HORT SNACKS

Summer is officially here and with it comes wet spots, dry spots and "interesting" weather. So far, I've heard about a fair bit of wet in a number of areas, but all told, it hasn't been the worst summer I've heard of, so far. Still plenty of time to change that verdict, unfortunately.

Welcome to another edition of Hort Snacks. You'll find a few different things inside, including some tables/charts that outline when you might expect certain pests to be around or what plant parts they can affect. Please recognize that it isn't an all inclusive list and for presentation purposes, you have to generalize the timelines a fair bit. The key is to understand that insect pests have growth cycles and stages (infancy, juvenility, puberty and adulthood) just like humans, although those stages can vary. Diseases also have stages and are heavily influenced by weather and climatic conditions and the crops. Hopefully these will be useful tools for you.

Also contained in this edition are several reminder notes or advertisements for different project initiatives, events/workshops, etc. There are lots of tidbits to get your creative juices flowing and to spark a few new ideas.

I hope to see some of you this summer, but I am also trying to balance a busy office life, with a busy home life and so I may not get everywhere or be able to be "there" all the time. Some places where I will be this summer include the North American Fruit Explorers Conference in Saskatoon (including Haskap Days), the North American Strawberry Growers Summer tour in Halifax (in August) and at the Fruit and Vegetable Field Day in the Olds area (in and around Olds College) in August.

Have a great summer. Keep in touch with updates and issues, challenges and opportunities and any other things that you might like to share.

Rob Spencer, Commercial Horticulture Specialist
Alberta Ag-Info Centre, Alberta Agriculture and Rural Development
310-FARM (3276)

In this edition of Hort Snacks

MENTAL SNACKTIME

"Discipline is based on pride, on meticulous attention to details, and on mutual respect and confidence. Discipline must be a habit so ingrained that it is stronger than the excitement of the goal or the fear of failure." – Gary Ryan Blair

"Success in any endeavor requires single-minded attention to detail and total concentration." – Willie Sutton

"A man's accomplishments in life are the cumulative effect of his attention to detail." – John Foster Dulles

"The difference between something good and something great is attention to detail." – Charles R. Swindoll

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 runnering 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

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)

UPCOMING EVENT

Fruit & Vegetable Field Day#2

A summer field day is being planned for the Olds area on August 21th, 2012.

Olds College will be the main site visited, however additional locations may be visited. The following is the tentative agenda:

Session on Insect & Disease ID (in the lab) - Confirmed
Tour of Fruit Demonstration Orchards – Confirmed

Visit of 1-2 Farm Operations (TBD)

Lunch and refreshments provided.
R.S.V.P. to Alberta Farm Fresh Producers Association (1-800-661-2642) or email info@albertafarmfresh.com

More information & directions are available on www.albertafarmfresh.com

IN THE NEWS / Interesting Articles

Are you applying the proper water volume with your herbicide – OMAFRA article

Scouting for vegetable diseases on your organic farm – eXtension article

Upcoming Conferences / Workshops

July 2012

- Canada's Fruit & Veg Tech X-change
  July 12-14, 2012 – St. Williams, ON
  www.fruitvegtechxchange.com
- "Adapting Crops to Change" + Symposium – "Technology Transfer in the 21st Century" – Joint Meeting of Cdn Society of Agronomy (CSA), Cdn Society for Horticulture Science (CSHS), Cdn Crop Advisers – Prairie Chapter (CCA), Agricultural Institute of Canada (AIC), North American Fruit Explorers (NAFEX)
  July 16-19, 2012 – Tours, Society Meetings, Poster Sessions, etc. – Agriculture Bldg – University of Saskatchewan – Saskatoon, SK
  July 17-18, 2012 – CSA / CSHS Sessions
  July 18-19, 2012 – CSA & Joint NAFEX / CSHS Sessions
  July 19, 2012 – NAFEX Conference
  http://www.usask.ca/saskatoon2012/index.php
  https://sites.google.com/site/nafexsaskatoon2012/home
- Haskap Day (Following NAFEX Conference)
  July 20, 2012 – Horticulture Field Lab – Saskatoon, SK
  www.fruit.usask.ca/extension.html
- Saskatchewan Fruit Growers Association (SFGA) Summer Tour (part of NAFEX Conference)
  July 21, 2012 – Saskatoon area – Saskatoon, SK
  www.saskfruit.com
- Organic Alberta – Organic Field Days
  July 23, 2012 – Veg Farms / July 24, 2012 – Other Organic Farms
  http://organicalberta.org/events/organic-field-days-july-23-24
- Windbreak Renovation & Innovation Conference
  July 24-26, 2012 – International Peace Gardens (Manitoba/North Dakota border)
  http://www.unl.edu/nac/renovation.htm

August 2012

- *96th Potato Association of America (PAA) Conference*
  Aug 12-16, 2012 – Crowne Plaza – Denver International Airport Convention Centre – Denver, Colorado
  http://www.paa2012.colostate.edu/
- *North American Strawberry Growers Association (NASGA) Summer Tour*
  Aug 14-15, 2012 – Halifax, Nova Scotia area
  www.nasga.org
- NAFDMA Advanced Learning Retreat 2012
  Aug 17-20, 2012 – Tanners Orchard – Speer, Illinois
  http://www.nafdma.com/ALR2012/
- *Fruit & Vegetable Field Day #2*
  Aug 21st, 2012 – Olds College & Olds area - Olds, AB
  www.albertafarmfresh.com
- *Farwest Show*
  Aug 23-25, 2012 – Oregon Convention Centre – Portland, OR
  http://www.farwestshow.com/

September 2012

- *2012 Canada's Outdoor Farm Show*
  Sept 11-13, 2012 – Woodstock, ON
  www.outdoorfarmshow.com
- *CanWest Horticulture Show*
  Sept 19-20, 2012 – Vancouver Convention Centre – Vancouver, BC
  www.canwesthortshow.com

***A new fundraising opportunity for schools
***A new business opportunity for local food

DO YOU WANT

- An inexpensive way to advertise your local food business to thousands of Alberta families?
- To let Albertans know where to find your farm fresh products – be it the farm gate, your shop or the farmers' market?
- To let folks know of an event you want them to attend on your farm or business?
- To support schools in their fundraising efforts using local, healthy foods?
- To encourage school kids to eat fresh food, experience Alberta on-farm activities or grow their own fruits and veggies?
- To help school kids and parents learn about food grown and produced right here in Alberta?

If you answered yes, consider Alberta Farm Fresh Producers Association's (AFFPA) new initiative, the Farm Fresh Coupon Book. Here's how it works.

1. Farmers, ranchers, farmers' market vendors, greenhouse growers and agri-tourism operators are invited to participate in this pilot project.

Any member of AFFPA who sells food directly to the public or offers healthy activities can participate by creating a coupon for the upcoming 2012 school year.

To become a member visit AFFPA's website at www.albertafarmfresh.com

Food makers choose the kind and value of the coupons they want to provide. They reap the benefit of increased business while at the same time supporting schools in their fundraising efforts. The best types of coupons are those

that bring in business, not just give products away.

2. In the fall, schools all over Alberta make the coupon book available for fundraising to their students and sale to the public. During this first year only 3,000 books will be sold. The schools keep a portion of the profits for their fundraising efforts and AFFPA keeps the rest to administer the program.

3. Coupons are be redeemed by the public over the course of the year. Results and evaluation will determine how to proceed the following year.

Frequently Asked Questions

Who can be involved in this initiative?

- All AFFPA members

  (membership is $145.00/year) and **Creating a coupon is free**

- Food growers and food producers including farmers, ranchers, dairy, meat, u-picks, farmers' market vendors who are in accord with AFFPA values. No crafts.

- Coupons for food must be **healthy** -- meet the Alberta Nutrition Guidelines for choose most often or choose sometimes. healthy u food checker to see if your product fits

- Agri-tourism operators

- Greenhouse growers

- Vendors can be from anywhere across the province of Alberta and any size

What kinds of coupons are acceptable?

- Any food that fits the nutrition guidelines

- coupons for entrance to on farm activities such as a corn maze or a Halloween bash

- coupons for a special event such as an on farm dinner or for a farm accommodation

- coupons for vegetable starter plants

- coupons can provide a discount such as 10% off orders up to $20.00; 2 for 1 sales; buy one, get a discount off a second; buy one, get something else free; discounted entry for an event; etc – basically anything that makes sense for your business to bring in more clients

To find out more:

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info@albertafarmfresh.com

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

Pear slug larvae foliar feeding damage
Photo by Mountainview Farms

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
Photo by agf.gov.bc.ca

Check your Elm Trees for Dutch Elm Disease 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.stopded.org .

Q&A

Q: Mid-season decision-making – How do you make adjustments "on the fly"?

A: One of the critical steps to making adjustments is to correctly identify and flesh out any particular issue. It is easy to SEE, REACT, and then THINK (I believe the cute phrase is "READY, FIRE, AIM"). Better to pause, clear away any distractions or competing influences and then dig into the issue. It doesn't have to be a lengthy or time-consuming process, but should be focused, with sufficient time devoted to the scope and scale of the issue. – Rob Spencer – (AARD)

A: Another way of dealing with necessary adjustments "on the fly" is through contingency planning, preferably well in advance. While we jokingly have a Plan B or Plan C, the concept is sound. Think out how different things that are subject to change (e.g. harvest dates, etc.) might be different from the desired option and build in a plan that you might implement if/when something happens. – Rob Spencer (AARD)

Next Month's ? → What steps do you take to help your perennial plants to get ready for winter?

Sunscald

Causal Organism: abiotic (physiological)

Crops Affected: range of fruit and vegetable (e.g. beans, eggplants, peppers, tomatoes, onions) crops, ginseng, ornamental (annual, perennial and woody) crops

DISEASE OF THE MONTH

Disease Cycle:

- Not caused by a biotic organism
- Can occur at different points in the season
- Can affect both field grown and greenhouse plants
- All aboveground plant parts can be affected, including leaves, stems, branches, fruit and pods
- Associated with periods of intense, direct sunlight
    - May occur after plants are exposed to high humidity and cloudy conditions
    - May occur in association with high temperatures (may be worse under high temperatures)
    - Intense temperature increases at the soil surface, due to sunlight and hot, dry conditions
- Plants that have a sudden reduction in sheltering foliage (defoliation, pruning, etc) may have fruit that is affected
- Shade loving plants that are exposed to full sunlight will be adversely affected
- Sensitive young plants / seedlings can be affected
- Tissue and cell death occurs at the exposed location (e.g. leaves, fruit shoulders, neck areas)
- Dormant woody ornamental plants (trees/shrubs) with exposed bark or trunk can heat up and experience tissue damage and death
    - May occur on south-facing sides or in areas where there is reflected sunlight (off of buildings or snow)

Symptoms:

- Vary according to crop and plant part affected
- Often on one side of the plant only (exposed side)
- May include leaf spots (small becoming large), which are light brown to white, ranging to russetted or bronzing (discoloured lesions)
- Exposed tissues may become slightly soft, eventually becoming discoloured or bleached
- Exposed fruit may have sunken, light brown to white areas
- Secondary organisms can attack affected areas, causing rots
- Leaf tissues in highly sensitive plants (e.g. ginseng) may burn, wilt , discolour / turn brown and die
- Tender young plants / seedlings of plants such as onions, may appear to wilt and die, starting at the neck area
- Woody ornamental plants may have damaged bark or may fail to leaf out following winter injury

Management:

- Ensure plants are healthy and growing
- Ensure that sensitive plants are protected or sheltered
    - Protect the bark of sensitive woody ornamentals
    - Misting or supplementary shading can be effective in greenhouses
    - Artificial shading may be required for shady loving plants or for plants during sensitive stages
- Ensure that fruit are protected by shading leaves
- Adjust seeding dates so young crops are beyond sensitive stages when high summer temperature conditions occur
- Protect plants from defoliating foliar diseases, insect pests, or other conditions that cause leaf loss
- Select varieties of sensitive, fruit bearing crops that have sufficient, protecting foliage

Pest Management Regulatory Agency (PMRA) – Electronic Label Search Engine
Search the database for electronic labels

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Alberta Ag-Info Centre
310-FARM (3276)
FAX: 403-742-7527

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	
Cherry Shoot Borer	Chokecherry, Saskatoon, 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	
Strawberry Bud/Clipper Weevil	Strawberry; caneberries, other		mid-May to late-June			Apr to late-May / late-June to end-Sept	
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	
Two-Spotted Spider Mites	strawberry, raspberry, etc.						ALL (Mult gen)
Cyclamen Mite	strawberry						ALL (Mult gen)
McDaniel's Spider Mite	saskatoon berry						ALL (Mult gen)
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		
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	
Meadow Spittle Bugs	strawberry, other non-fruit species	April to mid-May		late-May to mid-July		mid-late-June to mid-Aug	
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
Ugly Nest Caterpillar	chokecherry, pin cherry, etc.	April	May to Aug			late-June to end-Sept	
Woolly Elm Aphid / Wooly 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)
Apple Maggot	apple, crabapple, sweet/tart cherry, etc.	July	mid-July to Sept		Sept (overwinter)	late-June-early-July to end-Oct	
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	
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

* 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 - Vegetables

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
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
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
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
Cabbage Looper	cole crops + other cruciferous crops	July	mid-July onward		late-July to Aug	June-Sept	One generation per year
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
Tuber Flea Beetles	potatoes	mid-May to June	June 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
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

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
Wireworms	range of host crops	May	all season - several years			May	Life cycle spans several years
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	
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
Two-Spotted Spider Mites	bean, cucurbits, eggplant			April to late-Sept		Overwinter to Sept	Multiple generations per season

* 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	*Entomosporium mespili*	Unknown - lesions on infected plant parts; in debris	Spores	-	-	Y - insignif	Y	Y	Y	Foliar can occur throughout summer; Fruit infection = flowering to harvest	Protective sprays	N
Mummyberry	saskatoon berry	*Monilinia amelanchiaris*	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)	*Gymnosporangium mespili*	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	*Apiosporina collinsii*	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	*Erwinia amylovora*	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	*Botrytis cinerea*	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	*Spaerotheca macularis f.sp fragariae; Podosphaera clandestina;*	cleistothecia (sexual spores)	windblown spores	-	-	Y	Y	-	Y	Spring or fall	Ensure air movement; fungicide application	N
Pythium root rots	strawberry, raspberry, etc	*Pythium spp.*	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	*Leptosphaeria coniothyrium*	lesions on infected canes	spores	-	-	Y	Y	Y-indirect	N-indirect	mid-late season; depends on environmental conditions	Protective sprays	N
Spur Blight	caneberries	*Didymella applanta*	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	*Mycosporaella fragariae*	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	Prunus spp	*Apiosporina morbosa*	Galls	Spores produced on infected wood	-	-	Y	indirect	-	-	infection occurs in early spring	Pruning in dormant season	N
Brown Rot / Cherry Blossom Blight	Prunus spp	*Monilinia spp.*	mummified fruit; infected plant parts	spores dissem'd 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)	*Cytospora leucostoma*	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	*Fusarium, Rhizoctonia, etc*	soil borne	soil to plant	Y	Y	-	N-indirect	-	-	Depends on the weather	Clean plants; good drainage	N
Black Root Rot	strawberry	*Rhizoctonia, Pythium, etc.*	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	*Verticillium albo-atrum; V. dahliae*	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

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

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
Clubroot	cruciferous crops	*Plasmodiophora brassicae*	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
Aster Yellows	wide range	*mycoplasma-like organism*	Infected host plants	Aster Leafhopper	Y	Y	Y	Y	Y	Y	-	-	N	June to Sept	Control insect vector
Common Blight	beans	*Xanthomonas campestris pv phaseoli*	infected seed; contaminated soil	rain splash; physical contact; insects, etc	-	-	-	Y	-	Y	Y	-	N	any point in summer	Use clean seed; bury residues
Halo Blight	beans	*Pseudomonas syringae pv phaseolicola*	infected seed; contaminated soil	rain splash; physical contact; insects, etc	-	-	-	Y	-	Y	Y	-	N	any point in summer	Use clean seed; bury residues
Early Blight	potato, tomato, pepper, eggplant	*Alternaria solani*	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
Late Blight	potato, tomato, pepper, eggplant	*Phytophthora infestans*	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
Common Scab	potato, beets, carrots, turnips, rutabaga, radish	*Streptomyces scabies*	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
Fusarium dry rot	potato	*Fusarium sambucinum, F. solani, F. coeruleum, F. avenaceum*	contaminated soil or infected seed	wounds	-	-	-	-	-	-	-	Y	Y; does not spread	Wounding during harvest or post-harvest	Careful handling during harvest & post-harvest

Neck rots	bulb vegetables	*Botrytis aclada, B. byssoidea, B. squamosa*	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	*Phytophthora erythroseptica*	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
Rhizoctonia / Black Scurf	Potato	*Rhizoctonia solani*	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
Silver Scurf	potato	*Helminthosporium solani*	in soil or in debris in soil	soil to tuber	-	-	-	-	-	-	-	Y	Y	Before or at harvest	Seed treatments; quick harvest; cold storage
Sclerotinia rot	carrots, lettuce, beans, cole crops, potatoes, peas, cucurbits, solanaceous crops, etc.	*Sclerotinia sclerotiorum*	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
Downy Mildew	beets, spinach, cole crops, radish, rutabaga/turnip, lettuce, rhubarb, onion,	*Perenospora spp. (depends on host crop)*	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

	garlic, peas														
Powdery Mildew	cruciferous crops, peas, lettuce, rhubarb, cucurbits	*Erysiphe polygoni; E. cichoracearum*	cleistothecia (sexual spores)	windblown spores	-	-	Y	Y	-	Y	-	-	N	Spring or fall	Good airflow; crop rotation; remove inoculum
Pythium root rots	wide range	*Pythium spp.*	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
Botrytis	wide range	*Botrytis cinerea*	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
Slippery Skin	bulb vegetables	*Pseudomonas gladioli pv. allicola*	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
Bacterial Soft Rot	wide range	*Erwinia carotovora subsp carotovora or atroseptica*	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;
Verticillium Wilt	potato, tomato, pepper, eggplant, cucurbit crops	*Verticillium albo-atrum; V. dahliae*	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

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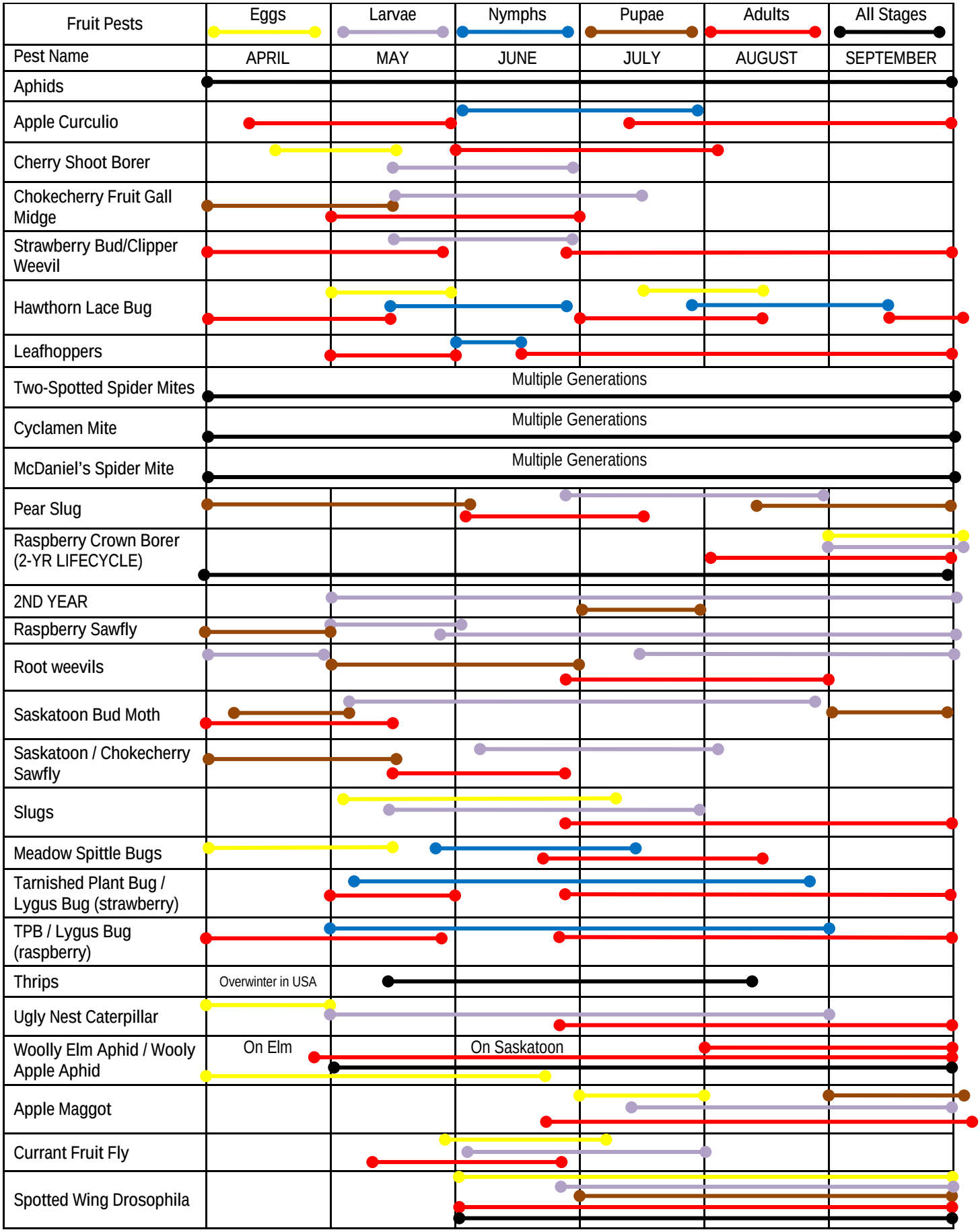

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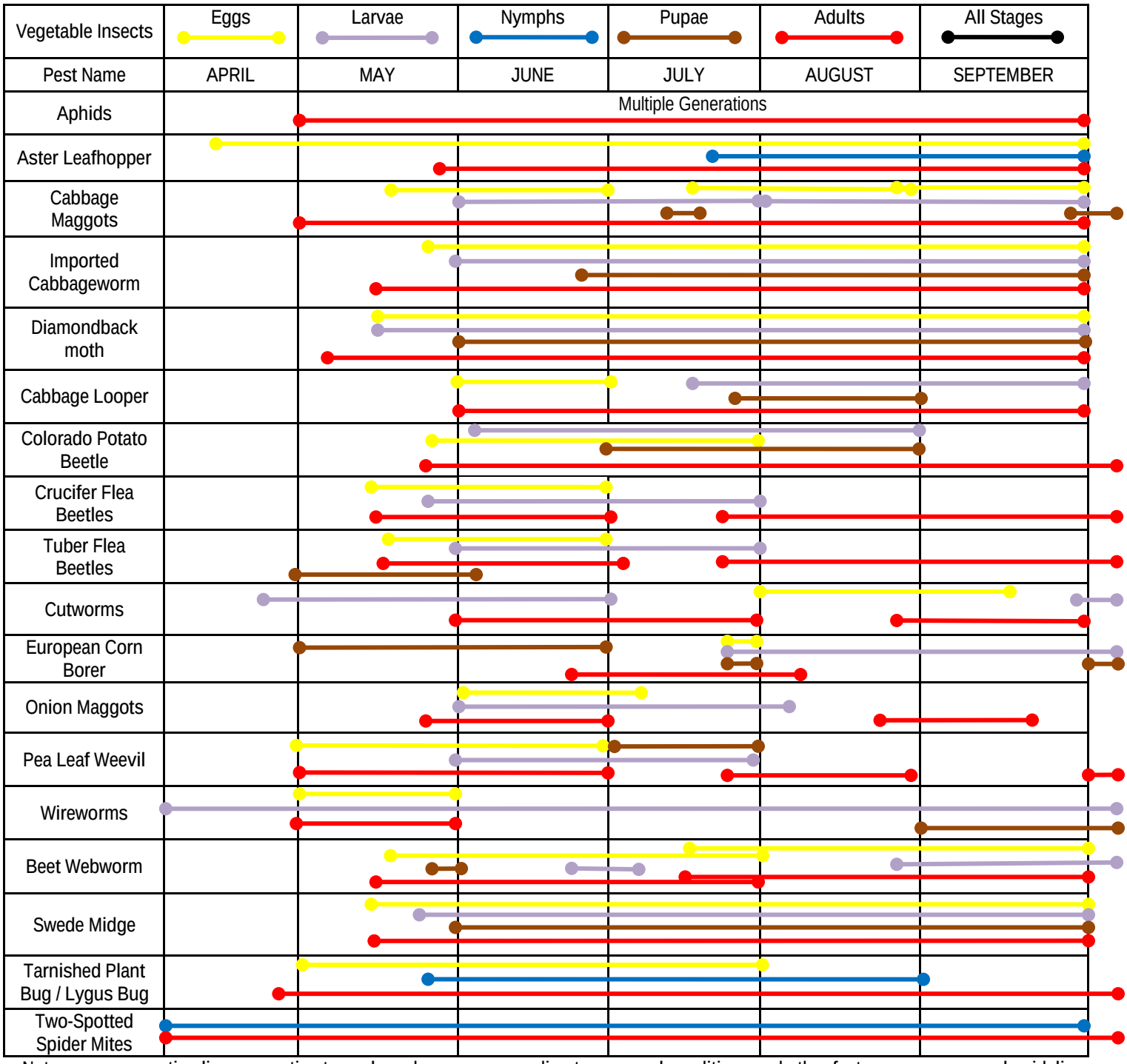

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** Prepared with contributions from Dr. Ken Fry, Olds College