



Summer is chugging along and another edition of Hort Snacks (the mid-summer one, if you believe it) is here for your reading and learning pleasure. Hopefully it finds you with a smile on your face, the sun shining, your soils at field capacity and nary a storm cloud on the horizon to threaten your actively growing crops. And maybe a cold, refreshing beverage close at hand, as the gentle breeze dries the sweat off your brow.

In this edition, you will find a number of articles that are geared to preparing you for attack by various insects or diseases, so that you might know where they are at their most vulnerable or when they can be expected to arrive. It is a bit of guesswork, but since it is educated guesswork, that makes it ok.

Otherwise, there are a range of other materials that might help you in some way. As we progress through the growing season, please feel to reach out to us for help, a quick update chat or to share some suggestions for how we might help you in some way. Have a great summer. We'll see you around.

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In the News / Interesting Articles

- [Canada's Seasonal Ag Worker Program – 10 Myths vs Reality](#) – CHC article (PDF)
- [High produce prices affecting consumption: U of G survey](#) – Greenhouse Canada article
- [Protect Your Greenhouse From The Worst Disasters](#) – Greenhouse Grower article
- [Cash In On Ethnic Crops](#) – Growing Produce article
- [Fundamentals of Growing Media](#) – HortiDaily article
- [Biocontrol with predatory mites: build up the army before the battle begins](#) – HortiDaily article
- [Do you REALLY know where your food comes from?](#) – HortiDaily article
- [Do Your Products Meet Your Customers' Values?](#) – Growing Produce article
- [Bacteria to the rescue](#) – SpudSmart article

THINGS TO DO / THINGS TO THINK ABOUT THIS MONTH

Strawberries

- Maintain good weed control – dandelion and chickweed infestations can contribute to Tarnished Plant Bug damage (issue in day-neutrals)
- Application of nutrients – primarily nitrogen –should be done as soon as June bearer harvest is complete - 50lb/ac N, P & K; Make 2nd application in mid-August - 15-20 lb/ac N (using calcium nitrate)
- Mowing old leaves of June bearing strawberries (only) at renovation should only be done if harvest and mowing can be completed by August 5
- Irrigation (if not supplied by rainfall) should be continued at this running stage of June bearers
- Day-neutral strawberries will require constant nitrogen feeding until end of August - 10-20 lbs actual N/ac/month - may be split into weekly or bi-monthly applications
- Field cooling of strawberries should be considered if temperatures exceed 30°C. Day-neutral flower bud formation ceases at 26-28°C
 - Failure to cool will result in the conspicuous absence of a crop a month later

Saskatoon berries

- Ensure any off-plant types (e.g. chokecherries) are pruned out of the Saskatoon berry rows prior to harvest
- Soil moisture can be reduced after harvest to encourage plants to harden-off
- Harvest at night or early morning to take advantage of fruit temperatures (reduces cooling requirements)
- Cool crop immediately after harvest to preserve produce quality
 - Ensure that there is airflow through the harvested product to cool more quickly
 - If freezing the graded crop, consider that smaller quantities or thin layers will freeze more quickly than bulk quantities – which will affect final quality of the frozen product

Vegetables

- Harvest product at appropriate stages, with consideration given to cost of harvesting versus total yield
 - Multiple harvests of each planting can increase total yield but quality (and returns) may be higher for early harvests of each planting
- Cool harvested product quickly to slow post-harvest degradation
- Final washes/rinses should be in potable water

Greenhouse ornamentals

- If holding plants for extended periods, ensure plants are kept healthy, fertilized and free from pests
 - Apply sufficient water, maintenance fertilizer, etc.
- Clear out older stock as quickly as possible

General / Other

- Adjust irrigation as soil moisture conditions and plant requirements change.
 - As plants begin to mature and fruit fills, moisture requirements typically increase.
 - Maintain soil moisture levels through harvest (particularly during fruit formation and filling)
- If June was particularly wet and you have sandy soils, it is possible that soil nitrogen levels may be depleted. Make light applications of nitrogen. Heavy applications of nitrogen can lead to soft fruit and plants

Pest Monitoring / Management

- Continue to monitor disease and insect pest development and make appropriate controls (adhering to PHI and REI restrictions)
- Remove / prune out diseased plant material
- Check out PMRA website for most recent info on registered pesticides
- Abandonment (ploughing under) of an annual crop can sometimes be more cost effective than trying to salvage a heavily infested crop with chemical sprays (weeds, insects, disease)
- Consider cultural pest control practices such as exclusion, using such technologies as row covers, netting, etc.
- **Raspberries**
 - Monitor for spider mites and control if necessary
 - Examine primocane growth on floricanes for spur blight infection
 - Plan post-harvest fungicide spray if identified
- **Saskatoon berries**
 - Continue to monitor for Entomosporium and apply fungicides with short Pre-harvest interval if necessary
 - Ensure that you do not exceed seasonal maximum number of applications
 - If Woolly Elm Aphids have been or are an issue in your orchard, application of Orthene, Alias or Admire is permitted on bearing and non-bearing plants
 - Apply as close to peak aphid migration as possible – early to mid-July to mid-August (depends on crop and season)
 - Apply after harvest in bearing plants, although Alias / Admire may be applied with a short PHI window (14 days)
- **Greenhouse ornamentals**
 - Monitor for spider mites and aphids, as well as foliar diseases such as powdery mildew
 - Correct situations that encourage fungus gnats

DETAILS TO COME SOON

Fruit & Vegetable Field Days

#2 Strawberry Varieties (August 29) – The Jungle Farm (Innisfail, AB)

The plan for this year:

- Afternoons (starting with lunch)
- Single farm locations
- Focused / Specific topics

Watch www.albertafarmfresh.com OR
AAF [Coming Events](#) for event details.

Online Course on Post Harvest Handling to Minimize Losses

July 11th - August 19th, 2016

This [University of Massachusetts course](#) will include an introduction to the environmental and biological factors that contribute to postharvest loss of fruits and vegetables, commercial procedures of harvesting, handling, and storage of horticultural commodities, and specific handling information for commodities of various plant organs. Small-scale handling practices will be emphasized.

MENTAL SNACKTIME – Maintenance

“We need 4 hugs a day for survival. We need 8 hugs a day for maintenance. We need 12 hugs a day for growth.” – Virginia Satir

“I hope I shall possess firmness and virtue enough to maintain what I consider the most enviable of all titles, the character of an honest man.” – George Washington

“Successful people maintain a positive focus in life no matter what is going on around them. They stay focused on their past successes rather than their past failures, and on the next action steps they need to take to get them closer to the fulfillment of their goals rather than all the other distractions that life presents to them.” – Jack Canfield

“One must always maintain one's connection to the past and yet ceaselessly pull away from it.” – Gaston Bachelard

“One might as well try to ride two horses moving in different directions, as to try to maintain in equal force two opposing or contradictory sets of desires.” – Robert Collier

Upcoming Conferences / Workshops

July 2016

- Haskap Intro Course – U of S
July 7, 2016 – University of Saskatchewan – Saskatoon, SK
www.fruit.usask.ca/extension.html
- Haskap Day 2016
July 8, 2016 – Horticulture Field Lab – Saskatoon, SK
www.fruit.usask.ca/extension.html
- Cultivate 16 (Formerly OFA Short Course)
July 9-12, 2016 – Greater Columbus Convention Centre – Columbus, OH
<http://cultivate16.org/>
- Organic & Low Input Field Day – Organic Alberta
July 11, 2016 – Lethbridge, AB
www.pivotandgrow.com/event/lethbridge
- 100th Potato Association of America (PAA) Conference
July 31 – August 4, 2016 – Amway Grand Plaza Hotel – Grand Rapids, Michigan, USA
www.potatoassociation.org

August 2016

- NAFDMA Advanced Learning Retreat 2016
Aug 2-5, 2016 – Seaquist Orchards – Sister Bay, Wisconsin, USA
<http://nafdma.wix.com/alr2016>
- 8th International Strawberry Symposium
Aug 13-17, 2016 – Quebec City Convention Center – Quebec City, QC
<http://www.iss2016-quebec.org/>
- North American Strawberry Growers Association (NASGA) Summer Tour
Aug 17--18, 2016 – Quebec City, QC area
www.nasga.org
- Farwest Show
Aug 25-27, 2016 – Oregon Convention Centre – Portland, OR
<http://www.farwestshow.com/>
- Hort Snacks in the Field (Strawberry Varieties)
August 29, 2016 – The Jungle Farm – Innisfail, AB
<http://www.albertafarmfresh.com/> or AAF [Coming Events](#)

September 2016

- 2015 Canada's Outdoor Farm Show
Sept 13-15, 2016 – Woodstock, ON
www.outdoorfarmshow.com
- CanWest Hort Expo
Sept 28-29, 2016 – Tradex – Abbotsford, BC
www.canwesthortexpo.com

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.

Hort Snacks in the Field Strawberry Varieties



August 29, 2016



Location: The Jungle Farm – 28120 Township Rd 362, Red Deer, Alberta (north of Innisfail, AB)

This field day will provide strawberry growers with an opportunity to visit a strawberry production operation to learn about different June-bearing and Day-neutral-type strawberry varieties. This interactive field day encourages participants to learn from each other, as well as the host farm.

Registration: 11:30 a.m. to 12 Noon

Lunch: 12 Noon to 1 p.m.

Farm Tour: 1 p.m. to 3 p.m.

To register: 1-800-387-6030

Registration deadline: August 22

Cost: \$10/person

Lunch and snacks provided

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

By Janet Feddes-Calpas

Dutch Elm Disease Awareness Week is recognized annually throughout the province of Alberta from June 22- 28. The intent is to raise awareness on how dangerous Dutch elm disease (DED) is, the importance of elm trees to our communities, and that DED can be prevented. At present, Alberta has the largest DED-free American elm stand in the world, and it is important to protect this valuable resource. The Society to Prevent Dutch Elm Disease (STOPDED) is asking for your assistance to save our beautiful elm trees from this deadly disease.

DED is caused by a fungus that clogs the elm tree's water conducting system, causing the tree to die. The fungus is primarily spread from one elm tree to another by three species of beetles, the smaller European, the native and the banded elm bark beetle. 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. Monitoring for the beetles is done annually throughout the province by STOPDED. The smaller elm bark beetles have been found throughout the province in low numbers and now the banded elm bark beetle is found in larger numbers throughout the City of Medicine Hat and area. For this reason we must be even more vigilant.

Leaves on a DED-infected elm will wilt or droop, curl and become brown. This appears in mid-June to mid-July. Leaves on trees infected later in the season usually turn yellow and drop prematurely. Leaf symptoms are accompanied by brown staining under the bark. All DED suspect elms must be tested in a lab so if you think you see DED symptoms call the hotline.

During DED Awareness Week, please take a moment and find out how you can help save our elms.

What can you do?

- Be aware of the Alberta elm pruning ban between April 1 and September 30. The beetles are most active at this time and can be attracted to the scent of fresh tree cuts, possibly infecting a healthy elm.
- Keep your elm trees healthy, and vigorous.
- Water elms well from April to mid-August. To allow the tree to harden off for the winter, watering should be stopped mid-August followed by a good soaking or two before freeze-up.
- Only between October 1 to March 31, remove dead branches and trees as they can provide beetle habitat.
- Dispose of all elm wood immediately by burning, burying or chipping.
- Report all suspect trees to the DED Hotline at 1-877-837-ELMS. A confirmed DED tree must be removed immediately to prevent further spread.

What you shouldn't do!

- Do not transport or store elm firewood at any time! DED and the beetles are declared pests under the AB Agricultural Pests Act and this can be enforced.
- Do not transport elm firewood into Alberta! Firewood is confiscated at all the Alberta-Montana border crossings.
- Do not prune elms between April 1 to September 30.

To report a DED suspect elm tree or for more information, call the STOPDED hotline at 1-877-837-ELMS or check out the web site at www.stoppeded.org



Q: What is one pest management practice that you have found to be of great value to you?

A: When it comes to weeds, I have always found that controlling them early is the absolute best practice. Small, tender and not deeply rooted is the best kind of weed to kill. Big, full of roots, seeds and shoots is a nightmare weed.

When it comes to insects, monitoring for pest populations and changes in a population is the best practice for any type of pest management. With that practice usually comes an understanding of life cycle dynamics and where the life cycle can be most easily controlled.

With diseases, protective sprays are the most effective practice. I don't mean prophylactic sprays for no reason, but linking monitoring, awareness and protective controls means you nip a problem in the bud before it escalates. – R Spencer (AAF)

Next Month's ? → [What strategies do you use to manage the harvest of multiple crops?](#)

CleanFARMS 2016

CleanFARMS will be running obsolete pesticide & livestock medication collections in October of 2016 as follow:

- Northern Alberta (Red Deer to AB Peace)

The program is free and ag-retail collection locations/dates will be released in early summer. The program is delivered by CleanFARMS and its members in each province/region of the country every three years.

Visit www.cleanfarms.ca for more information.

Note: In 2015, Alberta farmers disposed of more than 72,000 kg of obsolete pesticides and livestock medications

INSECT OF THE MONTH

Pear Slugs

Caliroa cerasi

Crops Affected: Saskatoon berry, pin cherry, cotoneaster, hawthorn, chokecherry

Life Cycle:

- Green-black, slug-like larvae of a leaf-skeletonizing sawfly
- Overwinter as larvae in cocoons in the soil near the base of host plants
- Adults emerge in mid-June to mid-July
- Females deposit eggs in slits made in lower leaf surfaces
- Larvae feed on the upper leaf surfaces
- Larvae are slightly larger at one end than the other
- Mature larvae are green/yellow-orange
- May have a 2nd generation per year

Symptoms:

- Feeding by larvae results in leaf discolouration, mottling and loss of leaf material
- Initially, leaves may have yellowish spots on upper surface, which enlarge as feeding continues
- Leaves may have a bleached appearance followed by foliage turning reddish-brown
- Larvae are quite visible on affected leaves

Monitoring:

- Scout plants weekly for larvae and damaged leaves, which are readily visible

Management:

- Remove and dispose of affected leaves (with larvae)
- Chemical applications for other pests may provide some degree of coincidental control



Pear slug larvae foliar feeding damage
Photo by Mountainview Farms



Pear slug larvae
Photo by agf.gov.bc.ca

Constant Vigilance – Watch out for Late Blight

Over the last few years, there has been a great deal of concern in Alberta surrounding a serious disease called Late blight that affects mainly potatoes and tomatoes. This disease is caused by a fungal pathogen called *Phytophthora infestans*. In those years, the favourable conditions for disease development, combined with the presence of the pathogen, have resulted in multiple outbreaks of Late blight in commercial, market garden and urban potato and tomato crops throughout parts of Alberta. A number of different strains of the pathogen have been identified in different years, each being more or less aggressive on either potatoes or tomatoes. For 2016, this disease continues to be a risk for all Solanaceous crops (potato/tomato family) grown in Alberta.

Although the hot and dry conditions that are sometimes observed in Alberta during the summer help to reduce the potential for this disease, irrigation and rain showers can create favourable conditions in localized fields and plantings. Certain strains of *Phytophthora infestans* are also more tolerant of warmer/drier conditions than others, which increases risk.

It is recommended that ALL growers of potatoes and tomatoes be extra vigilant to try and catch any diseased material early on, before a significant outbreak can occur. In the early season, growers should watch for:

- Tomato transplants and newly emerged potato shoots with water-soaked leaf lesions
- Plants that develop lesions early on in the season or as the season progresses, particularly if conditions are moderate and wet/humid

If you find plants showing suspicious lesions, it is recommended that you can contact 310-FARM (3276) to determine if further testing is required and to discuss management. Please do not hesitate to report an incidence, as early awareness will help to prevent and contain an outbreak and can help others to protect their crops.

While undertaking identification, producers should dispose of infected material as quickly as possible, removing disease parts (small scale) or killing out plants so disease cannot develop further. Protective fungicide applications can be made if conditions favour disease (and if disease is known to be present in the province)

Information on Late Blight

[FAQ – Late Blight of Potatoes and Tomatoes](#)

Cherry Leaf Spot

Blumeriella jaapii (formerly *Coccomyces hiemalis*)

Crops Affected: Tart and sweet cherry, plums

Disease Cycle:

- Fungal pathogen
- Overwinters on dead leaves on the ground
- Attacks the leaves, petioles, fruit and fruit stems of host plants
- In spring, around petal fall, following rainfall, spores (ascospores) are forcibly ejected for 6-8 weeks to infect new leaves
- Spores infect leaves through stomata on the leaf undersides
- Infection development rate will vary depending on moisture and temperature
- Lesions develop and produce asexual conidia on the leaf undersides that are spread further by rain splash

Symptoms:

- Initial infection appears as tiny, red to purple circular lesions on the upper leaf surface
- Lesions enlarge gradually, eventually reaching 1/8-1/4 inch in size
 - Lesions become more brown coloured
 - Centres of the lesions may drop out, creating a shot-hole appearance to the leaf
 - In wet conditions, on the leaf underside, the centres of lesions will turn white/pink as masses of asexual conidia are produced
- Lesions may also develop on leaf petioles and fruit pedicels, but do not typically form on fruit
- Leaves may turn yellow after infection, and fall from the plant if severely infected
- Trees may be weakened by defoliation, resulting in increased amounts of winter injury or death, as well as poor flower bud formation and fruit set in subsequent seasons
- Early defoliation will affect fruit quality
 - Fruit may be light-coloured, less sweet, soft and watery
 - Fruit may ripen unevenly if fruit pedicels are infected

Conditions Favouring Disease Development:

- Damp conditions (rainfall and high humidity) and temperatures between 15 and 20°C will result in the most rapid rate of infection

Management:

- Sanitation and removal or mowing/mulching of fallen leaves can help to reduce the levels of inoculum that overwinters
 - This is not likely practical for any significant scale of operation
- Ensure that orchards have good air circulation, soil drainage and exposure to sunlight
- Prune plants to ensure an open canopy and light penetration
- Apply practices that encourage rapid leaf drying and short periods of leaf wetness
- The application of registered pesticides can help to protect plants from infection or reduce the spread of disease in the crop



Early leaf lesions on Cherry Leaf Spot on the upper leaf surface

Photo by K. Peter on www.extension.psu.edu

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

Search the database for electronic labels

Seasonal Insect Pest Occurrence - Fruit

Pest Name	Host Crops	EGGS	LARVAE	NYMPHS	PUPAE	ADULTS	ALL STAGES
Aphids	Many						Apr to Sept
Apple Curculio	Saskatoon berry, chokecherry, crabapple, hawthorn & pear			June-July		mid-Apr to end-May / mid-July to end-Sept	
Apple Maggot	Apple, crabapple, sweet/tart cherry, etc.	July	mid-July to Sept		Sept (overwinter)	late-June-early-July to end-Oct	
Brown Marmorated Stink Bug	Wide range – over 300 different hosts – berries, grapes, stone & pome fruit	Early June until late July or early August		5 stages – throughout summer		Emerge May to June; stick around throughout season	Single generation per season
		Note – most stages likely occur elsewhere than Alberta, at present – typically arrive as hitchhikers					
Cherry Shoot Borer	Chokecherry, Saskatoon berry, hawthorn	mid-Apr to mid-May	mid-May to end-June			end-May to start-Aug	
Chokecherry Fruit Gall Midge	Chokecherry, Saskatoon berry		mid-May to mid-July		Apr to mid-May	May to end-June	
Currant Fruit Fly	Currants and gooseberries	late-May to early-July	early-June to July		Aug to overwinter	mid-May-early-June to late-June	
Cyclamen Mite	Strawberry						ALL (Mult gen)
Hawthorn Lace Bug	Saskatoon berry & other Rose family plants	May; mid-July to mid-Aug		mid-May to late-June / late-July to mid-Sept		Apr to mid-May / July to mid-Aug / mid-Sept+	
Leafhoppers	chokecherry, Saskatoon berry, raspberry, strawberry			start-June to mid-June		May / mid-June to end-Sept	
McDaniel's Spider Mite	Saskatoon berry						ALL (Mult gen)
Meadow Spittle Bugs	Strawberry, other non-fruit species	April to mid-May		late-May to mid-July		mid-late-June to mid-Aug	
Pear Slug	Saskatoon berry, pin cherry, cotoneaster, hawthorn, chokecherry		late-June to end-Aug		Apr to early-June / mid-Aug to end-Sept	early-June to mid-July	
Raspberry Crown Borer (2-YR LIFECYCLE)	Caneberries	Sept to Oct	Sept to Oct			early-Aug to end-Sept	All stages present in any one year
2ND YEAR			Apr to Sept		July		

Pest Name	Host Crops	EGGS	LARVAE	NYMPHS	PUPAE	ADULTS	ALL STAGES
Raspberry Sawfly	Caneberries, gooseberry, etc.		June to early July (above ground); Late June to end-Sept (in soil)		April		
Root weevils	Strawberry, raspberry, range of other crops		April; Mid-July to end-Sept		May to end-June	late-June to end-Aug	
Saskatoon Bud Moth	Saskatoon berry		early-May to late-Aug		early-mid-April to early May; Sept	April to early-mid-May	
Saskatoon / Chokecherry Sawfly	Saskatoon berry, chokecherry		early-June to early-Aug		April to mid-May	Mid-May to late June	
Slugs	Strawberry + range of hosts	early-May to early-mid-July	mid-May to end-July			late-June to end-Sept	
Spotted Wing Drosophila	Strawberry, caneberry, bushberries (blueberry, Saskatoon berry, etc.)	June to Sept	late-June to Sept		July to Sept	June to Sept (in some areas)	June to Sept
Strawberry Bud/Clipper Weevil	Strawberry; caneberries, other		mid-May to late-June			Apr to late-May / late-June to end-Sept	
Tarnished Plant Bug / Lygus Bug	Strawberry			early-May to late-Aug		May; late-June to end-Sept	
	Raspberry			May to Aug		April to late-May; late-June to end-Sept	
Thrips	Strawberry, caneberry, tree fruit, etc.	Overwinter in USA					mid-May to mid-Aug
Two-Spotted Spider Mites	Strawberry, raspberry, etc.						ALL (Mult gen)
Ugly Nest Caterpillar	Chokecherry, pin cherry, etc.	April	May to Aug			late-June to end-Sept	
Woolly Elm Aphid / Woolly Apple Aphid	Saskatoon berry, elm (alternate host)	April (on elm)				late-Apr to Sept (on Saskatoon); Aug to Sept (migrates to Elm)	May to Sept (some winged migratory stages)

* Note – occurrence timelines are estimates only and can vary according to seasonal conditions and other factors – use a general guideline

** See below for graphic representation of seasonal pest occurrence

*** Adapted and expanded from MAFRI Fruit Crop Insect Guide

Seasonal Insect Pest Occurrence – Vegetable

Pest Name	Host Crops	Eggs	Larvae	Nymphs	Pupae	Adults	All Stages
Aphids	Many vegetable crops					May to Sept - Multiple generations	
Aster Leafhopper	Many vegetable crops	early Spring or other crops in other regions; Multiple generations		Multiple generations per season - late July to end-Sept		Multiple generations - 1st generations late- May to early-June; June-Sept	May have 1-4 generations per season
Beet Webworm	Many vegetable crops	mid-May to July; mid-July to Sept	late-June to early July; late-Aug to Sept (overwinter)		late-May; Sept to overwinter	mid-May to July; mid- July to Sept	
Brown Marmorated Stink Bug	Wide range – over 300 different hosts – peppers, tomatoes, corn, etc.	Early June until late July or early August		5 stages – throughout summer		Emerge May to June; stick around throughout season	Single generation per season
		Note – most stages likely occur elsewhere than Alberta, at present – typically arrive as hitchhikers					
Cabbage Looper	Cole crops + other cruciferous crops	July	mid-July onward		late-July to Aug	June-Sept	One generation per year
Cabbage Maggots	Cole crops + other cruciferous crops	mid-May to June; mid-July to Aug; late-Aug to Sept	June to July; Aug to Sept		mid-July; late Sept overwinter	May to Aug-Sept	1-3 generations per season
Colorado Potato Beetle	Plants in Solanaceous family	late-May to July	early-June to Aug		July to Aug	late-May-early-June to Sept; Overwinter as adult	All season; typically 1 complete generation per season
Crucifer Flea Beetles	Cruciferous crops	mid-May to June	late-May to July			mid-May to June; late-July to overwinter	Typically 1 generation per season
Cutworms	Range of host crops	Aug to mid-Sept	late-Apr to June; late-Sept to overwinter; most overwinter as larvae		May to early June; some overwinter as pupae	June-July (hibernate); late-Aug to Sept	Timing and duration of stages depends on the species
Diamondback moth	Cole crops + other cruciferous crops	mid-May to Sept	mid-May to Sept		June to Sept	early-May to Sept	Multiple generations per season

Pest Name	Host Crops	Eggs	Larvae	Nymphs	Pupae	Adults	All Stages
European Corn Borer	Corn, snap bean, potato, eggplant, pepper	late-July	late-July to overwinter pupation		May to June	late-June to early Aug	1 generation on Prairies
Imported Cabbageworm	Cole crops + other cruciferous crops	late-May to Sept	June to Sept		late-June to Sept; overwinter as pupae elsewhere	mid-May to Sept	2-3 generations per year
Onion Maggots	Bulb vegetables	June to early-July	June to early-Aug		Overwinter; late-July	late-May to June; repeats later in season	May be more than 1 generation per season
Pea Leaf Weevil	Peas	May to June	June to July		July	May to June; late-July to Aug (then overwinter)	1 complete generation per season
Swede Midge	Cole crops	mid-May to Sept	late-May to Sept		June to Sept	mid-May-early-June to Sept (multiple generations)	Multiple generations per season (in some areas)
Tarnished Plant Bug / Lygus Bug	Many vegetable crops	May to July		end-May to Aug		late-Apr to Sept; overwinter	Multiple generations per season
Tuber Flea Beetles	Potatoes	mid-May to June	June to July			mid-May to June; late-July to overwinter	Typically 1 generation per season
Two-Spotted Spider Mites	Bean, cucurbits, eggplant			April to late-Sept		Overwinter to Sept	Multiple generations per season
Wireworms	Range of host crops	May	all season - several years			May	Life cycle spans several years

* Note – occurrence timelines are estimates only and can vary according to seasonal conditions and other factors – use a general guideline

** See below for graphic representation of seasonal pest occurrence

*** Prepared with contributions from Dr. Ken Fry, Olds College

Seasonal Disease Occurrence - Fruit

Pest Name	Host Crops	Causal Organism	Mode of Carryover	Mode of Transfer	Seedlings	Roots	Branches / Canes	Foliage	Flowers	Fruit	Timing	Control	Storage
Entomosporium Leaf & Berry Spot	Saskatoon berry	<i>Entomosporium mespili</i>	Unknown - lesions on infected plant parts; in debris	Spores	-	-	Y - insignif	Y	Y	Y	Foliar infection can occur throughout summer; Fruit infection from flowering to harvest	Protective sprays	N
Mummyberry	Saskatoon berry	<i>Monilinia amelanchiaris</i>	mummified fruit	spores	-	-	-	sometime	Y	Y	May to June (during bloom)	Remove inoculum; protective sprays	N
Saskatoon berry / Juniper Rust	Saskatoon berry (juniper = secondary host)	<i>Gymnosporangium mespili</i>	spore stages on alternate host (juniper)	spores from junipers; spores on saskatoon berry	-	-	-	Y	-	Y	June to August	Apply protective sprays; control on junipers	N
Blackleaf / Witches' Broom	Saskatoon berry	<i>Apiosporina collinsii</i>	Infected plant material (wild, etc)	Spores	-	-	Y	Y	-	indirect -Y	Infection of new growth in spring	Pruning in dormant season	N
Fireblight	All plants within Rosaceae (saskatoon berry, apple, etc.), caneberries	<i>Erwinia amylovora</i>	branch cankers	insects, rain / water splash, Physical transfer (pruning)	-	-	Y	Y	Y	N - indirect	Throughout growing season once active growth commences	Prune out diseased material	N
Botrytis grey mold	Strawberry, raspberry, etc.	<i>Botrytis cinerea</i>	infected plant material; sclerotia; spores	spores	Y	-	Y	Y	Y	Y	Can occur at any point in growing season	Remove debris; Protective sprays	Y
Powdery Mildew	Strawberry, Saskatoon berry, raspberry, black currants	<i>Spaerotheca macularis f.sp fragariae;</i> <i>Podosphaera clandestina;</i>	cleistothecia (sexual spores)	windblown spores	-	-	Y	Y	-	Y	Spring or fall	Ensure air movement; fungicide application	N

Pythium root rots	Strawberry, raspberry, etc.	<i>Pythium spp.</i>	soil borne mycelium, sporangia, oospores	germinating oospores	Y	Y	-	Y - seedlings - indirect	-	-	early season or whenever young plants are present	good drainage; seed treatments	N
Cane Blight	Caneberries	<i>Leptosphaeria coniothyrium</i>	lesions on infected canes	spores	-	-	Y	Y	Y-indirect	N-indirect	mid-late season; depends on environmental conditions	Protective sprays	N
Spur Blight	Caneberries	<i>Didymella applanata</i>	lesions on infected canes	spores	-	-	Y	Y	Y-indirect	N-indirect	mid-late season; depends on environmental conditions	Protective sprays	N
Common Leaf Spot	Strawberry	<i>Mycosporaella fragariae</i>	infected plant material (in field, propagative material)	spores - rain or mechanical transfer	-	-	-	Y	-	Y-black seed	Early season or late summer	Clean plants; adequate air flow; protective sprays	N
Black Knot	<i>Prunus spp.</i>	<i>Apiosporina morbosa</i>	Galls	Spores produced on infected wood	-	-	Y	indirect	-	-	infection occurs in early spring	Pruning in dormant season	N
Brown Rot / Cherry Blossom Blight	<i>Prunus spp.</i>	<i>Monilinia spp.</i>	mummified fruit; infected plant parts	spores disseminated by wind, rain, insects	-	-	Y - twigs	-	Y	Y	During bloom & fruiting stages	Remove inoculum; protective sprays	N
Cytospora canker	Saskatoon berry; other crops (dif spp.)	<i>Cytospora leucostoma</i>	cankers in infected tissues	via wounds	-	-	Y	Y-indirect	-	-	Can occur at any point in growing season	Remove infected tissues	N
Root rots	Raspberry, etc.	<i>Fusarium, Rhizoctonia, etc</i>	soil borne	soil to plant	Y	Y	-	N-indirect	-	-	Depends on the weather	Clean plants; good drainage	N
Black Root Rot	Strawberry	<i>Rhizoctonia, Pythium, etc.</i>	soil borne; infected plant stock	soil to plant	Y	Y	-	N-indirect	-	-	Depends on the weather	Clean plants; good drainage	N
Verticillium Wilt	Strawberry, raspberry, other fruit	<i>Verticillium albo-atrum; V. dahliae</i>	microsclerotia or mycelium on crop debris or in soil	spores or spores in soil	Y	Y	Y - indirect	Y - indirect	-	-	Dependant on weather & crop stage	seed, soil treatment; clean plants	N

Seasonal Disease Occurrence – Vegetables

Pest Name	Host Crops	Causal Organism	Mode of Carryover	Mode of Transfer	Seedlings	Roots	Stems / Branches	Foliage	Flowers	Fruit	Seeds	Tubers	Storage	Timing	Control
Aster Yellows	Wide range	<i>mycoplasma-like organism</i>	Infected host plants	Aster Leafhopper	Y	Y	Y	Y	Y	Y	-	-	N	June to Sept	Control insect vector
Bacterial Soft Rot	Wide range	<i>Erwinia carotovora subsp carotovora or atroseptica</i>	soil borne	via wounds/weak points; in storage, wash water;	N	Y	Y	Y	N	Y	N	Y	Y – spreads	Typically post-harvest	crop rotation; careful post-harvest handling;
Botrytis	Wide range	<i>Botrytis cinerea</i>	spores; mycelium; sclerotia	spores; mycelium	Y	-	-	Y	Y	Y	-	-	Y	any point in the growing season with suitable conditions	Adequate fertilizer; protective sprays; timely harvests
Clubroot	Cruciferous crops	<i>Plasmodiophora brassicae</i>	resting spore in soil	germinating resting spores; transfer of spores in water, soil, etc.	Y	Y	-	indirect - stunting	-	-	-	-	N	any point in summer - typically in early summer	Rigorous sanitation; Long rotations; Avoid contamination
Common Blight	Beans	<i>Xanthomonas campestris pv phaseoli</i>	infected seed; contaminated soil	rain splash; physical contact; insects, etc	-	-	-	Y	-	Y	Y	-	N	any point in summer	Use clean seed; bury residues
Common Scab	Potato, beets, carrots, turnips, rutabaga, radish	<i>Streptomyces scabies</i>	Soil borne; infected seed	soil to tuber (via lenticels)	-	-	-	-	-	-	-	Y	Visible; does not spread or increase	Infection occurs during 5 weeks (flowering onward)	Clean seed; seed treatments; even watering; variety selection
Downy Mildew	Beets, spinach, cole crops, radish, rutabaga/turnip, lettuce, rhubarb, onion, garlic, peas	<i>Peronospora spp. (depends on host crop)</i>	oospores in soil, debris, plant parts	spores - water splash, wind	Y	Y - crown infect	-	Y	-	-	-	-	N	Dependant on weather	Crop rotation; bury debris; protective sprays

Pest Name	Host Crops	Causal Organism	Mode of Carryover	Mode of Transfer	Seedlings	Roots	Stems / Branches	Foliage	Flowers	Fruit	Seeds	Tubers	Storage	Timing	Control
Early Blight	Potato, tomato, pepper, eggplant	<i>Alternaria solani</i>	Soil, crop residues, alternate hosts	spores - soil to tissue transfer; rain splash	-	-	-	Y	-	Y	-	Y	Y - does not spread	mid-late summer	Crop rotation; protective sprays; avoid plant stress
Fusarium dry rot	Potato	<i>Fusarium sambucinum</i> , <i>F. solani</i> , <i>F. coeruleum</i> , <i>F. avenaceum</i>	contaminated soil or infected seed	wounds	-	-	-	-	-	-	-	Y	Y; does not spread	Wounding during harvest or post-harvest	Careful handling during harvest & post-harvest
Halo Blight	Beans	<i>Pseudomonas syringae</i> pv <i>phaseolicola</i>	infected seed; contaminated soil	rain splash; physical contact; insects, etc	-	-	-	Y	-	Y	Y	-	N	any point in summer	Use clean seed; bury residues
Late Blight	Potato, tomato, pepper, eggplant	<i>Phytophthora infestans</i>	On living tissues (tubers, etc)	sporangia; rain splash; on storm fronts	Y	-	-	Y	-	Y	-	Y	Y	any point in summer - depends on point of infection	Monitoring/early detection; protective sprays; clean seed potatoes
Neck rots	Bulb vegetables	<i>Botrytis aclada</i> , <i>B. byssoidea</i> , <i>B. squamosa</i>	Sclerotia in bulbs, debris, cull piles, volunteers, soil	spores via air; wounding at harvest	-	-	-	Y - bulbs	-	-	-	-	Y - increases in severity & as symptomless bulbs develop	mid-late summer to harvest	Reduce inoculum; avoid wounding; cure after harvest
Pink Rot	Potato	<i>Phytophthora erythroseptica</i>	soil borne	infection of stolons, eyes, lenticels; via wounds at harvest	-	-	-	-	-	-	-	Y	Y - spreads in storage	late summer; at harvest	Crop rotation; Cull after harvest; fungicides applied around planting or tuber set
Powdery Mildew	cruciferous crops, peas, lettuce, rhubarb, cucurbits	<i>Erysiphe polygoni</i> ; <i>E. cichoracearum</i>	cleistothecia (sexual spores)	windblown spores	-	-	Y	Y	-	Y	-	-	N	Spring or fall	Good airflow; crop rotation; remove inoculum

Pest Name	Host Crops	Causal Organism	Mode of Carryover	Mode of Transfer	Seedlings	Roots	Stems / Branches	Foliage	Flowers	Fruit	Seeds	Tubers	Storage	Timing	Control
Pythium root rots	Wide range	<i>Pythium spp.</i>	soil borne mycelium, sporangia, oospores	germinating oospores	Y	Y	-	Y - seedling - indirect	-	-	-	-	N	early season or whenever young plants are present	good drainage; seed treatments
Rhizoctonia / Black Scurf	Potato	<i>Rhizoctonia solani</i>	sclerotia in soil or on seed tubers	soil to plant parts	Y	Y	Y	-	-	-	-	Y	Y - visible - doesn't increase or spread	early spring or late season	seed treatments; good growing conditions
Sclerotinia rot	Carrots, lettuce, beans, cole crops, potatoes, peas, cucurbits, solanaceous crops, etc.	<i>Sclerotinia sclerotiorum</i>	sclerotia in soil or on plant debris	spores; germinating sclerotia	Y	Y	Y	Y	-	-	-	-	Y	any point in summer	Remove inoculum; protective sprays; post-harvest management
Slippery Skin	Bulb vegetables	<i>Pseudomonas gladioli pv. allicola</i>	soil borne	rain splash of soil; via wounds	-	-	Y - neck area	Y - bulbs	-	-	-	-	Y - doesn't spread	mid-late summer	careful irrigation; proper post-harvest handling
Silver Scurf	Potato	<i>Helminthosporium solani</i>	in soil or in debris in soil	soil to tuber	-	-	-	-	-	-	-	Y	Y	Before or at harvest	Seed treatments; quick harvest; cold storage
Verticillium Wilt	Potato, tomato, pepper, eggplant, cucurbit crops	<i>Verticillium albo-atrum; V. dahliae</i>	microsclerotia or mycelium on crop debris or in soil	spores or spores in soil	Y	Y	Y - indirect	Y - indirect	-	-	-	-	N	Dependant on weather & crop stage	seed, soil treatment; clean plants

Note – occurrence timelines and disease attack points are estimates only and can vary according to seasonal conditions and many other factors – use a general guideline

