

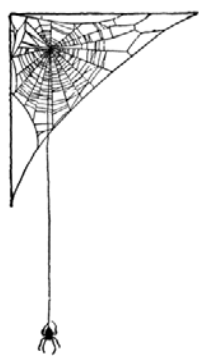


The heat and busy-ness of summer is fully upon us, and with that brings another edition of Hort Snacks. This edition is number 104 in the entire series, which is hard to imagine.

Inside you will find a number of pertinent articles relating to severe weather and how to deal with the impacts of the various types. It is unpleasant to consider but these days, it is relevant to recognize and understand how plants/crops respond to damage and what might be done to reduce the impact. There are also other articles that you might find useful in the constant battle to recognize pests, both for yourself and for clients and those around you. Over the past year, to supplement the Disease and Insect of the Month articles, we've put together some short informational videos on several pests, under the playlist Horticulture Tips, on the Alberta Agriculture and Forestry YouTube channel. Hopefully there will be new ones every month or three.

With the busy season, it is tough to find time to find and visit other farms, but do so, if you get a chance. And, if you get a moment, send a quick note about the progress and quality of harvest of the various crops you grow. We're always interested in hearing from you, whether it be the day to day stuff you are doing or suggestions for articles for the newsletter or extension programming. Regardless, have a great summer.

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 Alberta Ag-Info Centre
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Featured Website

[Horticulture Tips Playlist](#) –
 Pest videos on Alberta Agriculture's
 YouTube channel
 New = [Powdery Mildew](#) & [Poplar Borer](#)

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THINGS TO DO / THINGS TO THINK ABOUT THIS MONTH

Strawberries

- 2nd nitrogen application should be made to June bearing strawberries mid-August → 15-20 lbs actual N/ac
- Continue to cultivate June bearers between rows (same direction) after harvest to ensure good aeration and incorporation of straw and decrease next year's disease and slug population
- Maintain uniform soil moisture to facilitate rooting of runners
- Continue nitrogen feeding of day-neutrals until end of August → 10-20 lbs actual N/ac/month applied in weekly or bi-monthly applications
- Apply field cooling to day-neutrals if temperatures remain high (over 30°C)
- Application of herbicides after harvest (June bearers) if quackgrass or other grass is a problem
- Application of herbicides before mid-August (after harvest) for control of hard-to-control broadleaf weeds (June bearers only)
- Line up a clean wheat or rye straw for a mulch supply. Run straw through the combine twice to reduce the number of weed seeds (or volunteer grain) in the straw or have it ammoniated (Note: ammoniation is a dangerous and costly process)

Raspberries

- Increase watering until harvest completion
- Continue irrigation after harvest to maintain growth of new canes
- Trellis primocane raspberry canes (if required)
- Cultivation between rows after harvest to break up compacted soil
- Delay spent cane removal on floricanes until September

Saskatoon Berries

- Prune diseased plants
- Remove non-species plants

Vegetables

- Continue to supply water through to crop maturity, particularly during the fruit filling or maturation process
- Small amounts of foliar nutrient applications may be required to maintain plant growth and health

General / Other

- Maintain good weed control (harbouring of disease and insect pests)
- Commence or complete harvest operations, ensuring crops are harvested carefully, at appropriate mature stages and cooled quickly to prolong post-harvest lifespan
- For most fruit crops, particularly tree or bush fruit, reduce the supply of water towards the middle of the month and do not water after the end of the month – watering can slow or prevent the onset of dormancy and can increase winter kill in some crops
 - e.g. Apples – will not shut down growth if water continues to be available
- Visit a fellow producer

Pest Monitoring / Management

- Continue to monitor for pests and diseases, controlling as required, remembering to adhere to Pre-Harvest Intervals
- Strawberries
 - Continue to monitor for Tarnished Plant Bug and apply appropriate control measures
- Raspberries
 - Control mites as required

In the News

- [Variable Rate Potato Production = More \\$ in Your Pocket](#) – SpudSmart article
- [Growing Relationships](#) – SpudSmart article
- [How You Can Use Lifestyle Marketing to Sell Plants](#) – Greenhouse Grower article
- [Tips to Stay Ahead of Aphids, Mites, and Thrips](#) – Greenhouse Grower article
- [How The Sustainability Movement Impacts Growing Media](#) – Greenhouse Grower article
- [How Nitrogen Influences The pH Of Your Growing Medium](#) – Greenhouse Grower article
- [Succession advice from farm families](#) – Family Farm Succession
- [Want Labor-Saving Harvest Equipment? Collaborate.](#) – Growing Produce article
- [Frustrated by Overwintering Culls and Volunteers? Blame Potatoes' Wild Roots](#) – Growing Produce article
- [Researchers Studying Spotted Wing Drosophila Attractants](#) – Growing Produce article
- [Farming for Online Sales Will Require Growers to Reboot](#) – Growing Produce article

NEWSLETTER USE RESTRICTIONS

Please feel free to share all or portions of this newsletter with other interested parties.

If you want to use content from this newsletter in other media, please request permission before doing so.

DETAILS TO COME SOON

Hort Snacks in the Field

Growing Season Extension
Technology & CSA (September – date
TBD) – Sand Springs Ranch (Lac La
Biche area, AB)

The plan:

- Afternoon (starting with lunch)
 - Focused / Specific topic
- Watch www.albertafarmfresh.com OR
AAF [Coming Events](#) for event details.

MENTAL SNACKTIME – Harvest

“Always do your best. What you plant now, you will
harvest later.” – Og Mandino

“Don't judge each day by the harvest you reap but by
the seeds that you plant.” – Robert Louis Stevenson

“What we plant in the soil of contemplation, we shall
reap in the harvest of action.” Meister Eckhart

“Before the reward there must be labor. You plant
before you harvest. You sow in tears before you reap
joy.” – Ralph Ransom

“We must give more in order to get more. It is the
generous giving of ourselves that produces the
generous harvest.” – Orison Swett Marden

“Reason clears and plants the wilderness of the
imagination to harvest the wheat of art.” – Austin
O'Malley

“Happiness is the harvest of a quiet eye.” – Austin
O'Malley

... more “In the News”

- [Study Suggests Closer-Proximity Lures Help Increase Insect Pest Catches](#) – Growing Produce article
- [Bright & challenging future for the North American berry](#) – HortiDaily article
- [Risk and spread of plant viruses](#) – Wageningen University and Research article
- [The Value of the Local Label at Farmers Markets](#) – University of New Hampshire article
- [Video: Scouting Vegetable Crops: An Introduction for Farmers](#) – eXtension video

Upcoming Conferences / Workshops

August 2017

- **CityFARMed – Small Farm Tour**
Aug 1, 2017 – Edmonton, AB – Call 1-800-387-6030 to register
- **North American Strawberry Growers Association (NASGA) Summer Tour**
Aug 15--16, 2017 – Minneapolis, Minnesota, USA area
www.nasga.org
- **Farwest Show**
Aug 23-25, 2017 – Oregon Convention Centre – Portland, OR
<http://www.farwestshow.com/>
- **Independent Garden Center (IGC) Show 2017**
Aug 15-17, 2017 – Navy Pier Festival Hall – Chicago, Illinois, USA
<https://www.igcchicago.com/>

September 2017

- **3rd International Strawberry Congress 2017**
Sept 6-8, 2017 – Flanders Meeting & Convention Center – Antwerp, Belgium
<http://www.iscbelgium.com/>
- **CityFARMed – Small Farm Tour**
Sept 12, 2017 – Calgary, AB – Call 1-800-387-6030 to register
- **2017 Canada's Outdoor Farm Show**
Sept 12-14, 2016 – Woodstock, ON
www.outdoorfarmshow.com
- **CanWest Hort Expo**
Sept 27-28, 2017 – Tradex – Abbotsford, BC
www.canwesthortexpo.com
- **Potato Europe 2017**
Sept 13-14, 2017 – Emmeloord, Flevoland, Netherlands
<http://www.potatoeurope.com/>

October 2017

- **Canadian Greenhouse Conference**
October 4-5, 2017 – Scotiabank Convention Centre, Niagara Falls, ON
www.canadiangreenhouseconference.com
- **PMA Fresh Summit International Convention & Exposition**
October 19-21, 2017 – Ernest N. Morial Convention Center, New Orleans, Louisiana, USA
<http://www.freshsummit.com/>

cityFARMed



**Interested in producing food commercially?
Want to learn more about small scale farming in the city?**



Check out these two field days with Alberta Agriculture and Forestry as we tour some of the leading urban farms in Alberta. You'll learn best practices for producing food for profit in the city, some of the challenges involved, and navigating relationships with neighbours. Time to network and ask questions abound!

Registration Information

Dates: **Tuesday, August 1, 2017**
Edmonton
Registration deadline – July 25

Tuesday, September 12, 2017
Calgary
Registration deadline – September 5

Time: Registration – 11:30 a.m.
Lunch – 12 noon
Tour Start – 1 p.m.
(Lunch and snacks provided)

Cost: FREE

To register
call the Ag-Info Centre at

1-800-387-6030

Check your Elm Trees for Dutch Elm Disease (DED) Symptoms

By Janet Feddes-Calpas

Please help us prevent Dutch elm disease (DED) in Alberta. It is that time of year to be checking your elm trees for DED symptoms. A confirmed DED tree must be removed immediately to prevent further spread.

If an elm tree is infected with DED the leaves initially become wilted and soon will curl up, turn yellow and then brown. This is also referred to as flagging. Leaf symptoms are usually accompanied by brown staining under the bark. Symptoms begin in late spring or any time during the growing season. Suspicious elms must be tested in a STOPDED recognized lab for the presence of the fungus. Lab costs are covered by STOPDED.

This fatal fungus, which affects all species of elm trees in Alberta, clogs the elm tree's water conducting system and will cause the tree to die, usually within one or two seasons. The fungus is primarily spread from one tree to another by three species of insect vectors, the smaller European elm bark beetle (SEEBB), the native elm bark beetle (NEBB) and the banded elm bark beetle (BEBB). The beetles are attracted to weak and dying trees, which serve as breeding sites for the beetles. Once the beetles have pupated and turned into adults they leave the brood gallery and fly to healthy elms to feed, thus transporting the fungus on their bodies from one tree to the next. STOPDED monitors annually for the vectors throughout the province and both the SEEBB and BEBB have been found in various locations.

For this reason, it is important that elm firewood not be transported into or within Alberta as the wood may be harbouring the bark beetles. Firewood is confiscated at all the Alberta-Montana border crossings.

All elm trees that are showing DED symptoms must be reported immediately. To report symptoms or for more information call the toll free provincial STOPDED hotline by dialling 1-877-837-ELMS (3567). You can also visit our website at www.stopped.org.



Q: When do you decide to stop harvesting a crop? What tells you that it is "done"?

A: What it's done or overripe. Like peas can get too big.

A: When the time to harvest exceeds the benefits

A: When I have enough for myself, customers and friends.

A: We harvest (U-Pick) as long as we have good product. When quality goes down we close that product.

A: Saskatoon Berry - U Pik/ We Pik. When it takes more than an hour to pick a bucket of good berries, we close We Pick first, quit advertising, but allow people to still pick, telling them we are done but there are still good berries down there! During this time, we are cleaning up, taking down signs, etc. It's not a one day open, one day closed but 3-4 day decision. Then, if anyone is interested, we sell the berries as fresh, frozen.

A: I guess that depends on the crop, when all the berries are picked and it isn't producing more, then it is done. Leafy things like Kale and lettuce, when their leaves are getting smaller and smaller or go to seed. Spinach as soon as it bolts. Most things have a finite harvest time per mother nature.

Next Month's ? → [What are the deciding factors that you use to drop or cut loose a product or crop?](#)

[Pest Management Regulatory Agency \(PMRA\) – Electronic Label Search Engine](#)

Search the database for electronic labels

The Effect of Hail on Fruits and Vegetables

Unfortunately, hail and hailstorms are almost a given during the summer on the Prairies. Hailstorms are associated with regular thunderstorms, and are typically localized events; however, hailstorms can cover wide swaths of land.

Thunderstorms form when air heats up during the day, rising (because it is lighter) and then cools; the moisture within the air condenses to form clouds. Sometimes condensed water within thunderclouds will become super cooled (cooled to below the point of freezing, without freezing) in the strong updraft winds that are common in thunderheads. Updrafts can keep the suspended moisture from falling. Once the super cooled moisture contacts something to form around (such as dust, ice crystals, etc.), a hailstone will be formed. Once the hailstones are too heavy to be held up by the winds, they will fall. The size of the hailstone will be determined by the amount of moisture and the strength of the updrafts.

The overall effect of hail damage will depend on the size of the hail, the duration of the hailstorm and the type and growth stage of crop. Generally, the earlier the damage occurs, the greater potential for regrowth. Yield and product quality will generally be reduced. Below are some of the effects of hail damage on different crops and some of the ways that producers might manage the effects of hail on their crops.

Potatoes

Surface damage to potatoes is typically some amount of defoliation, ranging from leaf damage to complete destruction of leaves and stems. Although potatoes can recover from hail, tuber yield and quality are usually affected. The effect of damage will relate to the amount of damage, the growth stage of the potato, cultivar, as well as subsequent cultural practices and weather.

Loss of foliage greater than 25 per cent will reduce total and marketable yield, particularly if damage occurs before midseason. Greatest losses will result if damage occurs within 2 to 4 weeks of flowering. Foliar damage results in reduced yields, increased number of small and deformed tubers, and reduced tuber specific gravity. Tuber maturity will also be delayed and some foliar regrowth may be observed. Damaged tissues are at risk from attack by plant pathogens, particularly soft rot bacteria.

To manage the crop after damage, the key is to ensure that the crop is not stressed further. Apply protective fungicide applications to the crop. Ensure that there is adequate fertility; however, high levels of nitrogen can enhance foliar growth, perhaps at the expense of the tubers. Be prepared to adjust harvest dates based on how the crop recovers.

Root crops (carrots, beets, etc.)

Foliar damage will reduce photosynthetic capacity of the plants and may reduce yields, depending on how early or late the damage occurs. Most root crops will be protected from direct damage, but grade and cull thoroughly at harvest in case of shoulder injury, which may lead to increased levels of storage rot.

Bulb vegetables

These crops are especially sensitive during early growth stages however, at all stages, leaves and neck areas may have whitish/yellowish spots or leaves may be shredded completely by hail. Replanting young crops may be necessary, whereas fungicide applications can protect older crops from infection by fungal and bacterial pathogens.

Leafy greens

Leaves may have some slight holing or may be completely destroyed. These generally short season plants have the potential to recover quickly from damage, depending on the stage of growth. If the damage appears to be minimal, wait it out and clean up plants during harvest by trimming unmarketable portions. If plants are young and heavily damaged, consider replanting. Disease susceptibility will be increased, so consider a fungicide spray.

Fruiting vegetables (tomatoes, peppers, cucurbits)

Similar to other crops, foliar damage can slow growth and reduce yields. Physical damage to developing fruit can reduce quality and marketability, depending on the type of crop. Some wound healing and subsequent scarring is likely on thicker skinned crops, but this may not affect marketability. Wounds on leaves and fruit represent a doorway to invading pathogens. Fungicidal sprays can help protect damaged fruit.

Fruit & Berries

Damage can include foliar injury (ranging from slight leaf holing to complete defoliation), as well as branch breakage in larger trees and bushes. Injury to fruit can include bruising, scarring, holing, as well as fruit being physically knocked off of the plant. Defoliation can result in delayed fruit maturity or potentially excessive lateral shoot proliferation. Wounded plant parts are susceptible to attack by pathogens such as soft rot, canker, etc.

Remove broken or damaged plant material. Apply registered protective fungicides if necessary. Pick damaged fruit and utilize quickly.

Flooding / Excess Water

Flooding or excess water damage can be caused by short to medium term, intense introductions of water, as a result of poor soil drainage causing soil saturation and pooling, from overapplication of water through irrigation or through heavy rains or runoff from water bodies.

Impact on Soil

Excess water impacts both the plants and the soil. During and after excess water situations, soil quality and structure will be reduced, with an increase in compaction, clinging soil and the number of clods. Nutrients will be leached out of the soil profile, potentially resulting in nutrient deficiencies. Soils (and plants growing within them) may become contaminated with pathogens (human or otherwise), while produce may become contaminated with silt or other debris.

General Plant Damage / Impact

Plants that have been flooded or that grow in saturated soil situations will often exhibit reduced growth and/or stunting. Foliage (leaves and stems) may look yellowed and chlorotic and, if conditions persist, may become necrotic (dead). Seeds may rot and root death may occur. Plants may wilt and decline (depending on the duration of the saturated soil conditions). There will be an increase in the incidence of diseases (bacterial, fungal) due to weakening to the plants and due to improved conditions for disease development (increased humidity, prolonged leaf wetness periods, etc.).

Plants that are exposed to excess water will have altered plant hormone levels, which will result in abnormal growth, including twisting, epinasty, distortion, enlarged lenticels, and aerial or adventitious root formation.

The main impact that comes from excess water is due to a reduction in the amount of oxygen that is in the roots, which affects respiration and metabolic transport systems. Reduced oxygen also damages roots, which reduces uptake of nutrients (such as calcium) and can result in increased uptake of toxins and attack from pathogens.

Different crops respond to flooding in different ways, depending on the previously outlined factors. The following tables outline the specific impact of flooding on different crops.

Impact of Flooding on Potatoes		
Timing / Duration	Plant Response	Other Damage
Anytime		Leaching of nutrients from soil
8 -12 hours	Root death	
	Irreversible wilting and plant death	
After Planting	Delayed emergence	
	Increased seed piece decay	
Planting to Emergence	Seed piece decay	Increased clod formation
Vegetative Growth Stage	More prone to development of Verticillium wilt	Increased compaction & clod formation
Tuber Initiation	Development of tuber disorders - brown centre; stem and hollow heart	
Tuber Bulking	Lush canopy	Nitrate leaching
	Increase in Early blight, Late blight, Aerial stem rot, sclerotinia stalk rot, bud end hollow heart	
Tuber Maturity	Enlarged lenticels	Increased bacterial soft rot

From the Hort Snacks Archives

	Delayed senescence and skin set	Increased Pythium leak, pink rot, late blight tuber rot
Harvest	Increased susceptibility to shatter bruise and thumb nail cracking	More soil cling
	Increased tuber rot	

Impact of Flooding on Carrots	
Timing / Duration	Plant Response
Anytime (at higher temperatures)	More permanent affect
	Plant wilting
Persistent flooding	Chlorotic / necrotic tissues
	Increased chance of attack by pathogens / secondary pathogens
	Increased bacterial soft rot
	Forking of tap root (due to death or restriction of growing tip)
	Reduced carrot quality <ul style="list-style-type: none"> • Decreased root length and colour • Increased lateral root development (e.g. hairy roots) • Stimulate cellular growth at later root emergence sites • Blemishes

Response / Solutions to Excess Water

The most important thing when dealing with excess water is to remove it as quickly as possible. When at all possible, improve drainage of the soil to prevent future issues. Removing water will improve access of the roots to oxygen, which immediately will improve nutrient uptake. Root growth will resume to replace lost roots.

Tillage, once soil is dry, may remove soil crusts and hard layers and improve aeration. You might consider replacing lost nutrients, if you feel it is necessary and appropriate. Consider waiting for a short time to allow plants to recover somewhat, otherwise applications may be less effective wasted. Foliar applications can supply necessary nutrients quickly to plants, which might be more effective than a soil-based application.

During recovery, it is important to monitor plants (especially young ones) closely. Increase monitoring for diseases. The application of fungicides may be appropriate to protect recovering plants from disease, but carefully consider the cost/benefit of applications. In some cases, tilling under unsalvageable crops to reduce spread and development of disease will be necessary. You may replant shorter maturing crops to try and recover lost revenue.

Harvest mature crops as quickly as possible after flooding damage, however only harvest if product is safe. Increase culling to remove any reduced quality product and avoid use of harvested product where flooding may have introduced human pathogens. Wash/disinfect all harvested product carefully.

Hail

Hail (and similar severe weather) can be devastating, both in the physical/tangible sense, and psychologically, as it can be pretty random and pretty much impossible to predict or prevent. Hail can cause partial to complete defoliation of leaves and stems, tearing or shredding leaves and breaking stems and branches. The plant will often focus on recovery of lost tissues, which results in the diversion of resources away from storage areas (such as fruits, tubers, storage roots, etc.). As a result of the loss of the foliage/foliar area, the plants have reduced photosynthetic capacity and reduced sugar (metabolite) production and increased sunburn to exposed fruit.

If hail occurs at a generative stage of plant growth, flowers or fruit may be physically knocked off (e.g. strawberries, tomatoes, etc.), reducing yields, while fruit, bulbs, root shoulders, etc. may be bruised and tissue browning may be observed. Injured tissues also represent an entry point for pathogens. Product may not be marketable or may be reduced in quality (e.g. storage organs such as tubers). Some delay in maturation of produce may be evident, as the plant regrows or recovers. As with all severe weather damage, the severity of the damage and associated losses depend on a number of factors, including how much damage actually occurs, what stage of growth the plant is at, specific cultivars, as well as cultural practices and the subsequent weather that follow the injury. In the case of crops like potato, if slight to moderate damage is combined with good subsequent weather/growing conditions should result in a rapid recovery.

The specific impact of different types and levels of damage at different growth stages of potatoes and other crops are outlined below.

Impact of Hail of Potatoes	
Level of Injury / Plant Stage	Plant Response
Slight leaf damage (any stage of growth)	Minimal impact on yield
Partial defoliation to complete mutilation of leaves and skins	Reduction of yield and tuber quality
	Delayed maturity
25% Foliage loss (especially if before mid-season)	Reduced total and marketable tuber yield
Increased Damage	Reduced marketable tuber yield
	More small and malformed tubers
	Lower specific gravity
Severe stem damage	
Shortly before/during or just after bloom	Reduced yield
2-4 weeks after bloom	Highest losses
Percent Defoliation	Reduced tuber starch content in proportion to % foliage removal
	Delayed maturity
	Secondary growth

Impact of Hail on Various Crops	
Level of Injury / Plant Stage	Plant Response
Strawberries	
During flowering or fruiting	Reduced yield /Highest losses
	Bruising on mature fruit / brown scars on immature fruit
Beans	
Cotyledon/seedling stage	Death if cut off below cotyledons or cotyledons are severely damaged
Flowering stage	Reduced yield and split sets (uneven maturity)
Other stages	Similar response to damage to other crops
Corn	
Vegetative stage or silking	Reduced marketable ears and reduced yields
At harvest	Minimal impact

Response / Solutions to Hail Damage

After heart rates have settled, take some time to assess the level of damage that has occurred. This isn't necessarily a one-time process. As plants recover to some degree, it will become easier to see permanent versus temporary damage. In some cases, wait up 7-10 days to make the final assessment. This allows clear distinction between dead and living tissues. Assessment will help you to determine the reduction in both yield and quality.

Once a reasonable assessment has been made, some actions may help plants to recover. The application of fungicide treatments may help in recovery and can help to protect damaged tissues from attack by pathogens. Additional nitrogen can encourage new vegetative growth, however, ensure that plants have recovered sufficiently to be able to take up nitrogen and use it. Pruning or removal of damaged tissues (e.g. trimming carrot tops in field) can be undertaken with moderation.

Heavy Rain

Rain is rarely considered to be negative weather, however if it arrives in excessive amounts in a short time, resulting in localized flooding of soil and associated excess moisture damage. Sudden, heavy rains can also produce damage that is very similar to hail damage, causing varying degrees of defoliation, bruising of plants (particularly soft fruit), specifically in the shoulder regions. Some cracking of the shoulder regions can also occur. Disease development may increase due to soil splash, damaged tissues and increased humidity.

Response / Solutions to Heavy Rain

Dealing with heavy rain is similar to dealing with excess water / flooding or hail, depending on the situation. Producers should ensure that there is good drainage (or actively work to drain soils) and may apply protective fungicides may help protect damaged tissues from infection. Replacement of lost nutrients may also be necessary.

INSECT OF THE MONTH

Leafminers

Chrysanthemum leafminer – *Liriomyza trifolii*; vegetable leafminer – *Liriomyza sativae*; pea leafminer – *Liriomyza huidobrensis*; birch leafminer – *Fenusa pusilla*, *Profenusa thomsoni*; aspen serpentine leafminer – *Phyllocnistis populiella*; *Phyllonorycter* nr. *salicifoliella* and *P.* nr. *nipigon*; lilac leafminer – *Gracillaria syringella*; cottonwood leafmining beetle – *Zeugophora acutellaris*, *Z. abnormis*; European alder leafminer – *Fenusa dohrnii*; plus other species

Crops Affected:

Edible crops – beets, spinach, Swiss chard, tomato, Cole crops, cucurbits, peas, beans, lettuce, etc.

Ornamental crops - aster, begonia, dahlia, impatiens, lily, marigold, petunia, and verbena, greenhouse ornamental crops (e.g. chrysanthemum, gerbera), woody ornamental trees and shrubs (e.g. birch, poplar, aspen, oak, willow, alder, lilac, etc.)

Life Cycle:

- Adult insects are flies, moths or beetles which lay their eggs on/in the undersides of host leaves (depending on the species)
- Larvae tunnel into the leaves to feed between the upper and lower leaf surfaces (epidermal layers), forming “mines”
 - Larvae develop fairly rapidly, depending on the species and the temperature
 - Larvae typically complete development by exiting the leaf and dropping to the soil to pupate
- Damage is largely cosmetic
 - Yields of edible plants are typically not affected unless severe defoliation occurs
 - Damage is typically insufficient in ornamental species to cause lasting harm to large woody plants
- Populations can increase rapidly, particularly in protected environments, depending on the species
 - For woody ornamental hosts, flies emerge in spring and often lay eggs as leaves are starting to emerge from buds
- The presence of the various pest species will vary by region, with some being more prevalent in some areas and others not being present at all

Symptoms:

- Mines are visible, twisting back and forth across the leaves of host plants
 - In some host species, mines become pockets of spaces, within which larvae can be observed feeding
 - Some mines resemble blotches
 - Differences between the appearance of mines can be indicative of the pest species
- Leaves may appear brown and dried out, as the leaf tissues die off as mines are enlarged

Monitoring:

- In greenhouses, yellow sticky traps can be used to monitor adult fly populations
- Watch fields for signs of early mining and be prepared for preventative protection in advance or to stop later generations from developing

Management:

- Ensure that plants have adequate water and nutrition to produce strong, healthy growth
- Rotate to non-host crops on a regular basis
- Covering edible crops can restrict access to the plants by adults
- Resistant or tolerant varieties can be available for some host crops
- Control weeds, to prevent population carryover between crops
- Early removal of mined leaves can interrupt the life cycle of the pests
- Parasitic wasps can be effective biological controls some species, particularly in protected crops (e.g. greenhouse)
- The use of registered insecticides can be used to control adult leafminers
 - Resistance can develop quickly in this pest – use caution and rotate chemical groups
 - Control options may be limited in some crops
- It is very difficult to control leafminers in woody ornamentals, other than through the use of systemic insecticides applied early in the spring
 - There are very few options available in the present day
- Strict sanitation programs (in protected environments) can help to keep populations in check



Leafmining damage on birch & cutleaf weeping birch – note: visible larvae
Photos by Robert Spencer



Leafmining damage on spinach leaves

Photo Courtesy: Whitney Cranshaw, Colorado State University, Bugwood.org

Anthracnose of Strawberry

Colletotrichum fragariae; *C. acutatum*; *C. gloeosporioides*

Crops Affected: strawberry

Disease Cycle:

- Different species can cause different diseases
 - Crown rot
 - Fruit rot
 - Leaf spots
- Affects foliage, runners, crowns and fruit
- Typically introduced in infected plants
- Can overwinter for a short time (up to 1 year) on debris
- Spores are produced in warm, humid weather
 - Spread by rain splash or irrigation
 - Spores may also be transferred by clothing and equipment
- Wetness is required for infection

Symptoms

- Occur on green or ripe fruit
- Brown or black, sunken lesions
 - Tend to be small (typically less than 1.5cm across)
- In humid conditions
 - Salmon (pink-orangey) coloured ooze (filled with spores) is released from lesions
- Dark, sunken lesions form on petioles, runners and crowns
- Daughter plants may die
- Outer leaves may die prematurely
- Plants may collapse from crown rot
- Crowns may exhibit a reddish-brown streaking when cut lengthwise
 - Looks a bit marbled
- Dried up, dead flowers or small, hard dried up fruit may be observed if infections occur during flowering

Conditions Favouring Development:

- Very weather dependent
- Splashed rain
- Warm, humid conditions
 - 20-32°C and 100% RH

Management:

- Start with clean plant material
 - Some varieties have resistance (most don't)
- Practice good sanitation
 - Remove infected fruit from the field
 - Clean up crop debris between crops
 - Clean equipment between fields
- Maintain a good rotation between non-host crops
- Control weeds
 - Some weeds may be hosts
- Work in infected fields last
- Clean clothing and equipment after working in infected fields
 - Spores can survive on clothing for several weeks
- Avoid over fertilizing plants, specifically Nitrogen
 - Vigorous plants are more susceptible
- Ensure a good layer of straw is in place
 - Straw reduces rain splash and disease spread
- Use drip irrigation instead of sprinklers
- Apply registered fungicides, where appropriate

DISEASE OF THE MONTH

SYMPTOM	<i>C. acutatum</i>	<i>C. fragariae</i>	<i>C. gloeosporioides</i>
Crown rot		X	
Fruit rot	X	X	X
Black leaf spot		X	X
Irregular leaf spot	X		

Information courtesy www.fruit.cornell.edu

Anthracnose lesion on fruit

Photo by OMAFRA.gov.on.ca



Below – Sunken elliptical Anthracnose lesion on runner

Photo by OMAFRA.gov.on.ca



Symptoms of Anthracnose crown rot (possibly Phytophthora – difficult to tell)

Photo (left) by OMAFRA.gov.on.ca /

Photo (right) by Frank Louws, North Carolina State University

Anthracnose lesion on leaf petiole

Photo by OMAFRA.gov.on.ca

Look-a-like Disease	Symptoms
Botrytis Grey Mold	<ul style="list-style-type: none"> • Fruit lesions often associated with the calyx • Lesions develop grey fuzzy mould and grey spores
Leather Rot	<ul style="list-style-type: none"> • Indistinct lesions • Smell foul • Spores that develop are white
Verticillium Wilt	<ul style="list-style-type: none"> • Wilted plants, but crowns do not have the reddish discolouration
Phytophthora Crown Rot	<ul style="list-style-type: none"> • Plants wilt • Crowns have reddish discolouration