



Silver Creek Nursery's Guide to Common Fruit Tree Diseases, Disorders & Pests

Updated January 2021

For those wondering about some of the diseases, disorders, and pests your trees might be susceptible or resistant to, this guide will help to break down some basic facts about common problems and what you can do about them.

All of the treatments we propose are organic, but they still tend to rely on eliminating pests. For a more natural remedy to many of these issues that helps to deter rather than kill, we would recommend checking out our Holistic Spray recipe. We have found it helps to reduce scab, bacterial leaf spot, fungal diseases, and insect damage.

Diseases

Fruit tree diseases are often caused by fungi or bacteria and can have a wide range of effects. While some diseases only cause minor aesthetic problems, others can kill trees or entire orchard blocks without proper monitoring, prevention, and treatment. It is important to familiarize yourself with common problems so you are prepared to handle them!

Some terms you will come across:

Holistic Spray: based largely off Michael Phillip's recipe, available on our website under 'How To Grow Fruit Trees'. We advise the following as a regular/annual spray schedule:

- 4x in spring (for polyculture orchards, your trees will be breaking bud at different times; just go with a rough average and you'll be fine. You can get into degree days, but for general growing, this will suffice; Mac is a good baseline tree to base your sprays off) :
 1. Green tip/tight cluster; can add extra liquid fish and neem oil if needed
 2. Pink/end of bloom; can add extra liquid fish and neem oil if needed. Add Bt if needed.
 3. 2 weeks later/after petal fall; add Bt if needed
 4. 1 week later; add Bt if needed (unlikely)
- 1x in fall: when the leaves fall

When spraying, remember to spray all areas of the tree, to the point of run-off: leaves, branches, trunk and ground under the dripline of the tree

Bt (Bacillus thuringiensis): *Bacillus thuringiensis*, commonly known as Bt, is a naturally occurring bacteria that is often used as a biological insecticide. It comes in several varieties such as *Bacillus thuringiensis var kurstaki* (Bt-k) which targets caterpillars specifically, an especially useful variety when working with fruit trees. Bt is less harmful when compared to other insecticides since it has no effect on animals and humans, making it relatively safe compared to many other chemical insecticides. It isn't harmful to most beneficial insects but will kill other moth and butterfly species, so ensure you are only spraying when there are pests present. Bt-k is available at most garden centres and box stores such as Home Hardware. Look for Safer's if you are operating on a small scale and DiPel for larger scale orchards. We only use Bt if pest pressures are particularly bad,

Raw Milk or Whey Spray: The idea behind this is that the microbiology of the raw milk colonizes the leaf/tree surface before the 'bad guys' find a place to live. Raw milk is full of beneficial bacteria that also help boost the immune system of the tree, and it's great even as a soil drench. Your local small scale dairy farmer is your friend here (unless you have your own herd!!) We like to let our milk sit for a couple days to get nice and cultured before spraying; when it separates simply give it a good shake to liquefy it. And we just spray when the farmers have a surplus (which they usually do in spring when the spray is most helpful, as the cows get out on pasture and pick up in production - well played, Mother Nature!); this is a lovely bonus for the orchard, but not a necessity.

Copper Sprays: though suitable for organic production, we don't use any copper sprays as they are a general fungicide. However in bigger commercial situations, the occasional application may be quite helpful. Instead we opt for the mentality of keeping everything

alive where possible and try to maintain an ecosystem that has so much life it balances itself, rather than trying to apply sprays so carefully and analytically that we have to control the ecosystem.

Sterilize Pruning Equipment: we use 99% isopropyl alcohol mixed 50% with water in a spray bottle. This way, we can sterilize regularly between trees/cultivars as we are out in the field and orchard.

Disease: Apple Canker

Severity: High, spreads slowly each year and will eventually kill branches or possibly the tree

Caused By: Various fungal species

Affected Tree Species: Primarily apples

Symptoms: Dead and sunken patches of bark, eventually causes death of branch, European Apple Canker produces small bright orange fruiting bodies on the canker in winter

Prevention: Avoid planting in wet or acidic soils where canker is said to be worse. Sterilize pruning equipment between trees and after dealing with infected branches.

Treatments: Remove all infected branches/areas by cutting back until you reach living green tissue, burn all infected material immediately to prevent spores from infecting more trees, optional additional action: spray with Bordeaux or approved copper materials

Notes: Canker comes back every year, on large branches it creates a rounded patch of dead wood with raised bark at the edges and will eventually kill the branch. We have experienced this at the nursery, and simply remove all infected wood and burn immediately. It is most noticeable in spring, so if you notice those tiny bright orange dots on branches in March-April, act quickly!

Disease: Apple and Pear Powdery Mildew

Severity: Low, mostly no side effects but in extreme cases can impact fruit set

Caused By: The fungus *Podosphaera leucotricha*

Affected Tree Species: Apples and pears

Symptoms: White powdery growth on fruit, leaves, and new twigs in apples, black marks on pear fruit, russetting on apple and pear fruit once fungus falls off later in season

Prevention: Prune trees to avoid overcrowding branches

Treatments: Prune and burn infected areas in severe cases, but regular application (4x in spring and 1x in fall) of the Holistic Spray should suffice

Notes: More difficult to detect in pears due to the lack of white growth

Disease: Apple Scab

Severity: Medium, scabby fruit may be unfit for sale and can cause premature leaf drop; can benefit cider apples though, as it concentrates sugar in fruit

Caused By: The fungus *Venturia inaequalis*

Affected Tree Species: Apples

Symptoms: Olive green lesions on younger leaves that turn dark purpley-brown or black over time, lesions on older leaves are dark green or grayish brown and raised, badly infected leaves will curl and drop off the tree, on fruit it starts as a small black spot that grows and turns brown and corky over time (like a scab on our human skin), fruit infected at a young age may crack or become deformed as it grows, small black scabs can form on fruit in storage even if it isn't evident during harvest.

Prevention: Holistic Spray reduces scab, as well as creating a good fungal duff area so infected leaves that drop in the fall are decomposed as opposed to being left so the spores can re-infect the tree in spring. Good pruning will also help by allowing adequate airflow to dry leaf surfaces in spring. Spraying with whey or raw milk is also an excellent preventative method, as the microbiology in the raw milk/whey pre-colonize the leaf surface, preventing scab spores from finding a place to live.

Treatments: Use Holistic Spray on all areas of the tree, 4x in spring to reduce spread. Alternatively apply various organic sprays and fungicides.

Disease: Bacterial Canker

Severity: High, canker spreads over time and can eventually kill branches or tree

Caused By: The bacteria *Pseudomonas syringae*, worse in years with especially cold and wet weather and late spring frosts

Affected Tree Species: Mainly cherries and other stone fruits, sometimes apples and pears

Symptoms: Soft/spongy cankers with a lot of gumming, dead buds, round brown spots or round holes on leaves, small brown lesions on immature fruit

Prevention: Reduce tree stress through proper care, since stressed trees are more likely to be infected; regular use of the Holistic Spray will help you in this regard.

Treatments: Prune small infected branches and remove infected areas, burn all infected material, copper fungicides are somewhat effective

Disease: Bacterial Leaf Spot

Severity: Medium, fruit unfit for sale since spots extend beneath skin and in extreme cases tree can be defoliated

Caused By: The bacteria *Xanthomonas arboricola* pv. *pruni*

Affected Tree Species: Stone fruits

Symptoms: Dark spots on leaves or fruit that sometimes have a yellow border, holes in leaves, twig cankers, cracking and pitting and gumming of fruit, early defoliation in extreme cases

Prevention: Remove gummy or diseased twigs and burn them, avoid spraying when leaves wet

Treatments: No cure but neem oil sprays including our Holistic Spray can help reduce effects, organic sprays and fungicides also help

Disease: Bitter Pit

Severity: Medium to Low, fruit may be unfit for eating in severe cases and can cause heavy fruit losses to susceptible varieties in storage; if fruit is affected, it is still safe to eat but it won't store well.

Caused By: Breakdown of cells due to nutritional imbalance such as excess nitrogen and/or low levels of calcium or boron or fluctuating soil moisture levels

Affected Tree Species: Apples

Symptoms: Small sunken brown areas beneath the skin that are dry and bitter, exterior of the apple is covered with tiny sunken brown dots

Prevention: Do not apply too much nitrogen fertilizer, apply calcium sprays, apply mulch around base of trees to regulate soil moisture

Treatments: None

Notes: This issue primarily occurs when apples are in storage and it can be a serious issue in conventional situations, but for the home orchardist or businesses that can make good use of seconds, Bitter Pit is not generally a big deal.

Disease: Black Knot



The first photo shows the chunky black mature fungus. The second photo shows the more juvenile stage described below.

Severity: High, over time trees will become less vigorous and productive, can eventually die; it's also quite contagious

Caused By: The fungus *Apiosporina morbosa*

Affected Tree Species: *Prunus* trees, mainly plums and cherries

Symptoms: Lumpy hard black growths (galls) on branches, new galls have velvet-like green surface due to spores, which then turn brown, and finally can form large black masses on trunks and branches that are rough and may ooze, in extreme cases tree may appear to lean to one side due to weight of galls on branches.

Prevention: Avoid planting susceptible species if local wild *Prunus sp.* are heavily infected, prune galls off wild *Prunus sp.* if there aren't many. Inspect plants before purchase, apply copper sprays when fungus dormant. Inspect *Prunus sp.* at least 1x month throughout the growing season, looking for the tell tale mis-coloured bark deformity. Once it turns black, the fungus will begin fruiting and spreading, so if you can remove it before it turns all chunky and black, you'll be ahead of the game with regards to it spreading.

Treatments: Prune off young infected branches 3-4 inches below galls and burn them, prune galls off large branches, remove heavily infected trees, spray with neem oil or Holistic Spray to reduce spread

Disease: Black Rot

Severity: High, cannot sell infected fruit, infection can kill limbs and trees

Caused By: The fungus *Botryosphaeria obtusa*

Affected Tree Species: Apples

Symptoms: Tiny purple spots on leaves that expand over time and middle turns brown, in extreme cases leaves drop off tree, forms reddish/pinkish-brown cankers on limbs that grow over time, limbs eventually turn black and bark cracks and peels until limb breaks or dies, fruit develops tiny red spots that turn into purple pimples and eventually a sunken black patch with a red border, this patch turns into brown rot sometimes centered around the calyx

Prevention: Prune to keep canopy open for sunlight and airflow. Spraying with whey or raw milk is also a good preventative method, as the microbiology in the raw milk/whey pre-colonize the tree surface, preventing fungal spores from finding a place to live.

Treatments: Remove and burn infected areas, small limbs, and fruit

Notes: We've seen signs of this in our orchard occasionally, but it's never been a serious issue; while it's listed as 'High' severity, it will vary from site to site; it may also be in part thanks to the years of using the Holistic Spray.

Disease: Brown Rot

Severity: Medium, fruit cannot be sold or eaten

Caused By: The fungi *Monilinia laxa* and *Monilinia fructigena*

Affected Tree Species: Apples, pears, and stone fruits

Symptoms: Brown rotting fruit usually starting in mid-summer, can also cause blossoms to wilt and fruit spurs to turn brown and shrivel up

Prevention: Reducing pressures from insect pests and birds since the fungus spreads more easily through wounds inflicted by feeding damage, scab can increase likelihood of brown rot so treat scab to reduce risk, prune trees so they are open to fresh air and sunlight, as with all fungal diseases, spraying with whey or raw milk is also an excellent preventative method, as the microbiology in the raw milk/whey pre-colonize the tree surface, preventing fungal spores from finding a place to live. The neem oil in the Holistic Spray would also help coat insect/bird wounds, as well as boost the tree's immune system.

Treatments: Prune and dispose of infected blossoms and spurs, remove and burn or bury infected fruit

Disease: Calyx End Rot and Dry End Rot

Severity: Medium, fruit cannot be eaten or sold

Caused By: The fungi *Sclerotinia sclerotiorum* (Calyx End Rot) and *Botrytis cinerea* (Dry End Rot)

Affected Tree Species: Apples

Symptoms: Reddish discolouration on the calyx that turns into lesions and eventually turns to rot, rot dries and becomes corky, Calyx End Rot forms on one side of the calyx while Dry End Rot is centered around the calyx

Prevention: Effective weeding out of infected fruit to reduce fungus population, mow vegetation and keep area relatively dry leading up to petal fall. Apply Holistic Spray and/or milk/whey.

Treatments: Remove infected fruit

Disease: Cedar Apple Rust



Ken snapped this photo a few years ago off site; rust and scab look similar at the beginning, but become very distinctly different.

Severity: Medium, fruit cannot be sold and can cause crop loss and defoliation in extreme cases

Caused By: The fungus *Gymnosporangium juniperi-virginianae*

Affected Tree Species: Apples

Symptoms: Young leaves and fruit (usually less than 3-4 weeks old) develop small yellow spots, eventually a dark spot appears in the middle of the yellow spots which fade to an orange colour as the lesions grow, in extreme cases can cause defoliation and crop loss

Prevention: Check nearby areas for Red Cedar or Juniper trees and remove fungal bodies on these hosts, plant resistant fruit varieties.

Treatments: Organic fungicides

Notes: Red cedar is the alternate host for *G. juniperi-virginianae* so Cedar Apple Rust is predominant in areas where they grow in the wild, ornamental juniper trees can also act as hosts. While we do have cedars on the farm within the vicinity of the test orchard, we haven't (knock on wood) had a serious problem with CAR past some spotty leaves; perhaps a testament to the Holistic Spray.

Disease: Collar Rot, Crown Rot, and Root Rot



This photo was taken of some test trees on Emla 26 rootstock, which Steph planted in her flowerbed at home; little did she know, the previous owners had put styrofoam about 8" under the soil to prevent weeds. This caused water drainage problems; luckily she managed to graft the special varieties on top so no all was lost - a frustrating lesson though!

Severity: High, can structurally weaken or kill tree

Caused By: Several species of oomycetes in the genus *Phytophthora*

Affected Tree Species: Virtually all fruit trees

Symptoms: Poor growth (trees will have small leaves, twigs, and/or fruit); reddish leaves in late summer; yellow chlorotic leaves; waterlogged cankers just above the graft union; purplish cankers near the base of the tree; reddish-brown cankers on the roots, crown (where the roots meet the tree), or base of the tree

Prevention: Plant in well-drained soils, pick rootstock that are resistant to Rot, don't let soil or mulch heap up around the trunk, avoid excessive irrigation to reduce soil moisture

Treatments: Scrape soil away from base of trunk and gently scrape away infected areas on tree, let dry

Notes: Your grafted fruit tree variety is not growing on its own roots so even if the variety itself is susceptible to Crown or Root Rot it is fine as long as the rootstock isn't susceptible.

Disease: Fireblight



This photo is courtesy of a customer who had to deal with it; areas where there is a lot of fruit production tend to have the most risk, as there is a high concentration of blossoms in one area for the bacteria to spread. This is an especially big problem in high density, monoculture orchard blocks. We are lucky here at the nursery that comparably we don't have as many blossoms since we grow mainly little trees rather than mature, fruiting trees.

Severity: Very High, can infect and kill entire orchard blocks

Caused By: The bacteria *Erwinia amylovora*

Affected Tree Species: Apples, pears, cherries, plums

Symptoms: Brown wilted blossoms, black wilted branches (look burnt) spreading from the outside of the tree spreading inwards. You will notice this in June typically; as it progresses, sunken discoloured areas on mature trees, splitting and cracking bark, watery ooze, cankers on trunk where bacteria overwinters.

Prevention: Sterilize tools when moving from tree to tree, control populations of sucking insects like aphids that spread the disease, plant resistant varieties. Routinely check trees during and after blossom time; the bacteria enters the tree during blossom time, and if you can catch it early, it's that much easier to control.

Treatments: Prune and burn infected areas and cankers immediately, apply copper spray or other organic sprays

Notes: So far (knock on wood!) we have not had to deal with Fireblight; we are hopeful that with regular applications of the Holistic Spray we will have continued luck in this area.

Disease: Flyspeck

Severity: Low, fruit cannot be sold but is still edible if peeled

Caused By: The fungus *Schizothyrium pomi*

Affected Tree Species: Apples

Symptoms: Cluster(s) of tiny black dots on apple skin

Prevention: Pruning trees to keep canopy open to sunlight and airflow, applying Holistic Spray

Treatments: None

Disease: Peach Leaf Curl

Severity: Medium, in extreme cases can kill shoots and reduce fruit production

Caused By: The fungus *Taphrina deformans*

Affected Tree Species: Peaches

Symptoms: New leaves curl and turn reddish, the red areas thicken and pucker before turning a yellow-ish grey and developing a velvet-like layer of spores, affected leaves may drop, in severe cases shoots may also thicken and die

Prevention: Keep tree happy and healthy, apply sprays before buds develop, apply beneficial microbes at end of season to decompose leaves to prevent next year's infection

Treatments: Apply copper sulphur fungicides in fall

Notes: We no longer spray copper to prevent this; we are planting some of our peach trees, but so far Veteran and Redhaven have regularly produced with no additional care than the regular Holistic Spray applications. They do show some signs of PLC, but it doesn't affect their production.

Disease: Pear Scab

Severity: Medium, infected fruit cannot be sold, but can be used as seconds or in perry

Caused By: The fungus *Venturia pirina*

Affected Tree Species: Pears

Symptoms: Similar to Apple Scab with olive green to black spots on fruit, deforms young fruit and can appear as small black spots on fruit in storage even if none evident during harvest, lesions on underside of leaf, small oval blisters on shoots

Prevention: Holistic Spray reduces scab, use same preventative measures as Apple Scab.

Treatments: In bad years use Holistic Spray on all areas of the tree to reduce spread. Alternatively apply various organic sprays and fungicides.

Disease: Quince Rust

Severity: Medium, infected fruit cannot be eaten or sold

Caused By: The fungus *Gymnosporangium clavipes*

Affected Tree Species: Apples, pears, and quince

Symptoms: Infects young fruit less than two weeks old and causes the area around the calyx to become distorted and turn greenish-brown, infected fruit tissue eventually turns spongy and brown

Prevention: Check nearby areas for Red Cedar or Juniper trees and remove fungal bodies on these hosts, plant resistant fruit varieties

Treatments: Organic fungicides

Notes: See Cedar Apple Rust for more information, as the prevention and treatment are virtually the same. Red cedar is the alternate host for *G. clavipes* so Quince Rust is predominant in areas where they grow in the wild, common and ornamental juniper trees can also act as hosts

Disease: Sooty Blotch



This Butirra Precoce Morettini has some mild sooty blotch (see the sooty blotches on the skin); it didn't stop Steph from enjoying its succulent flavour fresh off the tree though!

Severity: Low, fruit cannot be sold but is still edible

Caused By: Several species of fungi

Affected Tree Species: Apples

Symptoms: Cloudy spots that are olive green to grey on the surface of the apple, can spread to form larger irregular patches

Prevention: Prune trees to keep canopies open for sunlight and airflow, thin fruit that grows in clusters, spray Holistic Spray and milk/whey if available.

Treatments: None

Disease: Stone Fruit Powdery Mildew

Severity: Medium, infected fruit cannot be sold

Caused By: The fungi *Podosphaera clandestina* and *Sphaerotheca pannosa*

Affected Tree Species: Stone fruits

Symptoms: Patches of felt-like white powdery growth, fruiting bodies may appear as black specks on leaves, heavily infected leaves may pucker or become deformed, fruit may

develop white powdery patches, cherries may develop circular depressions on surface of fruit and on peaches patches of mildew eventually fade to a tan colour

Prevention: Prune trees to allow sunlight and airflow through canopy, apply Holistic Spray regularly and milk/whey as available.

Treatments: Remove and burn infected leaves, shoots, and fruit

Disease: Stone Fruit Scab

Severity: Medium, infected fruit cannot be eaten or sold

Caused By: The fungus *Venturia carpophila*

Affected Tree Species: Stone fruits

Symptoms: Small dark spots on fruit that can merge and form large brown lesions, on apricots lesions are pale green and flat, on peaches lesions are flat circular black spots, in extreme cases fruit may crack or drop prematurely, on underside of leaves forms sooty or olive green blotches or dark lesions down center, brown lesions on twigs with raised edges

Prevention: Remove and burn infected shoots, apply Holistic Spray regularly, as with all fungal issues, milk/whey can be helpful, and it's good practice to make sure the leaves are fully decomposed before spring to prevent re-inoculation.

Treatments: Apply organic fungicides, apply Holistic Spray to reduce spread

Disease: Stony Pit

Severity: Medium, fruit may have to be sold as seconds and isn't as pleasant to eat, can stunt tree growth

Caused By: Unknown virus

Affected Tree Species: Pears, especially Bosc

Symptoms: Deep conical pits with fused cells at the bottom that form stone-like masses, fruit shape may be severely deformed and develop an unpleasant gritty texture, scabby spots may appear on bark and leaves may develop some mottling, stunted growth

Prevention: Plant resistant varieties and only virus-free trees

Treatments: None

Disease: Verticillium Wilt

Severity: High, causes branch dieback and can kill tree in some cases

Caused By: The fungus *Verticillium dahliae*

Affected Tree Species: Stone fruits

Symptoms: Yellowing and wilting of young trees, on older trees up to 30-50% branches dying often on one side of tree, vascular tissue often develops brown discolouration or streaks that can resemble brown bullseye when branch cut straight across, tree may die

Prevention: Do not plant with other susceptible fruit and vegetable crops, avoid applying excess nitrogen fertilizer and overwatering, and as with all fungal issues, apply the Holistic Spray and raw milk/whey if available to boost the tree's immune system.

Treatments: Prune infected material

Disease: Watercore

Severity: Low, fruit cannot be sold but can still be eaten or used in cider

Caused By: Accumulation of sorbitol-rich liquid between cells on the inside of the apple

Affected Tree Species: Apples

Symptoms: Translucent spots or single large translucent patch near or around apple core, in severe cases patches can reach outer skin

Prevention: Pick fruit as early as possible to reduce risk of watercore developing, ensure apples have enough calcium and do not apply excessive amounts of nitrogen fertilizer

Treatments: None, dissipates somewhat in storage but fruit also softens and goes bad faster

Notes: Apples with watercore can add sweetness to cider blends

Pests

Pests are animals, often arthropods like insects and mites, that feed on fruit trees. They can target any part of the tree from the fruit, to the leaves, to the wood itself. Although they are less likely to kill trees than many diseases, they can still reduce tree vigour and impact the quality of your fruit. It is important to familiarize yourself with who may be visiting your orchard and how to handle unwanted guests.

General management tip applicable for all pests: develop a polyculture! Biodiversity will ease your struggles here: find or create habitat for all the birds and bugs you can think of! Parasitic wasps and swallows will assist in lowering caterpillar populations, ladybugs will eat your aphids, etc. As soon as one population becomes too dense (for example planting a 5 acre block of Honeycrisp apples), Mother Nature will do her level best to break things up. It would be prudent to learn from this.

At this point, the only practices we do for controlling pests is to add BT to our 3rd and 4th spring Holistic spray, and to use neem or dormant oil to prevent pear blister mites as needed based on

seasonal pressures. For those more concerned with fruit production, traps and kaolin clay applications would be advisable.

Species: Apple Maggot (*Rhagoletis pomonella*), aka Railroad Worm

Severity: Medium, can cause premature fruit drop and introduce fungal diseases

Affected Tree Species: Apples

Identification: Larvae reach 6.5-8mm in length with thick whitish bodies; pupae are 4.5mm long, yellowish and oval in shape, can be found buried 2-5cm underground around base of tree; adult flies are 5-6mm long with block bodies and a white dot in the middle of their back, wings have distinctive black bands

Period of Activity: Adults are active from July to end of harvest and maggot activity is worst in August

Symptoms: Small pinprick on fruit surface where female laid eggs, area darkens over time and may become pitted

Prevention: Hang yellow sticky cards for immature adults and red sticky ball traps for mature adults, apply kaolin clay sprays to prevent egg laying

Treatments: Beneficial nematodes, botanical insecticides, discarding dropped fruit while maggots still inside

Species: Codling Moth (*Cydia pomonella*)



Gastly little codling moth larvae trying to eat the Toka plum before Steph! An unfortunate surprise!

Severity: Medium, badly damaged fruit cannot be sold and may drop prematurely, can impact 50-90% of crop

Affected Tree Species: Apples and pears

Identification: Larvae reach up to 1-2cm, young larvae are pale white with black heads and older larvae are pinkish with brown or black heads; adult moths are narrow and ~1cm in length with brown wings banded with gray and white

Period of Activity: Larvae feed from July to end of harvest, there are two generations in this time

Symptoms: Small 'stings' where larvae enter fruit, exit holes blocked with reddish-brown frass often on side or bottom of fruit, premature fruit drop

Prevention: Pheromone traps to disrupt mating, in early spring scrape away loose bark to remove pupae and apply horticultural oil

Treatments: Biological controls such as ground beetles and parasitoid wasps, kaolin clay sprays, plant-based insecticides, Bt sprays, increasing bird population

Notes: Closely resemble Oriental Fruit Moth but Codling Moth larvae lack anal combs (need hand lens or microscope to see this) and adult moths have bands on wings

Species: Gypsy Moth (*Lymantria dispar*)



Some teenage gypsy moths that evaded the Bt, sunning themselves on our Toka plum

Severity: Medium, can defoliate trees in bad years but fruit trees are not primary food source

Affected Tree Species: virtually all fruit trees

Identification: Egg masses are 2-3cm long and covered in silky hair, often tan fading to whitish due to sun exposure; larvae reach up to 6-7 cm long, gray or black with long hairs, have five pairs of blue dots and six pairs of red dots along back; adult moths are white with black spots

Period of Activity: Larvae hatch and feed in spring, adults active until July

Symptoms: Holes in leaves from caterpillars feeding

Prevention: Search for and remove egg masses by scraping them in a container and disposing of with a solution of alcohol/bleach/something strong that will kill the eggs; eggs are laid in June/July and hatch the following April

Treatments: Spray with Bt in spring at first signs of damage/sighting; wait ~5 days and reapply if needed, or apply sticky barrier bands around trees, apply burlap hides (1 ft wide strips of burlap tied to tree and folded down) to catch caterpillars on a daily basis

Notes: Highly invasive species, remove if possible

Species: Japanese Beetle (*Popillia japonica*)



Severity: Medium, can cause defoliation and damage young apple and peach fruits

Affected Tree Species: All fruit trees we carry

Identification: Larvae are crescent-shaped and white, reach up to 2cm long; adults are ~1cm long, metallic green with copper wings, white spots along sides towards back of body

Period of Activity: Emerge in June or July and are active for about six weeks

Symptoms: Skeletonized leaves from adults feeding on softer leaf tissue

Prevention: Lawn aerator sandals can kill grubs

Treatments: Organic sprays and botanical pesticides, kaolin clay sprays, pheromone traps, apply Holistic Spray

Notes: Highly invasive, remove if possible

Species: Leafrollers (various moths in the family Tortricidae), specifically Obliquebanded Leafroller (*Choristoneura roseceana*)

Severity: Medium, can cause some defoliation, damaged fruit may drop early or be unsellable

Affected Tree Species: Primarily apples, pears, and sour cherries but can impact other stone fruits

Identification: Larvae often green with dark heads and tend to be wriggly when disturbed, have a translucent appearance; adult Obliquebanded Leafroller is 1.5-3cm long and brown with dark patches on wings, wide and shield-shaped

Period of Activity: As soon as green tissue present to end of harvest, some may have two generations per year

Symptoms: Feeding damage on leaves, leaves rolled and held shut by silk created by larvae, large indentations in fruit with corky scarring, second generation of Obliquebanded Leafroller feeds on fruit surface and may attach leaf to it with silk which causes pale discoloration where leaf and fruit in contact, fruit may drop prematurely

Prevention: Remove egg masses manually, prune to help remove egg masses and open up tree to make sprays more effective

Treatments: Release biological controls like lacewing eggs and *Trichogramma* wasps, apply Bt sprays

Species: Oriental Fruit Moth (*Grapholita molesta*)

Severity: High, feeds on and kills new shoots, badly damaged fruit cannot be sold

Affected Tree Species: All fruit trees we grow but mainly stone fruits

Identification: Larvae reach ~1cm in length, when young are white with a black head and when older are reddish-pink with a brown head, have anal combs; adults 6-7mm long, narrow and brown with silvery scales which give them a patchy bark-like look, underside of forewing lighter in colour

Period of Activity: End of tight cluster to end of harvest, there are 3-4 generations per year

Symptoms: First generation targets shoots which causes wilting or 'flagging' and browning as shoots die although this is less severe in apples, when feeding on shoots there is often a small entry hole with frass, larvae also feed on fruit which may drop and/or have obvious entry holes with gumming, often enter fruit near calyx or stem so entry holes hard to spot

Prevention: Spray horticultural oils during dormant season, remove loose bark where larvae like to pupate

Treatments: Spray Bt when larvae first hatching, prune and burn infected areas

Notes: Closely resemble Codling Moth but Oriental Fruit Moth larvae have anal combs (can only be seen with microscopes or hand lenses) and adults do not have white/gray banding on wings

Species: Pear Blister Mite (*Eriophyes pyri*)



Severity: Medium, can impair photosynthesis which reduces tree vigour and deform fruit

Affected Tree Species: Pears

Identification: Mites too small to see without a microscope, see Symptoms

Period of Activity: Green tip to mid-summer

Symptoms: 3mm wide green blisters on underside of leaf that eventually turn red then brown, if blisters mass together they can inhibit photosynthesis, feeding on fruit causes sunken russeted spots with a clear border that can deform fruit

Prevention: After growing season and before first frost remove and burn all leaves, in March coat bark/tree with 3% dormant mineral oil or neem oil and water mix when temperature is above freezing and there won't be rain for at least 1-2 days

Treatments: Remove and burn infected leaves

Species: Plum curculio (*Conotrachelus nenuphar*)

Severity: Medium, damaged fruit cannot be sold, fruit may drop early

Affected Tree Species: All fruit trees we grow

Identification: Larvae can reach 6-9mm in length and are whitish with a brown head, live inside fruit; adult weevils reach 4-6mm long, dark brown with grey or white patches on their back, beak-like snout, four distinct bumps on back

Period of Activity: Generally spring into summer, varies somewhat by fruit type

Symptoms: Crescent-shaped oviposition or feeding scars on fruit (often brownish) which you can see easily once the fruit is the size of a marble or smaller, clean exit holes in fruit when larva has matured and emerged

Prevention: Apply kaolin clay spray before petal fall, creating tower traps near trees with lures to catch adults

Treatments: Organic insecticides like Entrust, beneficial nematodes, place carpets under trees to catch dropped fruit and prevent larvae from pupating in soil, keep animals like chickens or piglets beneath trees to eat dropped fruit

Species: Round-Headed Apple Tree Borer (*Saperda candida*)



This appears to be the slit made by a borer, though we have found no trace of it and it was in a plum tree, nor any spreading in our orchard... hopefully a songbird found it and had a nice snack!

Severity: High, larvae can kill young trees

Affected Tree Species: Apples

Identification: Larvae reach up to 2.5cm long with yellowish-white bodies and brown heads; adult beetles are 2cm long, thin, olive green with two large white stripes running from head to rear

Period of Activity: Early May to September

Symptoms: Sawdust beneath entry hole where larva is boring into tree, blackened and sometimes sunken bark

Prevention: Brushing white latex paint onto trunk deters egg laying

Treatments: Monitor tree for signs of damage and manually remove larvae by digging into tree with wire or drill bit

Species: Woolly Apple Aphid

Severity: Low, mainly lowers fruit quality and form galls but can spread diseases like canker

Affected Tree Species: Apples

Identification: ~1mm long, reddish-brown or purple often with white waxy coating that gives them a 'woolly' look, may have wings

Period of Activity: From the end of tight cluster to mid-summer

Symptoms: Cotton-like/waxy white coating near pruning cuts, limbs, trunk, base of young shoots, and around roots; knots and galls caused by feeding; aphids release a sticky substance called honeydew that can cause russetting on fruit and may encourage growth of sooty fungus

Prevention: Remove suckers at base of trunk and on major scaffolding limbs which are preferred sites for feeding, apply pruning paint to large pruning cuts, maintain flowers nearby to encourage presence of natural predators

Treatments: Prune heavily infected areas

Notes: Woolly Apple Aphid itself doesn't do too much harm but it can leave the tree more vulnerable to winter damage and spread diseases like canker

Please note that the above lists are based on common diseases and pests in Ontario, along with what we have seen in our own orchard. This is not a comprehensive list so feel free to let us know if there is anything you feel should be added.

Other Notes of Interest:

Below are a few photos of other occurrences in the orchard. Our list is by no means exhaustive. If you have photos, send them in and we can try to figure out what's going on!

OMAFRA also has a good website too, for troubleshooting:

<http://www.omafra.gov.on.ca/IPM/english/tender/index.html>



Above is a nutrient deficient Yarlington Mill in its first year in the nursery. This is due to the fact our soil is a touch high on the pH scale (which we are working towards lowering); interestingly, this doesn't appear to affect the growth of the trees and mid-summer once things get nice and dry, the soil actually lowers in pH and the symptoms go away. When you have leaves that are discolouring like this, with no insect damage, it's good to look up what nutrient deficiencies they might be a sign of. Often it's a sign that the biology is off in the soil for that plant. Remember, simply adding more of whatever nutrient is lacking is not always the answer; soil is very complicated!



Heat stress often looks like this. If your plant appears otherwise healthy and happy and it's July/Aug, chances are the brown at the edges are just heat stress, rather like a sunburn. Notice it's

not particularly trailing up the veins of the leaf, it's just on the tip and doesn't appear to be spreading.



These pics were sent by a customer, and they are testament to a) letting trees grow at their own rate, and b) giving them room to grow. The first picture shows severe girdling where it was strapped to the stake. Always give a plant room to grow - trees are like humans in more ways than one! The next two photos show what happens when you feed a tree too much nitrogen and ask it to bear fruit too soon: the branches simply cannot handle the weight and rip in this ghastly manner. If you follow nature's lead and be patient, you will be rewarded! In this event, prune out the wounds and let the tree grow fresh.

Other Less Common Diseases and Pest Issues

Disease: Blister Spot

Severity: Low, fruit cannot be sold but is usually still edible

Caused By: The fungus *Pseudomonas syringae*

Affected Tree Species: Apples

Symptoms: Small raised blisters on fruit surface often near calyx, eventually grow into 4-5mm wide blisters that are brown with purplish-black margin, leaves on tender shoots may develop midvein necrosis and crusty brown lesions may form on underside of leaves and cause them to curl

Prevention: Don't plant susceptible varieties

Treatments: None

Notes: Cannot be eradicated once it enters an orchard. This has never been an issue for us in our nursery/orchards.

Disease: Moldy Core

Severity: Low

Caused By: Several species of fungi

Affected Tree Species: Apples

Symptoms: Brownish yellow mold in apple core and whitish mold on seeds, fruit may drop prematurely, can cause rot in long-term storage

Prevention: Pruning trees to allow for sunlight and airflow in canopy

Treatments: None

Disease: Silver Leaf

Severity: High, over time can kill limbs and entire trees

Caused By: The fungus *Chondrostereum purpureum*

Affected Tree Species: Apples, pears, and stone fruits

Symptoms: Leaves turning paler or silvery, often starts on a couple branches but can spread to whole tree, heartwood is often stained brown in autumn

Prevention: Do not prune when it is raining or going to rain soon since open cuts are susceptible to Silver Leaf spores, keep trees happy and healthy, plant trees in well-drained areas

Treatments: None

Notes: Silver Leaf can eventually kill the tree although some trees recover with no issues.

We have not had this issue in our

Disease: X-Disease

Severity: High, can kill trees or leave them vulnerable to being killed by other stressors

Caused By: Phytoplasma

Affected Tree Species: Peaches, cherries, and Japanese plums

Symptoms: Cherry leaves may be small and pale possibly with a reddish tinge, peach leaves develop yellowish spots and necrotic areas that leave the leaves looking tattered, fruit is small and pale often with a bitter taste, over time trees decline in vigour and can be killed by other stressors like cold winters, sour cherries more likely to be killed by X-Disease directly

Prevention: Avoid grafting with infected material, do not plant peaches near wild chokecherries which are often vectors for X-Disease

Treatments: Remove infected trees, prioritize removal of infected cherry trees which can spread the disease through insect vectors while infected peach trees cannot spread the disease

Species: Dogwood Borer and Apple Clearwing moths (*Synanthedon* sp.)

Severity: High, trees experience decline in vigour and productivity

Affected Tree Species: Apples

Identification: Larvae reach 1.5cm in length and have whitish bodies and reddish-brown heads;

thin black moths 1-2.5cm in length with yellow or orange banding, clear wings with black margins, resemble wasps

Period of Activity: Adults are active from June to September for Dogwood Borer and May to July for Apple Clearwing, larvae overwinter inside trees and emerge the following year

Symptoms: 2-3mm hole in trunk near base of tree with reddish frass, bark falling off, crown dieback, decline in tree health and productivity, discolouration beneath bark where larvae fed

Prevention: Use mesh tree guards instead of solid ones to reduce hiding spots for moths, apply white latex paint or kaolin clay to trunk to deter egg laying

Treatments: Manually remove larvae with a wire, remove and burn badly infected trees

Notes: Dogwood Borer is far more widespread in Ontario than Apple Clearwing, though we have not experienced it in our orchards.