-orchard-tools/id1510843988>

Podcasts

Listed below are a few episodes related to crop load management and apple thinning. Please keep in mind that some of these episodes are older and information may be specific to the region interviewers or interviewees are from.

Orchard Outlook

This podcast is by Perennia and hosted by Michelle Cortens. The podcast provides tangible, practical advice and information through insightful discussion to help commercial tree fruit growers reach sweet success.

- Episode 4 Season 2: Don't sneeze at blossom thinning

<https://anchor.fm/orchard-outlook/episodes/E4-S2--Dont-sneeze-at-blossom-thinning-epjvo2>

Dr. Tree Fruit and Don

This podcast is by the Penn State Extension team and hosted by Dr. Kari Peter and Don Sefrit. The podcast focuses on providing timely information for tree fruit growers throughout the growing season.

<https://extension.psu.edu/drtreefruit>

- Fruit Bites 4: 5.18.2022 Thinning Is On Our Minds!
- Season 2 Episode 6: Thinning Advice and an Insect Extravaganza

What's Killing My Kale?

This podcast is by the University of Minnesota Extension, where extensionists rotate hosting. The Podcast covers research-based solutions to pest issues that affect various fruits and vegetables.

- Episode 11: Apple Crop Load Management Techniques

https://afnr-podcast.s3.amazonaws.com/What'sKillingMyKale%3F/Amaya+podcast_crop+thinning_final_5.21.20.mp3

- Episode 22: Thinning Techniques for Apple Trees Through the Season

https://afnr-podcast.s3.amazonaws.com/What'sKillingMyKale%3F/Becky+Wiepz+Podcast+Interview_6.21.19.mp3

Blogs, Websites & Thinning Guides

OMAFRA Thinning Webpage

<https://www.ontario.ca/page/thinning-tree-fruit#section-4>

- This page has all the information related to thinning and goes into detail regarding application rates for chemical thinners.

ONFruit Blog

<https://onfruit.ca/category/apples/>

- This website posts timely information throughout the season, whether it be related insect or disease pressure, growth stages, weather updates and events – we try. Information is posted by various OMAFRA specialists and can be automatically sent to your email once subscribed.

PACMAN (Precision Apple Cropload MANagement)

[PACMAN – Precision Apple Cropload MANagement \(extension.org\)](https://extension.org)

- This website continues to be updated by various extension specialists across the U.S. as they trial various tools that are coming through the pipeline for apple growers in relation to precision crop load management.
- They have hosted webinars through January, February and March demonstrating various technologies currently available and those to come. Stay tuned for an overview article in the next issue of the Orchard Network Newsletter.

Michigan State University, Thinning Strategies for 2022

<https://www.canr.msu.edu/apples/uploads/files/Thinning%20Guide%202022%20updated.pdf>

- This is a great resource that is annually updated for Michigan growers. Although some of the methodologies aren't available in Ontario, this is still a great reference for general thinning practices.

Final Notes on Targeting Your Crop Load

The more tools you try, the better your understanding of using a multitude of tools and the more versatile your thinning strategy can be. This makes you more resilient for the variable thinning season to come.

I strongly believe that not every tool is for every grower. Each of you manage your orchard in a way that works for you and your crew – so do your research when trying a new tool or action item and give it time to see whether it would work in your operation. There is always a lower efficiency when trying new things, so be sure to give the strategy a few attempts. If the strategy doesn't work for, maybe it would work for someone else in the operation that would take on more responsibility to implement it. If it is something that truly doesn't work for you, it may be one less tool – but you can say that you tried it and maybe in the future you can come back to it.

There are constant advancements in the apple thinning world so keep your eyes peeled (pun intended!) for continuing articles on technologies coming down the pipeline to make your thinning decisions easier. Also stay tuned for apple thinning calendars in relation to the growing season! If you have any questions about thinning your apple crop please reach out to Erika DeBrouwer through text, email, or social media (226-931-4098, erika.debrouwer@ontario.ca, [@FruitWiTheSpurs](https://twitter.com/FruitWiTheSpurs))

Changes to Ethrel – Closed Loop System

Erika DeBrouwer, Tree Fruit Specialist, OMAFRA, Simcoe

Ethephon, sold at Ethrel by Bayer CropScience, has had a few changes to the label recently which have been in effect as of September 24, 2022.

- Not permitted for use when fruit are present
- A closed system is required when mixing, loading and applying
- Restrictions on amount of chemicals permitted to handle daily (these volumes differ based on open cab, closed cab, aerial, backpack, and/or handgun use)
- Reentry interval changes

For specific information regarding reentry intervals and daily handling quantities please refer to the label, which can be found here: [Pesticide Label Search - Health Canada \(hc-sc.gc.ca\)](https://www.hc-sc.gc.ca/pest/label/)

When defining a closed system, this is described on the as a system that removes “pesticide from its original container, rinsing, mixing, diluting and transferring the pesticide through connecting hoses, pipes, and couplings that are sufficiently tight to prevent exposure of any person to the pesticide or rinsing solution.”

To accomplish this, there are a few options:

(1) easyFlow System:

- This is available through Greenleaf and is an adapter for current sprayers
- The adapter allows you to utilize almost every bottle on the market
- Cheaper option compared to easyFlow M System
- <https://greenleaftech.com/closed-transfer-system.php>

(2) easyFlow M System:

- Not currently listed on Greenleaf's website
- Installed either directly fitted onto sprayer unit or externally (free standing) unit next to sprayer on a transport rack
- Allows you to utilize almost every bottle on the market
- Measures pesticide (minimum of 60 mL)
- More expensive option compared to easyFlow System
- <https://cropscience.bayer.co.uk/tools-and-services/easyflow-m/>

If you have any questions please feel free to reach out to Erika DeBrouwer through text, email, or social media (226-931-4098, erika.debrouwer@ontario.ca, [@FruitWiTheSpurs](https://www.instagram.com/FruitWiTheSpurs))

Crop Protection

Fire Blight Sensitivity of Cider Apple Cultivars

John A. Cline and Mandy Benef, Department of Plant Agriculture, University of Guelph, Simcoe

Introduction

There is increasing interest in growing apple cultivars (*Malus domestica* Borkh.) of European origin for the production of hard cider in Canada; however, little is known about their susceptibility to fire blight (FB). Specialty cider cultivars have been selected for their fruit and juice characteristics, and in some cases, for ease of management but not necessarily for yield or disease resistance. Traditional European cider cultivars were selected from areas with climates and pathogens vastly different from those found in southern Ontario's humid continental climate growing region of Canada. Consequently, several cultivars are challenging to grow due to higher disease susceptibility, biennial bearing, and pre-harvest drop. Fire blight can spread rapidly through apple (and pear) orchards causing extensive tree mortality and economic loss. The aim of this article is to report the FB susceptibility of twenty-seven cider apple cultivars in their seventh year (2021) of production when they were severely infected by a FB (*E. amylovora*) outbreak.

Materials and Methods

The orchard was established in 2015 at the Ontario Crop Research Centre – Simcoe on M.9 rootstock and trained in a vertical axis orchard system. Trees were spaced 1 m within and 4.5 m between rows (1667 trees/ha). Trees were planted in a randomized complete block, with four replications of five trees for each of the 27 cultivars, for a total of 560 trees. Bloom and harvest data were collected from the middle three trees of each five-tree block, with the two outside trees in each block acting as guard trees. Each replicate occupied two rows, resulting in a total of eight rows. The cultivars evaluated consisted of: Ashmead's Kernel, Breakwell, Brown's Apple, Bulmers Norman, Binet Rouge, Bramley's Seedling, Brown Snout, Calville Blanc d'Hiver, Crimson Crisp®, Cox Orange Pippin, Dabinett, Enterprise, Esopus Spitzenberg, Fréquin Rouge, GoldRush, Grimes Golden, Golden Russet, Kingston Black, Michelin, Muscadet de Dieppe, Medaille d'Or, Porter's Perfection, Sweet Alford, Stoke Red, Tydeman Late, Tolman Sweet, and Yarrow Mill.

Trees were provided with supplemental trickle irrigation and the orchard soil consisted of a Brady sandy loam with imperfect drainage and soil textures consisting of mainly lacustrine sand and sandy loam over glaciolacustrine clays at depths greater than 1.5 m. Pests and diseases were managed with conventional pesticide (OMAFRA, 2021). Trees were fertilized annually with muriate of potash based on leaf tissue analyses but were not fertilized with nitrogen. Daily minimum and maximum temperatures at 1.5 m above the ground were recorded at the Simcoe Research Station. Further planting details, cultivar descriptions, early yield, and juice characteristics have been previously reported (Plotkowski, 2020; Cline et al., 2021; Plotkowski and Cline, 2021a, 2021b).

Horticultural Measurements

In the spring of 2017-2021, phenology was rated three to four times per week from late April to the end of flowering in June. The rating system used herein was developed at Washington State University and covers the progression from the silver tip stage immediately after dormancy to petal fall. Tree mortality was recorded every autumn from 2015-2021.

Fire Blight Management

Fire blight was managed with applications of streptomycin during bloom and prohexadione-calcium (Apogee™) pre- and post-bloom. The incidence of FB infections was low to non-existent between 2015 and 2020. However, FB symptoms began to appear in vegetative 1-year old shoots in mid-June, 2021 almost exclusively in the cider apple cultivars, while other adjacent fresh-market cultivar blocks of Gala, Honeycrisp, Ambrosia, Golden Delicious, and Cortland were largely unaffected. The FB moved quickly in the tree to subtending older tissue. An aggressive spray program to contain its spread was immediately implemented with an initial application of streptomycin (24-June) followed by fixed copper (Cueva) on 28-June, 5-July, 19-July and 26-July. Unfortunately, the FB continued to spread despite active removal of affected shoots using recommended sterile methods, and in some cases removal of entire trees when there were multiple strikes on a tree. The infections continued unabated, and in many instances moved to the rootstock, causing collapse of the entire tree. By November 2021, there was widespread tree mortality in the orchard, to the extent that the difficult decision to remove the entire orchard was made to prevent further spread to adjacent research and commercial orchards. Historically, the incidence of FB has been low over the past 30 or more years of production. This led us to suspect that the primary infection inoculum had migrated from adjacent commercial orchards in the region.

Cultivar Sensitivity to Fire Blight (*E. amylovora*)

Prior to 2021, all-cause tree mortality was relatively low, but was as high as 8% in Dabinett and Tydeman. Late in 2015, mortality was 8% in Michelin and Breakwell in 2017, and ranged from 8 to 24% in Yarlington Mill and Michelin, respectively, in 2021 (Figure 1). All-cause tree mortality did not exceed 33% for any cultivar in 2020, and all but four cultivars (Dabinett, Yarlington Mill, Michelin and Tydeman Late) showed no tree mortality in the same year. In 2021, despite the application of pesticides to suppress and reduce the spread of *E. amylovora*, FB symptoms began to appear in mid-June and continued to spread through the cultivar block. By the end of the growing season in November, 42% of all trees in the experiment (of the initial 560 trees) displayed FB symptoms sufficiently severe that the trees had or would succumb to *E. amylovora* bacteria. Although the cultivars were randomly located in each block, all blocks were affected, indicating the FB pressure appeared uniform throughout the block.

There was a wide range but significant differences in cultivar tree mortality ($P<0.001$) ranging from no tree mortality for Enterprise (n=20 for all cultivars over four replications) and 100% tree mortality for Ashmead's Kernel and Tolman Sweet. Overall, the incidence of FB was zero for Enterprise (0%), low for GoldRush and Porter's Perfection (< 20%); low for Binet Rouge, Kingston Black, Cline Russet, Dabinett, Grimes Golden, Frequin Rouge, Crimson Crisp®, Cox Orange Pippin and Muscadet De Dieppe (20-40%); intermediate for Calville Blanc d'Hiver, Bramley's Seedling, Yarlington Mill, Michelin, Bulmers Norman, Stoke Red, Golden Russet, Breakwell, Esopus Spitzenberg (50-90%) , and high for Brown Snout, Medaille d'Or, Michelin, Brown's Apple, Sweet Alford, Tydeman Late, Ashmead's Kernel and Tolman Sweet (90-100%).

Tolerance for FB infection in commercial orchards is extremely low. Even when low FB symptoms and/or tree mortality caused by FB exist, cider growers should be concerned about further tree mortality in subsequent years if the bacteria continue to overwinter and spread, which is likely at specific temperatures, humidity, and precipitation conditions.

This study indicates that the majority of apple cultivars grown for cider in this study are susceptible to FB under ideal conditions for the causative agent *E. amylovora*. Cider producers should take preventative measures by using more FB tolerant cultivars and resistant rootstocks when there is a history of FB within or adjacent to the planting location, or when environmental conditions are often ideal for the proliferation for *E. amylovora*. Many apple cider cultivars flower later than fresh-market culinary apples and have secondary bloom or protracted bloom periods (Plotkowski and Cline, 2021a). These attributes increase the risk of FB incidence and severity (Dupont, 2019), indicating that selecting early flowering cultivars may be a best practice when growing cider-specific apple cultivars.

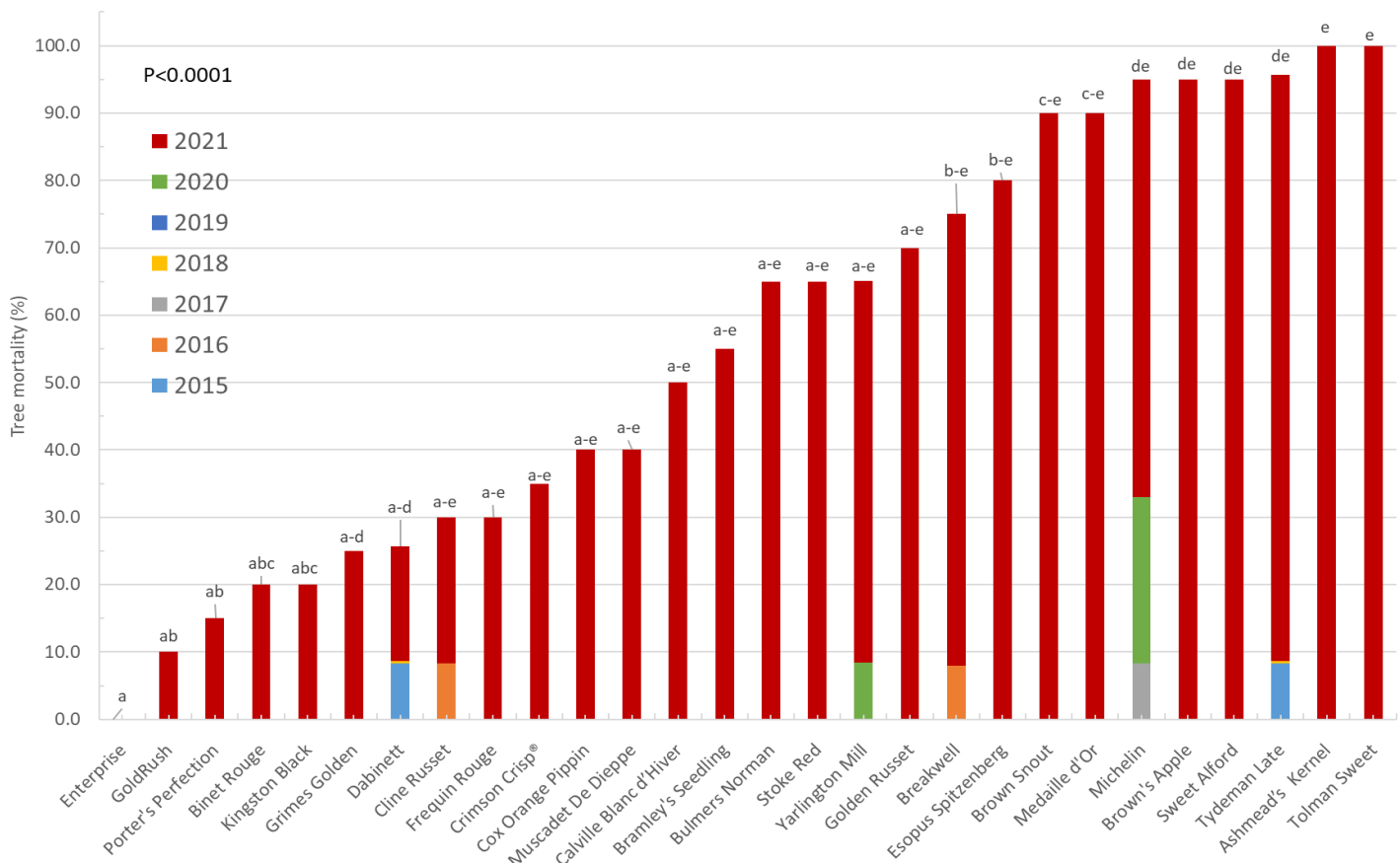


Figure 1. All cause tree mortality (%) of select apple cultivars from 2015 (year of planting) to 2021 (year 7) grown for cider at the University of Guelph Simcoe Research Station, Simcoe, ON. Mean values represented by the vertical bar with the same letter are not significantly different according to the Tukey-Kramer test at $P=0.05$ (for 2021 data only)

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Dormant Pruning for Fire Blight Management

Kristy Grigg-McGuffin, Horticulture IPM Specialist, OMAFRA

With the clear, sunny days lately making for excellent pruning weather, I've had several questions around pruning out fire blight cankers – what to look for and when the best timing is to make those cuts.

The first line of defense for fire blight management in an orchard is prevention. There is no silver bullet to eradicate this disease once it becomes well established. This means management is a year-long process to reduce inoculum in the orchard and prevent the spread of bacteria to healthy trees. Once infection has spread to the rootstock, there is nothing that can be done to eliminate the pathogen.

Winter and early spring is a good opportunity to clean up any remaining infected limbs, cankers or – in the case of rootstock blight – trees that will act as sources of inoculum and get as much fire blight out of the orchard as possible. These overwintering cankers will be the source of disease in the coming year, oozing in the spring as the tree begins to push.

Dormant pruning is effective for many reasons. Firstly, *E. amylovora* is not active in the cold temperatures and therefore will not be spread on pruning shears, tools or infected tissue. There will be no need to disinfect tools between cuts. Secondly, the cankers are easier to see in the orchard without foliage.

What To Look For When Pruning

Scout thoroughly for cankers while pruning. It is recommended to do this more than once during the early spring and at different times during the day. While this does take additional time, that extra work may save you trees down the road by removing inoculum sources.

Shoot blight can be easily identified by the characteristic shepherd's crook. Since the limb is dead, blighted leaves often remain on the limb throughout winter.

Cankers may not be as obvious. They can vary in size on twigs, limbs or trunks of trees (Figure 5). Typical characteristics of fire blight canker include: Sunken or wrinkled area with a narrow ridge along the margin

- Rough or darkened bark often located around a spur, wound or pruning stub
- May develop cracks within or around the margins
- Inner bark of canker may appear reddish brown and ooze a sticky amber substance during the spring and early summer, especially in humid conditions
- Black sooty mould can grow on the sugary substances, giving the canker a black appearance
- May become colonized by other fungi such as the black rot fungus, *Botryosphaeria obtuse*



Figure 1. Fire blight cankers can appear as rough, dark regions with cracked margins often around pruning stubs, infected limbs or wounds.

Pruning cuts should be made at least 30 – 45 cm (12 – 18 inches) beyond the canker or visible infected tissue into 2nd year wood. For young trees (less than 3 years old), trees that appear to be infected perennially or trees that have the canker established in the trunk should be removed altogether. Mulch limbs in the row middles in the early spring. An application of urea applied in the early spring for apple scab may help with degradation as well.

Trees with rootstock blight should be removed as soon as possible to reduce any chance of further spread. Cut off and remove the scion from the orchard, making sure to leave enough to allow the roots to be pulled out. Leave the remaining trunk to let the roots dry out prior to removal.

Plan ahead

Winter is also a good time to start to prepare for in-season management as bloom can come quickly. Having products ready and at your fingertips will allow you to act fast should conditions for infection occur. Don't get caught unprepared!

- Be prepared to apply copper at silver tip to help protect the spread of bacteria from any oozing cankers that were missed during dormant pruning.

- Consider an immune-boosting product such as an SAR (Systemic Acquired Resistance) like Lifegard or Regalia Rx at late tight cluster to pink.
- Have enough control product – antibiotic (Streptomycin, Kasumin), copper (Cueva) and/or biologicals (Blossom Protect, Serenade, Buran, Double Nickel, Oxidate) to cover all rows of susceptible blocks every 2–3 days during bloom.
- Become acquainted (or refresh your memory) with forecasting models such as Cougar Blight or MaryBlyt if you will be running these for your farm. Otherwise, bookmark the [Ontario Fire Blight Prediction Maps](#) in your browser for quick reference during bloom.
- Make a plan for management – what products you will use (antibiotics, coppers, biologicals, Apogee/Kudos, etc) and how (biologicals early bloom? antibiotics full bloom to petal fall?). Don't forget to consider your action plan in case of trauma blight.

Does a Mild Winter Mean More Pests?

Kristy Grigg-McGuffin, Horticulture IPM Specialist, OMAFRA

While certain areas of the province have experienced some significant snowfall over the last couple of months, we really haven't seen extremely low temperatures that could impact overwintering orchard pests. Unfortunately, at this point, it's still too early to tell just what we can expect this season following a mild winter.

In general, most insect pests that overwinter in Ontario orchards are adapted to the cold temperatures. Many go into what is known as diapause, which is a type of hibernation, while others seek shelter, utilize warming techniques (ie., produce insect "antifreeze"), or a combination of these. For example, codling moth overwinter in diapause in a pre-pupal stage snug within a cocoon, or hibernacula, under the protection of leaf litter or loose bark at the base of the tree (Fig 1A). Japanese beetle and apple maggot overwinter as larvae and pupae respectively in the soil, insulated from the extreme temperatures by the snow cover (Fig 1B). European red mite and several species of aphids overwinter as eggs by producing specialized proteins that prevent their cells from freezing (Fig 1C).

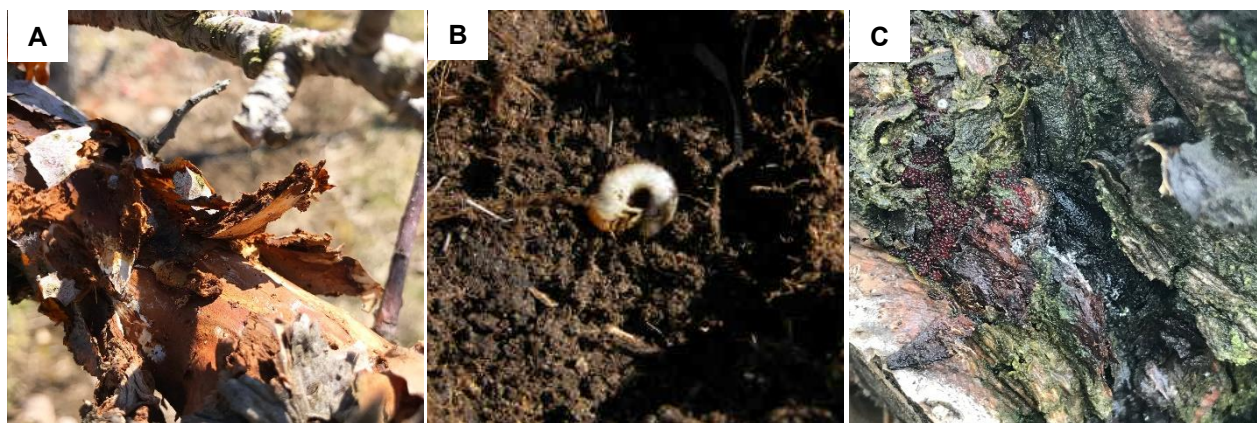


Figure 1. Overwintering insects in the orchard. (A) Codling moth hibernacula under loose bark on apple limb. (B) Japanese beetle larva in soil. (C) European red mite eggs on tree trunk.

In a typical winter, insect populations often experience winter kill to some degree, depending on many factors within the micro-climate of the orchard, such as air drainage, snow cover and extreme temperature. While an extremely cold winter could reduce pest numbers, a mild winter with sufficient snow cover to compensate for fluctuating temperatures could favour winter survival. With a warm, dry spring, we could see a quick emergence of European red mite, rosy apple aphid, tarnished plant bug and mullein bug, whereas a wet, cold and rainy spring could delay emergence of these early season pests.

The concern of an early emergence of overwintering pests is the potential for more time for the population to build or for populations to peak earlier than expected – such as during bloom when insecticides can't be applied. A longer growing season (and pest development season) could even result in seeing some pests getting in an extra generation per year. For instance, potato leafhopper is predicted to go through an extra generation per season if it arrives 2-3 weeks earlier than normal.

The same can be said of most overwintering disease inoculum, which typically overwinter protected from cold weather in infected branches or cankers (e.g., fireblight), in leaves on the orchard floor (e.g., apple scab), in dead wood or mummified fruit in the tree or on the ground (e.g., black rot, bitter rot), or in alternate hosts to be carried in from other areas on wind currents (e.g., rust).

The exception to this would be powdery mildew, which overwinters as mycelium in dormant fruit and shoot buds that were infected the previous season (Fig 2). Conidia grow out of buds in the spring as infected tissue and spread to other leaves causing secondary infection. Overwintering powdery mildew infected buds and shoots lack winter hardiness and can see 95% winterkill at temperatures of -24°C. Following a mild winter, early season powdery mildew risk is often high, especially in blocks with a history of this disease.

Powdery mildew requires living tissue. So, if the winter has killed the infected bud, the mycelium will not survive. However, if the bud survives, there is a good chance the fungus survived, too. Since infected buds typically open later than healthy ones, susceptible, green tissue may be already present when the first conidia are produced. If conditions are ideal, even a small powdery mildew population can quickly explode if not managed properly.



Figure 2. Healthy apple bud (left) and powdery mildew infected apple buds (right).

Spraying Pesticides by Drone in Canada

Dr. Jason Deveau, Application Technology Specialist, OMAFRA

In Canada, the use Remote Piloted Aerial Systems (RPAS; hereafter referred to as drones), is regulated by two Federal Departments: Transport Canada establishes regulations for safe operation and Health Canada for the registration and conditions of use of pest control products.

Drones are already used in Canadian agriculture for crop surveillance and livestock management, and they're being used to apply granular fertilizers, for pollination, and for frost protection. The use of drones for general spraying was cleared by Transport Canada in July 2017. In 2018, Health Canada stipulated that the use of drones for pesticide application is not allowed under the Pest Control Products Act without sufficient data to characterize the hazards or risks associated with this use.

Drones or unmanned aerial vehicles must be specified on the pest control product label if this method of aerial application is to be used. Current references in the Pest Management Regulatory Agency's Directive on aerial application of pesticides refer to the use of fixed-wing or rotary aircraft and are intended to apply to conventional piloted vehicles only.

At the time this article was written, there were no liquid pest control products registered for application by drone in Canada. However, two restricted-use granular microbials intended for larval mosquito control were expanded to include drone application in the fall of 2022.

Drone working groups, both industry-oriented and regulatory-oriented, are working collaboratively to assemble the information needed to support drone registrations. Many research trials (approved by Health Canada) are planned or on-going as stakeholders determine the safest and most effective way for drones to fit into agricultural pest control.

For more information on pilot certification, and for links to the 2023 PMRA Information Note on drone-based spraying, please go to <https://sprayers101.com/droning-canada/>

Post Harvest

Common Disorders of 'Honeycrisp' Apples

Dr. Jennifer DeEll, Fresh Market Quality Specialist - Horticulture Crops, OMAFRA, Simcoe



Figure 1. Soft scald on a Honeycrisp apple



Figure 2. Soggy breakdown on a Honeycrisp apple



Figure 3. Bitter pit and peel blotch on a Honeycrisp apple

Soft scald is a major chilling-related disorder that is characterized by sharply defined, irregularly shaped, smooth, brown lesions of the skin. Peel tissue is initially affected and then hypodermal tissue is damaged as the disorder continues to develop. Skin lesions are often then invaded by secondary pathogens and disease. Prior to cold storage at 3°C, conditioning at 10°C for 1 week is recommended to reduce the incidence of soft scald and soggy breakdown.

Soggy breakdown is another major chilling-related disorder, which is distinguished by moist, soft, brown, spongy flesh tissue. It can form complete rings in severe cases. Apples harvested at advanced maturity are more susceptible to soft scald and soggy breakdown, while chilling temperatures in the orchard before harvest will further promote development. Both disorders have also been found in 'Honeycrisp' apples prior to harvest.

Bitter pit may appear prior to harvest or during storage, and usually develops in the calyx end of the fruit. Pits are dark, sunken lesions at or beneath the fruit surface. Bitter pit can develop more rapidly at warmer temperatures, so conditioning at 10°C is a compromise between bitter pit development and chilling-related disorders such as soft scald. The cause for bitter pit is a mineral imbalance in the apple flesh, associated with low levels of calcium. There is sometimes confusion between bitter pit and lenticel breakdown.

Lenticel breakdown is characterized by darkened or black lenticels, or superficial brown spots surrounding lenticels. The lesions may become sunken over time and allow for the invasion of pathogens. Fruit with advanced fruit maturity are more susceptible, as well as those in long-term storage. The disorder can be aggravated by various chemicals and coatings.

Peel blotch or lenticel blotch pit is similar to both bitter pit and lenticel breakdown, characterized by irregular shaped sunken patches around lenticels. Larger lesions often coalesce and it is more common around the calyx end like bitter pit. Peel blotch severity increases with extended storage durations and warmer temperatures, and it can be exacerbated by 1-methylcyclopropene (1-MCP). Severe cases are sometimes called leather blotch.

Internal browning, or diffuse flesh browning, has no definite outline of the injured area. It may affect outer flesh or core tissue, or both areas. Vascular elements often appear normal and there are usually no external symptoms. Apples harvested at advanced maturity are more susceptible to internal browning, for which it is sometimes called senescent browning in 'Honeycrisp'.

CO₂-injury can easily develop in 'Honeycrisp', as it is very sensitive to CO₂. Internal CO₂ injury, with or without flesh cavities, can be common in 'Honeycrisp' stored in controlled atmosphere (CA), but it has also been observed in ambient air storage. Risk of this injury is slightly higher in less mature fruit and the use of 1-MCP can enhance it. Delaying CA establishment for 1-2 months has been shown to reduce the disorder. CA consisting of 3% O₂ + 1.5-3% CO₂ at 3°C is recommended for 'Honeycrisp'. Treatment with diphenylamine (DPA) can also decrease the incidence of CO₂ injury, and thus allow for the higher end of CO₂ concentrations (3%) in CA storage.



Figure 4. Lenticel breakdown on a Honeycrisp apple



Figure 5. Internal browning on a Honeycrisp apple



Figure 6. Internal CO₂ injury on a Honeycrisp apple

Acknowledgements

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Announcements

2023 Cider Competition Results



We would like to congratulate all of the winners and extend our thanks for everyone who submitted cider for the 11th annual Sweet Cider Competition and the 8th annual Craft Cider Competition.

Special thanks go out to the OAG, specifically Kelly Ciceran, Larissa Osbourne and Kelle Neufeld, the volunteers, including Leslie Huffman, Janelle Balsille, Kevin Montgomery and Ken Slingerland, and finally, thanks go out to the OCCA, Janice Ruddock and Sara Boyd for their knowledge and experience in assisting throughout the competitions.

Sweet Cider

1st Place: Brantview Apples & Cider, Sweet Cider
 2nd Place: Delhaven Orchards Ltd, Delhaven Orchards Sweet Apple Cider
 3rd Place: Loughborough Heritage Orchard, Heritage Apple Cider

Heritage/Traditional Craft Cider

1st Place: Loch Mor Cider Company, Kingston Black
 2nd Place: West Avenue Cider Ltd, Heritage Dry
 3rd Place: Georgian Hills Vineyards, Ardiel Apple Dry Cider

Modern Craft Cider

1st Place: Thornbury Craft Company, Premium Apple Cider
 2nd Place: Niagara Cider Company, No. 1 Dry Apple Cider
 3rd Place: Ernest Cider Company, Ernest Cider Dry

Specialty Craft Cider

1st Place: Coffin Ridge Boutique Winery, Forbidden Hopped
 2nd Place: Loch Mor Cider Company, Sour Cherry
 3rd Place: Shiny Apple Cider, Shiny Apple Cider Pineapple Mango

2023 OFVC Survey

On behalf of the OFVC Organizing Committee we would like to thank all attendees for joining us in February of 2023. We hope that you enjoyed your time at the convention.

We would like for anyone that attended the OFVC to please fill out the survey. We are continuously adapting the program and convention to meet the expectations of all attendees and truly appreciate your feedback and suggestions.



To fill out the survey please [click here](#) or go to <https://www.surveymonkey.com/r/SR3SQP9>



On behalf of OMAFRA, we hope that you had time to look through the amazing posters at OFVC and stopped by the Ontario Booth to learn more about our Crop Protection Hub and view the various underwear in relation to soil health.

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www.ontario.ca/omafra

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