



Home & Garden Pest Management Guide For British Columbia

2019 Edition

Chapter 16 Pests of Ornamentals



Pests of Ornamentals

This chapter describes insect and disease problems of ornamental plants. The first section describes pests that affect many different ornamentals, followed by pests of specific ornamentals. Management information describes preventative and cultural measures that may control pests. Try these first. Sometimes the management information also mentions pesticides. When more than one pesticide is mentioned, the least toxic pesticide is listed first. Before using a pesticide read and follow label directions. See the “Pesticide Table” in Appendix I for information on available home garden pesticides. Also read Chapter 8 "Using Pesticides to Manage Pests". It contains important safety information.

Proper identification of plant pests and diseases is an important step before attempting to control the pests. Not all plant problems are caused by pests; some are caused by cultural, nutritional or environmental conditions. See Chapter 2 for information on how to get help identifying plant problems.

Pests Affecting Many Ornamental Plants

Insects

Aphids

Aphids attack a wide range of ornamental plants, causing leaves to curl and twist. Look for small, soft-bodied, sap-sucking insects that vary in colour from pinkish-white to green and black. These insects will be found in clusters or colonies on stems and the underside of leaves. Secretions of sticky ‘honeydew’ often appear on lower leaves. Cars parked below infested trees can become coated with this honeydew. Aphid honeydew also provides a food source for fungi, which appear as a black, sooty mould on leaves.

Management:

Aphids are best controlled when colonies are small and before leaves start to curl. They can often be removed by hosing down the plant with water. Aphids will usually be controlled by natural enemies, such as ladybugs and parasites.

“Aphid Chaser” is a commercially available alarm pheromone for the control of aphids on roses. It does not kill aphids, but disrupts their feeding and reduces their population



Aphids on rose plant

growth. This will also increase the effectiveness of natural enemies. The dispenser device is a small rubber donut which is placed by hand on plant stems or branches. For best results apply early in the season according to package instructions, and replace every 4 weeks or when aphids re-appear.

Use insecticides only as a last resort, as they will also kill the natural predators and parasites of aphids. Plants can be treated with insecticidal soap, pyrethrins or malathion.

Asian Longhorned beetle

(Anoplophora glabripennis)

This beetle is currently present in localized areas in Eastern North America (Toronto, New York, Chicago), where eradication attempts are underway. There are several long-horned beetles that bore into various species of live trees and logs which could be introduced into B.C. Other species of concern include: brown spruce longhorn beetle, smaller Japanese cedar longhorned beetle, great capricorn beetle, and *Monochamus* spp. (sawyer beetles). There are native sawyer beetles in B.C., including the Oregon fir sawyer beetle, which is commonly confused with the Asian longhorned beetle.



Asian longhorn beetle

Management:

If found, the Canadian Food Inspection Agency needs to be notified and attempts will be made to eradicate it. Other similar native beetles can be found in downed logs, stumps, and dying or stressed trees. Maintaining good tree health is always the best preventive tool.

Brown marmorated stink bug

Brown marmorated stink bug was first detected in British Columbia in 2015. It is a serious pest that feeds on more than 100 different plant species including tree fruits, berries, grapes, vegetables, and ornamental plants. Both adults and nymphs feed by inserting their needle-like mouthparts into the flesh of fruit or vegetables, resulting in dead areas and distortions. They can be a nuisance to homeowners when the adults aggregate on and in buildings in the fall as they seek warm overwintering sites.



Brown marmorated stink bug adult



Brown marmorated stink bug nymphs on scarlet firethorn

The adult is shield-shaped, about the size of a dime, brown marbled appearance with alternating brown and white markings on the outer edge of the abdomen. It can be distinguished from other stink bugs by the presence of distinctive white bands on the antennae. Immature stages range in colour from bright orange, black or brown and later stages are pear-shaped with white markings on legs and antennae.

Management:

A tiny parasitic wasp *Trissolcus japonicus* that attacks the eggs of brown marmorated stink bugs in Asia has been found in the United States and British Columbia. Other predators such as spiders, ladybugs and lacewings will feed on brown marmorated stink bug eggs. Low numbers of brown marmorated stink bugs can be removed by hand, sweeping or a shop vacuum. Prevent entry into the home by sealing off any access points. The use of insecticides for controlling brown marmorated stink bugs in the home is not recommended. Traps to catch the adults and nymphs are available for purchase, or can be constructed at home. Traps will not eradicate the bugs from your area, but can be useful to remove some of them from your home and surrounding area.

Caterpillars

A wide variety of caterpillars attack many ornamental plants. Most cause chewing damage on leaves and new shoots. Some types feed within rolled leaves; others skeletonize leaves just under the surface or form webs. Damage may occur throughout the growing season. Caterpillars come in different sizes and colours. For more information see ‘Bruce Spanworm and Winter Moth’ under “Pests of Berries”, page 11-4 and under “Pests of Fruit Trees, page 13-6.

On herbaceous plants, watch for signs of leaf or bud damage and check for young larvae in the spring. Unlike cutworms, which only feed at night, most caterpillar larvae feed in the daytime.

Many caterpillar pests of ornamental trees have a population cycle with a peak every four to seven years. Most large trees can withstand quite a lot of defoliation in the peak year with no permanent damage.

Management:

Inspect woody plants during the dormant season for hardened, dark grey egg masses (1.2-2.5 cm wide) that encircle the twig. These can be pruned off and the prunings destroyed. Dormant oil may also be used according to label directions to kill overwintering eggs on trees. Sticky bands placed around the base of tree trunks will prevent damage from some caterpillar pests. Small numbers of caterpillars may be removed by hand picking or by pruning and destroying infested foliage (for example, with tent caterpillars).

If an infestation is severe, it may be necessary to apply an insecticide spray. This is usually not practical or necessary for large trees. There is little point in spraying trees if the damage has already been done and the caterpillars are already at their largest stage, or have already pupated. Btk is effective in controlling an early infestation of young caterpillars. The caterpillars die after feeding on treated leaves. Alternatively pyrethrins can be used. Note: repeated use of pyrethrins may cause a build-up of mites.

Forest and Western Tent Caterpillars

(*Malacosoma disstria* and *M. californicum*)



Forest tent caterpillar



Western tent caterpillars

The forest and western tent caterpillars have very similar life cycles. In spring the eggs hatch and larvae feed on flowers, buds, and foliage, usually in colonies. Western tent caterpillars form tent-like webs for protection, while forest tent caterpillars form a silken mat on the trunk or branches from which they move out and defoliate the host. They pupate in cocoons, emerging as tan coloured moths about midsummer. Females encircle twigs on the host tree with bands of eggs, which overwinter and hatch the following spring.

Forest tent caterpillars are bluish-grey and have a prominent row of whitish diamond shaped dots along the back. Western tent caterpillars are similar, but are yellowish brown, with a row of blue spots and orange spots along the back. Caterpillars can be up to 5 cm long. Moths have a wingspread of up to 34 mm and are varying shades of brown. They fly in June and July. Trees known to be susceptible to western tent caterpillars include: *Acer*, *Betula*, *Crataegus*, *Fraxinus*, *Populus*, *Prunus*, *Quercus*, *Rosa*, *Salix*, *Tilia*, and *Ulmus*. Trees known to be susceptible to forest tent caterpillars include: *Arbutus*, *Betula*, *Ceanothus*, *Corylus*, *Crataegus*, *Ilex*, *Malus*, *Populus*, *Prunus*, *Quercus*, and *Salix*.

Management:

Remove overwintering egg masses encircling twigs. During the growing season, prune off branches with caterpillars and tents, if not too numerous, and destroy the caterpillars. Trees can withstand some defoliation and usually recover with no management required.

Fall Webworm

(*Hyphantria cunea*)



Fall webworm tents



Fall webworm

Tent-forming caterpillars that occur in spring and early summer are either “forest” or “western” tent caterpillars. Those that occur in late summer and early fall are called “fall webworms”. They are variously coloured and hairy. Apple and cherry ermine moth larvae form small tents during May and early June. Healthy trees will tolerate considerable feeding damage.

Management:

During the dormant season, inspect branches up to pencil thickness for hardened, dark grey masses of eggs circling the branch. Prune them off and destroy prunings, and spray trees with dormant oil following label directions. See “Dormant Spraying”, page 8-15. During the growing season, prune off small branches with tents on them, or spray with Btk or pyrethrins at label rates.

Elm Leaf Beetle (*Pyrrhalta luteola*) and other Leaf Feeding Beetles

Various species of leaf-eating beetles and their larvae feed on trees and shrubs such as elm, alder, and willow. Some species have 2 generations per growing season. Beetles usually feed on the edges of the leaves resulting in notched and ragged leaf margins. Healthy trees can tolerate considerable feeding damage.

Management:

Elm leaf beetle larvae migrate down the tree trunk to pupate. Sticky bands can be applied to tree trunks to capture larvae before they pupate and prevent an infestation the following year. If trees are small and damage is severe, spray with insecticidal soap or pyrethrins according to label directions. Spraying a 50 cm wide band of insecticide on the tree trunk at a convenient height will also kill these migrating larvae. However, repeat treatments may be needed later in the season if larvae or beetles reappear.

Gypsy Moth (*Lymantria dispar*)



Gypsy moth larvae
Photo courtesy of CFS Insectary, Pacific Forest Centre



Gypsy moth adults, female left, male right

Gypsy moth is a serious threat to B.C. forests. The gypsy moth caterpillars feed on a wide range of deciduous trees. Entire trees can be stripped of leaves. The caterpillars are hairy, tan in colour with distinct coloured spots on their back, and grow up to 6 cm long. Moths emerge in July and August. There is one generation per year. Egg masses are laid in sheltered places on hard surfaces such as tree trunks, behind rocks, fallen logs, fences, or lawn furniture. The female adult gypsy moth lays all of her eggs in a single egg buff to tan coloured mass that resembles a sponge or chamois. The number of eggs in one of these masses varies from fewer than 100 to more than 1,000 eggs.

Management:

This pest has been found only in some parts of the Lower Mainland and Southern Vancouver Island and is not established in B.C. There are ongoing surveys to detect and destroy egg masses. If you find velvety, buff coloured egg masses or caterpillars on trees, please notify your local Ministry of Agriculture, forestry service, or Canadian Food Inspection Agency office. For more information on gypsy moth and the eradication program, see the [Ministry of Forests website](#).

Andromeda Lacebug

(*Stephanitis takeyai*)

Adults are 3 mm long and have a lacy appearance. They suck plant juices of *Pieris japonica* and sometimes rhododendrons and azaleas. They feed on the underside of leaves, giving them a yellow, mottled appearance. They have 1 generation per year. Feeding starts in mid-May. Plant health is generally unaffected, though mottling on leaves from feeding is unattractive.

Management:

Hosing off infested plants with water often controls the pest. Lacebugs are susceptible to most broad spectrum insecticides. If needed, apply insecticidal soap or malathion when young lacebugs are first seen.

Mealybug

(*Pseudococcus* spp.)

These scale-like insects have a soft scale that is covered in white, powdery wax. They feed on the sap of plants and produce honeydew on all parts of plants. Both larvae and adults cause damage. The honeydew attracts ants and often leads to the growth of sooty mold. Affected plants appear unthrifty, yellow, wilted, or deformed, and can die from the infestation. A wide variety of plants can host mealybugs. About 30 days are required for one generation. Two to eight overlapping generations are possible in a year, depending conditions and species.

Management:

Mealybugs favour high temperatures and humidity, so climate management is a good preventive approach; keep temperature and humidity as low as possible for indoor plants. Sprays with water or pesticides (insecticidal soap, malathion,) can effectively control crawlers (young that do not have a thick waxy protective covering). Adults are not controlled effectively with pesticides.

Mites - See pages 13-11 and 13-32, under Tree Fruit, and 11-7 under Berries.

Root Weevils - See page 11-6, under Berries.

Scale Insects - See pages 13-15 and 13-35 under Tree Fruit.

Shot hole Borer, Bark and Ambrosia Beetle - See page 13-2 under Tree Fruit.

Diseases

Bacterial Blight

(Pseudomonas syringae)

Bacterial blight is a widespread disease of woody ornamental plants in the Pacific Northwest but is less common in the Interior. Symptoms appear on new growth in the spring under cool, wet conditions. The bacterium lives on and inside twigs and buds. Damage from bacterial blight is often worse in very wet springs or following a late spring frost or cold period. Bacterial blight is common on more than 40 species of woody deciduous trees such as aspen, flowering cherries, dogwood, forsythia, lilacs, linden, magnolia, ornamental maples, magnolia, ornamental pear and, roses. The most common symptom on woody ornamentals is wilting, blackening and tip dieback of new shoots. It also causes blackened buds, flower blast, black, angular leaf spots and vein blackening, leaf shot hole and stem and trunk cankers.



Bacterial blight of lilac

Management:

Young trees are more susceptible to bacterial blight than older established trees and shrubs. Protect frost sensitive plants from cold weather by planting in sheltered locations. Prune out blighted shoots in January or February or in mid-summer when weather is dry. Minimize pruning wounds by making sharp cuts and disinfect pruners between cuts with 10% household bleach solution (corrosive), Lysol, or other disinfectants. Prune back to green tissue below the cankered or dead wood. Remove and destroy prunings, dead twigs and fallen debris. Keep weeds under control as the bacterium can survive on weeds. Provide good nutrition, drainage and growing conditions and add lime to increase the soil pH if necessary. Do not fertilize after July as this will lead to new growth which is more susceptible to bacterial blight. Space plants for better air circulation.

Copper sprays may help to prevent new infections but will not cure infected trees. Copper resistance is known to be present in the pathogen population, and will reduce copper effectiveness if present. Apply before buds open in the spring, if cool, wet weather persists. Follow label directions. Where a range of rates is given, use the highest rate for dormant applications. To avoid leaf injury, use a lower rate during the growing season.

Grey Mold or Botrytis Blight

(*Botrytis cinerea*)

Grey mold, caused by the fungus *Botrytis cinerea*, is common on decaying plant tissue and debris where there is high humidity and moisture. A grey, fuzzy mold develops on dead or dying plant tissues then spreads to healthy plant tissues when conditions are wet. Infection first appears as water-soaked spots or areas on soft or senescent foliage, flower parts or young stems. Fallen petals that land on leaves are often areas of infection by grey mold. These areas turn tan to brown or greyish-white as they dry out. Fuzzy grey spore masses develop on infected tissues under cool, moist conditions. Spores are air borne and can infect healthy plant tissues. On flowers and woody ornamentals, it can cause flower, leaf and shoot blights and occasionally stem rots or cankers.

Management:

Thoroughly clean and discard garden debris and refuse in the fall to reduce the level of grey mold in the garden. Remove spent flowers and old leaves before grey mold becomes established. Susceptible plants should be grown in a part of the garden having excellent sun exposure with good air circulation and spacing. Avoid sprinkler irrigation of annual and perennial flowers as they approach bloom. If practical, water the base of plants in the morning so that plants dry off quickly.

Powdery Mildew

There is a powdery mildew fungus for almost every plant species except conifers. With a few exceptions, most powdery mildew fungi are very host specific – for example, maple powdery mildew will not attack rhododendron. Look for white, powdery growth on leaves and shoots. Warm days and cool nights are ideal for disease development. Commonly affected ornamental plants include Acer, azalea, Betula, Ceanothus, Clematis, Cornus, Corylus, Gaultheria, Hydrangea, Kalmia, Lonicera, Malus, Nandina, Quercus, Rhododendron, Rosa, Syringa, Vaccinium and Viburnum.



Powdery mildew on maple

Management:

Avoid highly susceptible varieties. Resistant varieties of roses and many other ornamentals are available. Avoid planting in shady areas with poor air circulation. Cleanup of diseased leaves at the end of the season and removal of visibly infected shoots during pruning will reduce disease carryover. Hosing off infected plants with water in mid-day is partially effective as long as foliage dries off quickly.

If a chemical control program is desired during the growing season, apply a garden product containing sulfur according to label instructions. A summer oil (mineral oil) can be used on many woody plants to help manage mildew. Reynoutria extract (Regalia) may also help to suppress powdery mildew. To be effective, a fungicide program must begin before mildew is well established. Both sulfur and oil have the potential to cause injury on some plants, so check the fungicide label to make sure the plant is listed. Follow label instructions carefully, and avoid spraying during very hot weather.

Root Rot

(*Pythium* and/or *Phytophthora* species)

Common causal agents are *Pythium* and *Phytophthora* species, which are members of the “oomycete” group of fungus-like organisms called “water moulds”. Several other soil-borne fungi can also cause root rot of garden ornamentals. Woody plants are more commonly attacked by *Phytophthora* species and herbaceous plants by *Pythium*, but there are many exceptions. As a rule, they cause disease only when the soil is poorly drained or wet for extended periods of time. Symptoms of root rot include wilting of foliage on warm days, poor growth, pale colour or symptoms of nutrient deficiency and in severe cases, death of the plants. Affected root system shows a lack of feeder roots and blackening or browning of larger roots. When roots are pinched and pulled gently, the root cortex (outer layer) slips off easily, leaving a bare vascular cylinder. The rot may extend up into the crown of the plant.

Management:

Good soil drainage is the key to avoiding most root rots. In heavy soils, this may require installation of perforated plastic tile drains with a suitable outlet. The deeper the drains, the larger the area that will be drained so they should be installed as deep as the outlet permits. A minor root rot can cause problems even in well-drained soils. In these cases, replace dead plants with other species that are more resistant to root rot.

Over watering or surface watering with drip-lines or sprinklers or flooding can bring on root rot. Drought stressed plants seem to be more susceptible to root rot infection later when moisture is restored.

Armillaria Root Rot

(*Armillaria* species)

Armillaria root rot occurs on over 700 species of conifers, hardwood trees and shrubs. *Armillaria* is a native fungus in B.C. soils and most often infects plants on newly cleared land.

The first symptoms are decline and dieback, with leaves turning yellow and wilting. Only one side of the plant may be affected. Infected trees may die. Cutting away the bark at or just below ground level reveals a white mat of fungal mycelium. Black shoestring-like strands of fungal mycelium called 'rhizomorphs' may be visible in the mat or around the base of the plant. Rhizomorphs are evidence of armillaria root rot and can look like roots when found in the soil. Roots are destroyed and turn dark brown to black and the rot extends into the crown of the tree. In the fall, a cluster of honey-coloured mushrooms may appear at the base of infected trees.



Armillaria-infected blueberry bush; white mycelial growth of the fungus is seen beneath the bark at plant base.

Armillaria can survive for many years on dead roots and old cane stubs in the soil. It is usually a disease of mature trees that are suffering environmental stress. Healthy, vigorous trees can often out-grow the infection by *Armillaria* until other factors, such as flooding or soil compaction inhibits root growth.

Management:

Water deeply when needed. Avoid surface watering around the crown and main trunk. Remove infected trees and soil in the root zone and replant with resistant species. In landscape plants, the disease is most commonly found on conifers, Malus, Quercus, Rubus (blackberry, raspberry) and Thuja. Western larch and incense cedar are among the most resistant conifers. There is no effective chemical control.

Verticillium Wilt

(*Verticillium* species)

Two species of the fungus *Verticillium* (*Verticillium dahliae* and *Verticillium albo-atrum*) cause wilting of woody plants; *V. dahliae* is the most common. This species produces black hardened structures called 'microsclerotia' that can carry over in soil for up to 10 years. *V. albo-atrum* persists in the soil for 1-2 years, and is most commonly found on alfalfa. These fungi attack many deciduous trees, herbaceous perennials, berries, weeds and vegetables but do not infect conifers or grasses.

Other hosts of *Verticillium* include eggplant, potato, tomato, dahlia, raspberry and strawberry. Landscape trees planted on land previously cropped with these plants have a high risk of developing the disease. The fungus enters the roots and moves upwards in the plant, plugging up the plant's water and nutrient transport, i.e. vascular system. Often the first symptoms seen are nutrient deficiencies, yellowing, wilting and dieback of young twigs and branches, often on one side of the plant or tree. These symptoms are easily mistaken for root rot, frost damage, drought stress or other problems. However, with verticillium wilt, the dieback becomes progressively more severe from year to year. Cutting into woody stems with a knife reveals black or brown streaks in the wood or vascular region, often in nodes where branches or stem diverge, but these are not always visible. Mature landscape trees with verticillium wilt will sometimes 'wall-off' the fungus in the infected branches and survive for many years. Other trees may totally succumb within a year or two of the first twig dieback.

Management:

Avoid drought stress or flooding on mature landscape trees. Remove dead and dying plants including the infested roots and soil and replant with a tolerant or resistant species. Mature trees where dieback is just starting can be pruned to remove dead wood and may show only intermittent symptoms for many years. Disinfect pruners between cuts with 10% household bleach solution (corrosive), Lysol, or other disinfectants. No chemical controls are available.

Other Pests

Algae, Lichens and Moss

Variously coloured growths may be found on the twigs, limbs and trunks of many trees and shrubs. The growths may be leaf-like, hairy or scale-like. They are not parasitic on plants but make them look unsightly and in the case of evergreens, interfere with photosynthesis.

Management:

Annual dormant sprays with lime sulphur will prevent the establishment of these growths. Once established, however, they must be scraped off with a wire brush or stiff scrub brush in conjunction with spraying.

Fences, greenhouse benches, etc.: Cryptocidal soap (potassium salts of fatty acids) controls algae, mosses, lichens and liverworts. Use as directed on the label. Using lumber, which has been pressure-treated with wood preservatives, will delay the growth of these organisms for many years but should not be used on lumber in contact with food products.

Slugs and Snails



Common garden snail



Slug

Slugs have soft, un-segmented bodies and exude a slimy mucous. They are active throughout the year if temperature and humidity are suitable. They shelter in moist, dark places during the day and feed at night. Surface tissues of the plants are rasped, and irregular holes are eaten in foliage leaving it slimy and tattered. Seedlings may be completely eaten and blossoms on flowering plants may be damaged. Snails have shells and are usually less numerous and do less damage than slugs. However, they may be found in trees, whereas slugs prefer to stay on the ground.

Management:

Slugs prefer damp, shaded areas, so removing vegetative trash and other daytime hiding places and keeping grass mowed will help to control them. Large slugs can be destroyed by walking through the garden when it is damp and cutting them in half with a sharp, flat spade. This is impractical for small slugs. If slugs are a continual problem, apply control measures early when seedlings are in the most vulnerable stage. Homemade slug traps, containing beer or fermented yeast and sugar can be used to attract slugs that drown in the liquid. In flowerbeds, place boards, grapefruit rinds or cabbage leaves as shelter sites for slugs and then destroy the slugs in the morning. Slugs will not feed on geraniums and many ornamental shrubs. If slugs are a serious problem every year, consider growing plants that are not attractive to them.

Commercial slug bait containing iron (ferric) phosphate (in pellets) is attractive and toxic to slugs, but is not toxic to pets and wildlife. Place bait on the ground in areas where the silvery slime trails are evident. Replace bait every few days, particularly after rainfall.

Baits (either pellets or thick liquid) containing metaldehyde are toxic to pets and wildlife, and should be used only as a last resort. The metaldehyde bait should be placed in a “bait protector” made from a coffee can or something similar. Several holes are made along the bottom sides of the coffee can and the lid replaced. This is not an effective way to protect dogs from poisoning as they may knock the cans over. The same treatments apply to snails in flower and vegetable gardens. Do not get slug bait on plants grown for food.

Pests of Specific Ornamentals

Ash (*Fraxinus* sp.)

Insects

Lilac Ash Borer (*Podosesia syringae*)

The lilac ash borer was first reported in B.C. in 2006; it is well established in the U.S. Hosts include European ash (preferred host), privet (*Ligustrum* spp.), lilac (*Syringa* spp.), and mountain ash (*Sorbus* spp.). The adult is a clearwing moth that is similar in appearance to a paper wasp. There is usually one generation per year, but can take two years to complete a generation. The female moth deposits her eggs in bark crevices within 10 to 14 days of emergence. Upon hatching, the larvae tunnel into the trunk and feed beneath the bark, where they excavate galleries in the wood. The mature, 3 cm larvae overwinter inside the tree. Adult moths emerge the following spring. Infestations lead to unsightly scars and swollen areas on the trunk and can weaken branches. Severe infestations can kill a tree.

Management:

There are currently no registered insecticides for homeowners for the control of tree borers. Effective treatments may be available through commercial spray services. Pheromone traps baited with clearwing attractants can be used to time male moth activity. Because trees can have numerous larvae within, physical removal of larvae from under the bark is not likely an effective approach. To prevent infestations, ensure trees are healthy and have limited stress by providing adequate water and mulch. Be careful not to wound the trunk or main branches.

Diseases

Anthracnose (*Gnomoniella fraxini*)

In coastal areas, 'Modesto' ash is very susceptible to anthracnose disease. Large leaf spots and blotches appear in late spring/early summer. Severe and repeated infections can lead to twig dieback and gradual tree decline.

Management:

Do not plant 'Modesto' ash in coastal B.C. Rake up and remove leaves in autumn to reduce disease carryover. Leaves may be safely composted. Prune out cankered branches and to promote air movement within the crown. Fungicide applications are generally ineffective and impractical.

Verticillium Wilt (*Verticillium dahliae*)

Ash trees are very susceptible to verticillium wilt. See Verticillium under “Pests Affecting Many Ornamental Plants”, page 16-11.

Aspen - See “Poplar”, page 16-64.

Azalea (*Rhododendron* spp.)

Insects

Root Weevils - See page 11-6 under Berries.

Andromeda Lacebugs - See page 16-58.

Diseases

Azalea Leaf Gall

(*Exobasidium vaccinii*)

This disease occurs on rhododendrons and azaleas. In late spring and early summer, leaves become thickened, fleshy and white, later developing into hard, reddish-brown, gall-like bodies. Galls are composed of fungus-infected plant tissue. Flowers are also affected. Older leaves are resistant to infection.

Management:

Avoid overhead watering particularly in the evening. Remove galls as they appear and bury or send to a landfill. Spray with copper just before buds break in the spring and again 2 to 3 weeks later. Symptom reduction is then seen the following spring.

Leaf Scorch - See “Plant Disorders Not Caused by Pests”, page 9-5.

Powdery Mildew

(*Microsphaera* sp.)

Some varieties of deciduous azaleas are particularly susceptible to powdery mildew. The disease is most common on deciduous azaleas but not as frequent on evergreen azaleas. The disease develops late in summer. The whitish growth can occur on both sides of the leaf and may cover the leaf by the end of summer. High humidity and high nitrogen fertility favours the disease.

Management:

See “Pests Affecting Many Ornamental Plants”, page 16-8. Select resistant species or hybrids if possible. Planting susceptible varieties in the open with less shading and improving the air circulation are the best preventative measures. A spray program using sulphur will also give some control before the mildew gets well established for plants that had powdery mildew damage the previous year.

Proven Performers – Azaleas*

Evergreen	Deciduous
<i>R. kiusianum</i>	<i>R. albrechtii</i>
Balsaminaeflorum	<i>R. occidentale</i>
Blaauw’s Pink	<i>R. luteum</i>
Elsie Lee	Arpege
Hino Crimson	Balzac
Helen Close	Cannon’s Double
Mother’s Day	Cecile
Rosebud	Fanny
	Ginger
	Irene Koster

*This list has been provided by the Fraser South Rhododendron Society as being easy to grow, hardy and relatively problem-free in the South Coastal area.

Birch (*Betula* spp.)

Insects

Aphids

Small, soft-bodied, variously coloured, sap-sucking insects. There are several generations a year. See “Aphids” under “Pests Affecting Many Ornamental Plants”, page 16-1.

Birch Leaf miner (*Fenusa pusilla*)

Grey, white and paper birches are the most affected by birch leaf miner. Young leaves have blotchy brown areas that contain tiny sawfly larvae. Repeated attacks will weaken trees and lead to further problems such as invasion by bronze birch borers. The spring generation is most damaging, as new unfolding leaves are most susceptible. Older leaves are not attacked, so the summer generation is not as abundant.

Management:

Keep trees healthy with adequate water during dry periods. Stressed trees cannot withstand as much damage. On small trees, kill leaf miners by squeezing the larvae within the mines. Reduce pest numbers by gathering and disposing of fallen leaves. Burying leaves under soil in a compost pile is effective. Consider replacing the severely affected trees with a more trouble-free species. Tree trunks can be treated with insecticide, with the intent to control adult sawflies. This approach has variable results. There are no effective biological control agents. If infestations have been repeated and severe, spray trees when leaves begin to unfold in the spring, when eggs are being laid, with malathion at label rates. A second application may be useful in mid summer when the second generation is laying eggs.

Bronze Birch Borer (*Agrilus anxius*)

The adult is a 13 mm long olive-bronze beetle. Adults appear during May and June and lay eggs in bark crevices. Larvae, up to 15 mm long, chew oval-shaped tunnels under the bark that cause dieback in the upper part of the tree. D-shaped exit holes from adult beetles can be seen along dead branches.

Management:

Birches require a lot of water. Drought-stressed trees are more susceptible to borer damage. To prevent invasion by borers, keep your trees as healthy as possible by providing them with optimum fertilizer and water and controlling leaf miners. If there are borer-infested trees nearby, the damaged limbs should be removed and burned to kill the larvae. There are no effective insecticides for this pest. If more than 50% of the tree is dying back, it is best to remove the entire tree.



Bronze birch borer – larva and gallerie. Photo courtesy of David G. Nielsen, Ohio State University, Bugwood.org

Apple and Thorn Skeletonizer and other Caterpillars

See Tree Fruit, page 13-10

Camellia (*Camellia* spp.)

Insects

Cottony Camellia Scale

(*Pulvinaria floccifera*)

Scale insects feed on the underside of camellia leaves. The adult scales and crawlers are quite small but the cottony white, elongated egg masses are conspicuous. The honeydew that they secrete drips onto the tops of nearby leaves and is colonized by black sooty mold.

Management:

The honeydew, sooty mold and some of the scales can be washed off with the garden hose. If the problem persists, apply insecticidal soap or malathion in early July to kill the newly hatched crawlers. This is the only life stage when scales are susceptible to pesticide applications. Insecticides applied at other times will not penetrate the waxy covering. Follow label instructions. There are several natural biological control agents of scales which will help manage this pest.



Cottony camellia scale on holly

Other Disorders

Bud Drop

Flower bud drop may occur if plants are located in sites where they are exposed to cold, dry winds in winter or the hot summer sun. Low winter temperatures may also lead to bud drop. Both over-watering and under-watering may result in bud drop. Bud drop may also occur if more flowers are set than the plant can support. In this case, there is no cause for alarm.

Management:

Plant camellias in sheltered sites in well-drained soils that have good organic matter content. Avoid spring frost damage to flower buds and the resulting brown petals by choosing sites that do not receive early morning sun. Water plants thoroughly during hot dry summer weather. Select varieties recommended as hardy for the area by your local garden centre.

Chamaecyparis (yellow cedar, including Lawson's cypress)

Insects

Cypress Tip Moth

(*Argyresthia cupressella*)

This insect also attacks arborvitae, Monterey cypress and junipers. The larvae tunnel into tips of branches, which become brown and drop off. Larval exit holes can be seen in damaged leaves with a magnifying lens. Tiny (4 mm long) white cocoons appear on affected twigs in April and May. Small (5 mm long) grey moths are present in June and July when they lay eggs for the next generation. There is 1 generation per year. In some areas, most of the susceptible conifers become infested and they appear brown in early to mid-summer, especially towards the top.

Management:

If damage is slight, infected leaves can be pruned out in mid-summer. No insecticides will kill the larvae while they are inside the leaves. For new plantings in heavily infested areas, consider using a resistant variety such as western red cedar (*Thuja plicata*).

Juniper Scale

(*Carulaspis juniperi*)

Juniper scale attacks cones, twigs and needles of cedar, cypress, juniper and arborvitae. Trees turn greyish or yellowish when large amounts of sap are removed. Scales are white in colour, 1.5 mm in diameter, with brownish centers. Eggs and crawlers are pinkish to yellow. One generation is produced per year, with fertilized females overwintering. The adult female scale is grey and round. Eggs are produced in May and continue to hatch until late June. Little new growth is produced and individual branches can die. Very little honeydew is generated by these scales.

Management:

Apply high pressure water spray, insecticidal soap, or malathion when crawlers are seen on the conifers. This is the only stage of scale susceptible to pesticide application. However, an application of appropriate dormant oil during the early spring before the plants break bud will help manage the adult females. Caution: not all oils are safe for all conifers. Natural biological control agents are present in the landscape and will help manage scales.

Diseases

Cypress Root Rot

(*Phytophthora lateralis*, *Phytophthora cinnamomi* and other species)

These soil-borne fungal-like organisms affect all varieties of Lawson's cypress (Port-Orford-cedar). Root tissues become reddish-brown instead of white. Infection occurs during the wet season but trees turn brown during warm weather. Infection moves from feeder roots into larger roots and finally into the base of the tree, causing a dark discolouration of the sapwood. Foliage begins to lose colour, turning completely brown within a few months. Large trees may take 2-4 years to die but often die completely in one growing season.

Management:

Choose resistant plants such as *Thuja plicata* or other evergreens to replace dead Lawson's cypress. The fungus spreads in the soil and water and can be brought into the garden in topsoil, on contaminated tools, and in drainage water. Lawson's cypress should not be grown and never be used as hedge plants since the fungus will spread along the hedge from tree to tree. Avoid wounding the base of trees and do not over-water. Do not mulch or plant flowers under trees or hedges of Lawson's cypress. Do not water with drip irrigation.

Cherry (flowering) (*Prunus* spp.)

Ornamental cherries are prohibited by the B.C. Plant Protection Act in the Okanagan, Similkameen, Shuswap and Creston Valleys, because they are a possible source of little cherry virus disease for commercial cherry orchards. For more information see "Pests of Fruit Trees", page 13-44.

Insects

Cherry Bark Tortix - See "Pests of Fruit Trees, page 13-29.

Cherry Ermine Moth - See "Apple Ermine Moth", page 13-6. Cherry ermine moth looks like the apple ermine moth, but it occurs on hawthorn and cherry, not on apple trees.

Winter Moth and Leafrollers - See "Pests of Berries", page 11-4.

Peach Tree Borer - See page 13-33 (tree fruit)

Diseases

Bacterial Canker, Blight, Blast, Leaf Shot-hole and Spot

(*Pseudomonas syringae* pv. *syringae*)



Shot hole on cherry caused by bacterial canker



Gumming cankers on cherry caused by bacterial canker

In Coastal B.C., where flowering cherries are widely grown, the most important disease is bacterial canker, also known as bacterial blight. (Also see Bacterial Blight, page 16-8).

Susceptible varieties frequently fail to leaf out normally in the spring as many of the buds have been killed over the winter. Bud infections result from leaf scar infections in the fall. In wet springs, further blighting of new shoots occurs as bacteria are splashed from cankers on the branches onto the new foliage. Later, infected leaves may develop a leaf spot and shot-hole (also caused by some fungi and viruses). Blossoms and new shoots may brown off completely giving a “blasted” appearance. Ice-nucleating strains of the *Pseudomonas* bacteria increase the susceptibility of plants to frost injury so that damage is more severe after a late spring frost or cold period. Susceptible varieties decline and die over several years while resistant varieties recover with the onset of dry weather each summer.

Management:

Do not plant flowering cherries under or near old cherry trees as most of them are infected and the bacteria will spread during rainy weather. Don't plant them in shady or damp areas. Never allow sprinkler irrigation to wet the foliage. Avoid susceptible varieties. The following varieties have some resistance: *P. sargentii* ‘Rancho’ and *P. yedoensis* ‘Akebono’. *P. serrulata* ‘Kwanzan’ is susceptible when young but often develops resistance as the tree matures.

To reduce damage on established trees, copper sprays may be applied in spring and before fall rains. Apply copper octanoate or copper sulphate once or twice to protect the leaf scars during leaf drop in the fall. Repeat several times in the spring to prevent leaf & shoot blight. During a wet spring, try to pick a dry, sunny day every 7-10 days to apply a

protective spray. See label for instructions and precautions. Repeated use of copper can lead to copper-resistant strains of *Pseudomonas* and poor disease control. Note copper can cause plant injury. Use lowest label rates while foliage is present. Copper octanoate is generally tolerated better by foliage than copper sulphate.

Other Diseases and Insects

See under “Peaches, Apricots, Prunes, Plums and Cherries,” page 13-26.

Clematis

Diseases

Clematis Stem Rot and Leaf Spot

(*Ascochyta clematidina*)

This fungus infects the roots, crown and lower stems near the soil line, causing stems to wilt and die back. Sometimes a black leaf spot develops in wet weather. Individual shoots wilt suddenly when stems are infected and girdled at the base. Wounds and warm, wet conditions favour infection.

Management:

For new plantings, choose plants that do not have wilting or dying stems. The disease rarely develops on established plants in gardens. If stem wilt appears on new plants in the garden, it is best to remove them and re-plant with clean stock. If established plants do develop the disease, prune out infected stems and remove infected leaves. Space plants for good air circulation and keep the base of plants open so that it can dry out quickly after rain. Fungicides are not available to manage this disease in the home garden.



Ascochyta leaf spot on clematis

Cotoneaster

Insects

Cotoneaster Webworm

(*Cremona cotoneastii*)

In the spring, new leaves are skeletonized and webbing is present on leaves and twigs. Damage is caused by chocolate brown larvae up to 12 mm long that feed from silken tubes. Larvae feed until early summer and then pupate. Dark brown to blackish moths emerge in June and July, mate, and lay yellowish-red eggs on host plants. Young larvae feed until August, and then overwinter in a silken shelter on leaf axils or debris.

Management:

Pick or prune off infected leaves if damage is minor. If damage or webbing is severe when leaves start to form, spray with Btk or malathion. Follow label instructions carefully. Do not spray malathion during blossoming as cotoneaster is a favourite plant for bees.

Diseases

Fire Blight - See “Crabapple”, below.

Crabapple (flowering) (*Malus* spp.)

See “Apples and Pear” section in Chapter 13, for description and control of pests. Use small-fruited varieties to prevent codling moth population increases. This plant can host apple maggot. Consider NOT planting crabapple in commercial apple and pear production areas.

Diseases

Fire Blight

(*Erwinia amylovora*)

Fire blight rarely occurs in the cool, wet Coastal regions of B.C., but is common in the Southern Interior. Members of the Rosaceae family including crabapple, cotoneaster, photinia, potentilla, pyracantha, hawthorn, quince, rose, spirea and mountain ash are susceptible to this bacterial disease.



Fire blight on apple – shoot blight



Fire blight on pear – blackened fruit cluster

Fire blight can be spread by insects such as aphids, leafhoppers and bees as well as splashing rain. In late spring, during periods of rain or high humidity and when temperatures are above 18 °C, the bacterium enters the plant through blossoms, shoot tips, wounds and young leaves. Twigs appear burnt or scorched and brown leaves remain attached to the twig. Twigs often die back in a “crook” shape. The bacterium overwinters in infected wood. Entire trees can sometimes be killed and rootstocks can also be infected.

Management:

Plant resistant varieties, if available. Diseased twigs and branches that appear scorched should be cut off at least 15 cm below the infected part and burned or buried as soon as symptoms are noticed. Make sharp cuts and disinfect pruners between cuts with 10% household bleach solution (corrosive), Lysol, or other disinfectants. Avoid overhead watering to keep foliage dry. Spray with copper octanoate before and during blossoming if fire blight has been a problem, and weather is warm and rainy. Follow label rates and instructions for fire blight to protect blossoms. The following varieties should not be planted in fire blight-prone areas: *Malus baccata* ‘columnaris’, *Malus coronaria* ‘Charlottae’, *Malus floribunda* and ‘Royalty’.

Scab

(Venturia inaequalis)

Olive-green fungal leaf spots appear on leaves and fruit. This disease begins as water-soaked spots that become velvety-green, then brown and dead. Diseased leaves can be curled and distorted and fall off prematurely. New infections can occur whenever there is a moderate to prolonged period of rainy weather during the growing season.



Apple scab on leaves



Apple scab on fruit

Management:

See “Apple and Pear Scab”, page 13-22. In the coastal area do not plant the following susceptible varieties: ‘Almey’, *M. coronaria* ‘Charlottae’, ‘Hopa’, ‘Kelsey’, ‘Echtermeyer’, ‘Prince Georges’, ‘Radiant’, ‘Royalty’, or ‘Strathmore’.

Daffodil (*Narcissus* spp.)

Insects

Narcissus Bulb Fly (*Merodon equestris*) and Lesser Narcissus Bulb Fly (*Eumerus strigatus* and *E. tuberculatus*)

These insects also attacks snowdrops, hyacinths, tulips and other bulb plants. Plants stop flowering or produce weak and spindly flowers and either degenerate into masses of small, grass-like leaves, or die. Bulbs are tunneled and usually rotted. Damage is caused by a large maggot (*Merodon equestris*), measuring up to 2 cm, or several smaller maggots (*Eumerus* spp.). The adult flies resemble bumblebees, and will not sting. Flies are active and lay eggs near bulbs and on foliage in spring and early summer.

Larvae move down into the bulbs, where they feed and overwinter. *M. equestris* has one generation per year, and *Eumerus* spp. have two.



Narcissus bulb fly. Photo courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org

Management:

Dig up the bulbs after foliage has died and destroy any bulbs with signs of maggot infestation. Handle bulbs carefully; damaged bulbs or bulbs with disease are more susceptible to bulb fly infestations. Do not store or plant damaged or soft bulbs.

Diseases

Fusarium Basal Rot

(*Fusarium oxysporum*)

Foliage turns yellow and dies back early. Plants produce small flowers. Bulbs display a chocolate-brown rot, which usually begins in the basal root plate and spreads through the inside of the bulb, attacking the central portions first. Infections sometimes appear on the side of the bulb.

Management

Before planting, examine bulbs carefully for infected tissues and discard. Dig bulbs as soon as the tops have died down. Wash the soil off the bulbs and discard any with decay. Treat the healthy appearing bulbs with a bulb dust that includes a fungicide. Dry and store in a cool (15 °C), dry place until it is time to replant. Follow a 3-year rotation in the garden to prevent buildup of the fungus in the soil.

Bulb and Stem Nematode

(*Ditylenchus dipsaci*)

This soil-borne plant parasitic nematode is most common in commercial fields on Southern Vancouver Island but rarely occurs in home gardens. It causes a brown discolouration of scales, usually on the inside and starting from the base up. It may be introduced to home plantings occasionally on bulbs that do not show obvious symptoms. This nematode also affects tulips, onions and garlic and sometimes potato tubers.

Management:

There is no cure for infested soils. Remove soil and replace it if possible. Do not grow other bulb plants including onion/garlic in the soil for several years. If this is suspected, a laboratory diagnosis should be done to confirm bulb and stem nematode in infected bulbs and rule out other causes such as fungal and bacterial rots.

Dogwood

Insects

Dogwood Sawfly

(*Macremphytus tarsatus*)

The larvae skeletonize the leaves of *Cornus* species, in particular *C. racemosa* and *C. sericea*. Look for the larvae on the underside of leaves in early summer. First instars are almost translucent yellow, while second instars appear to be covered with a chalky powder. The last instar is 2.5-cm long and is creamy-yellow with a black head and black spots. Feeding damage progresses over the summer, and leaves can be completely eaten with only the veins remaining. Larvae feed in groups. The larvae overwinter in pupal chambers in decaying wood on the ground. Adult sawflies emerge the following spring from May through July, and lay eggs inside leaf tissue, about 100 at a time. There is one generation per year.

Management:

Smaller caterpillars can be controlled with horticultural oils, soaps, and other domestic insecticides. Low populations are easily tolerated by the plants and this pest does not permanently damage trees.

Diseases

Anthracnose

(*Discula destructiva*)

This fungal disease is widespread in South Coastal B.C. and appears as brown spots, blotches and wedge-shaped blotches at leaf tips in the spring. Leaves may drop early and twigs and branches may develop cankers and dieback. If repeated for several years, the trees may weaken and eventually die. Dead terminal buds and leaves remaining attached to dead branches in the spring, are typical symptoms. This disease is favoured by periods of prolonged wet spring weather or frequent sprinkler irrigation.



Anthracnose on dogwood

Management:

Cornus 'Eddie's White Wonder,' *Cornus florida* (eastern dogwood) and *Cornus kousa* (Japanese dogwood) have more resistance to the disease than *Cornus nuttallii* (western dogwood).

Rake up and burn or dispose of any fallen leaves during the growing season and autumn. Prune out dead or diseased twigs and branches. If trees are small, fungicide applications may be worthwhile. If severe disease continues, remove and replace with more resistant varieties. Dormant sprays with lime sulphur may be helpful.

Crown Canker

(*Phytophthora cactorum*)

This soil-borne fungal-like organism infects the base of the trunk (crown) at the soil line, either through the roots or through injury to the bark. Infected trees lack vigour and slowly die back. Wood beneath the bark of cankers is discoloured. Most infections of mature trees occur through wounds.

Management:

Plant only where there is good soil drainage. When transplanting, avoid wounding or injuring the bark. Avoid hitting the trunk with machinery or lawn tools. Protect young trees with stakes and provide shade for the base of the trunk. If the affected area is small, trim out the discoloured wood and cover the cut area with grafting wax or tree paint. Avoid over-watering.

Douglas-Fir (*Pseudotsuga menziesii*)

Insects

Cooley Spruce Gall Adelgid

(*Adelges cooleyi*)

Adelgids are similar to aphids. They appear as white cottony balls on fir needles in the spring. Unless the infestation is very severe, trees will not be damaged. Needles may have a yellow spot and be twisted at the point where the adelgid was feeding. Some needles may drop. On spruce trees, these adelgids cause brown, swollen galls on tips of branches.



Cooley spruce gall adelgid damage on spruce

Management:

Control is not usually needed on Douglas fir except on seedlings or on Christmas trees. On spruce, prune off and destroy galls while they are still green, usually before mid-July. This kills the adelgids still trapped within the gall. If the galls are too numerous to remove, spray spruce at bud-burst with insecticidal soap at label rates. Thorough spraying is required for good control and is impractical on large trees. If a severe infestation existed in spring, spray to the point of run-off in mid-August with an insecticide registered for aphids, such as malathion or insecticidal soap. This treatment will control young, overwintering adelgids thus preventing their re-occurrence the following spring.

Silverspotted Tiger Moth (Douglas fir Webworm)

(*Lophocampa argentata*)

Larvae overwinter in an inconspicuous group within a tree. They feed on warm days during winter and spring, and are usually fully-grown by May. They are up to 3.5 cm long, black and very hairy, with yellow tipped hairs and tufts of yellow and black hairs. They form a web or tent on the branch where they feed. Brown moths with many cream coloured spots on the forewings emerge from mid July through August and lay eggs on any coniferous evergreen. Eggs hatch in late summer and the small black larvae feed until winter. This pest also damages spruce, true fir and pine.

Management:

Prune off the infested branch and destroy the larvae. Landscape trees recover from the early spring damage with no intervention in most cases.

Elm (*Ulmus* spp.)

Insects

Elm Seed Bug

This insect is relatively new in BC. It has been an increasing nuisance as they congregate and enter homes and businesses. For information and management, see “Insects around the Home”, page 19-7.

European Elm Bark Beetle (*Scolytus multistriatus*)

This bark beetle can spread Dutch elm disease. See Dutch Elm Disease, below.

Elm Leaf Beetle (*Pyrralta luteola*)

See Elm Leaf Beetle and other Leaf Feeding Beetles, page 16-6

Diseases

Dutch Elm Disease (*Ophiostoma ulmi*, and *Ophiostoma novo-ulmi*)



Dutch elm disease – wilting branch
Photos courtesy of Gary Platford, Winnipeg MB



Native elm bark beetle galleries (bark removed)

The European elm bark beetle has been found in the Lower Mainland and Interior of B.C. It tunnels under bark producing galleries. These beetles can also spread the Dutch elm disease fungus. Dutch elm disease has not been found in B.C., but is present in most of North America, including Oregon and Washington. Susceptible elms wilt quickly from the top down when infected and usually yellow and die within 1 or 2 years. Wilt appears during hot weather.

Management:

Dutch elm disease is a quarantine disease in B.C. and Alberta. If you notice an elm tree wilting quickly in summer, call your local office of the B.C. Ministry of Agriculture, forestry service or Canadian Food Inspection Agency. Do not import elm firewood from other locations or take elm trees or firewood to Alberta, which is also free of the disease.

Fir or Balsam (*Abies* spp.)

Insects

Balsam Woolly Adelgid

(*Adelges piceae*)

These small insects attack native or ornamental true fir (*Abies*) trees such as grand, amabilis, mountain, balsam and white fir, but not Douglas fir. They cause infested twigs to develop a knobby or “gouty” appearance. Infested trunks and branches show white tufts of cottony substance produced by adult adelgids.



Balsam woolly adelgid damage (gouts)

Management:

To prevent the spread of this insect, provincial regulations prohibit the sale or shipment of all species of balsam or true fir out of the infested zone, which includes south and central coastal areas of B.C., including Vancouver Island and the Fraser Valley.

Spray affected trees between February and March with insecticidal soap at label rates, thoroughly wetting the entire tree. Repeat this treatment in mid-summer and early fall.

Diseases

Root Rot (*Phytophthora* spp.) – See Root rot, page 16-10.

Firethorn (*Pyracantha* spp.)

Diseases

Scab

(*Venturia pyracanthae*)

Look for dark, sooty areas on the leaves and berries. Leaves soon turn yellow, then brown and finally drop prematurely. Scabby lesions caused by this fungus may also occur on the twigs.

Management:

This is not a serious problem when pyracanthas are sheltered from rain, such as against a wall under eaves. Collect and remove or compost fallen leaves. Use resistant varieties. No fungicides are registered for this disease.

Fire Blight - See “Crab apple”, page 16-23 and “Apple and Pear”, page 13-19.

Forsythia

Diseases

Stem Gall

(*Phomopsis* sp.)

Stem galls caused by a *Phomopsis* fungus often develop on forsythia. They are not usually harmful to the plant but multiple galls may cause reduction in vigour, or dieback of small twigs. Galls resemble those caused by crown gall bacterium, but are usually higher up in the bush.

Management:

If twig dieback occurs or the galls become numerous, prune out and destroy infected branches. Disinfect pruners between cuts with 10% household bleach solution (corrosive), Lysol, or other disinfectants.

Geranium

Diseases

Bacterial blight

(*Xanthomonas campestris* pv. *pelargonii*)

This bacterial disease of geranium can be spread by infected cuttings. Look for dark brown, sunken leaf spots, and V-shaped yellow wedges that form at the leaf margin and taper down to the base of the leaf.

Management:

Purchase healthy plants from a reliable source. Do not propagate geraniums that appear unhealthy. Remove and discard plants with symptoms to prevent additional spread. There is no treatment or cure for this disease other than prevention and sanitation.

Gladiolus

Insects

Bulb Mites

(*Rhizoglyphus* and *Tyrophagus* spp.)

Bulb mites can infest bulbs such as daffodil, freesia, gladiolus, lily, tulip, onion and garlic in storage and in the garden. Bulb mites are shiny, white, bulbous mites with brown legs, 1/2 to 1 mm in length. They damage bulbs by penetrating the outer layer of tissue and allowing rotting organisms to gain entry. Symptoms include reduced growth and bulb rot.

Management:

Inspect bulbs before planting for signs of bulb mites, and destroy any that are infested or decayed. Avoid injuring bulbs during digging, handling or storage, as wounds will allow entry of bulb mites as well as plant pathogens.

Diseases

Gladiolus is subject to a number of corm and soil-borne diseases. In the coastal area, corms for propagation should be dug before the start of the wet season and quickly dried, cleaned and sorted for storage. Store in a cool, dry place protected from freezing. Do not propagate from diseased corms or replant gladiolas where they have died out from corm rot for at least 4 years.

Hawthorn (*Crataegus* spp.)

Insects

Hawthorn hosts apple maggot and other critical apple pests that do not yet occur in the major interior (Okanagan) apple producing areas of B.C. Please consider NOT planting hawthorn in apple growing regions, and DO NOT move hawthorn plants or their fruits to new locations.

Aphids - See page 16-1.

Cherry Ermine Moth (*Yponomeuta padellus*)

See "Apple Ermine Moth", page 13-6. Cherry ermine moth looks like the apple ermine moth, but it occurs on hawthorn and cherry, not on apple trees.

Sawfly (Pearslug) - See page 13-14 in "Pests of Fruit Trees"

Tent Caterpillar - See page 16-4

Apple Maggot - See page 13-7 in "Pests of Fruit Trees"

Diseases

Fire Blight - See Crab apple, page 16-23.



Fire blight in hawthorn

Leaf Spot or Fabrea Blight

(Diplocarpon mespili)

This is the most serious disease on hawthorn in Coastal B.C. Small, angular, reddish spots appear on the upper side of leaves in spring and early summer. Raised bumps (fungal fruiting bodies) appear in the centre of leaf spots. Spots increase in size and run together. Defoliation occurs in mid-summer. Repeated annual defoliation can reduce growth and weaken trees.

Management:

English hawthorns (*Crataegus laevigata*) are very susceptible to leaf blight. Planting resistant species (single seed hawthorn) is a good option.

Rake up and destroy compost or burn fallen leaves. In the dormant season apply lime sulphur at 1 part to 8 parts of water. When leaves begin to unfurl, spray and repeat twice at 10-day intervals with copper spray at 4-6 ml/L.

Rust

(Gymnosporangium spp.)

Rust is caused by a fungus. Yellow spots appear on hawthorn leaves in summer. The spots get larger, become thickened and produce large fungal spore-bearing thread-like spines or strands on the lower leaf surface. Fruits may also become infected. Rust spores produced on hawthorn infect the alternate host, juniper. Spores produced on juniper infect hawthorns. Rust on junipers appears as branch swellings, which produce orange spores in the spring.

Management:

If rust becomes a problem, it can be reduced by finding the nearest infected junipers and removing them. To prevent infections on hawthorn for the coming season, the infected junipers should be removed by mid-March.

Hellebores (Christmas Rose)

Diseases

Black Spot

(*Coniothyrium hellebore*)

Black spot is due to a fungus that is favoured by wet weather and environmental stress. The fungus spreads rapidly during wet weather causing irregular shaped, dark brown to black spots on both sides of the leaves. Spots coalesce and have concentric ring patterns with tiny black fruiting bodies of the fungus appearing over time. Leaves can turn yellow and die prematurely. Cankers on the stem cause the leaves to shrivel and die. Flowers wilt before the buds open or petals can have spots.

Management:

Avoid sprinkler watering and water from the base of plants. Allow good air circulation by properly spacing plants. Remove and destroy infected leaves, stems and plant debris.

Heuchera

Diseases

Rust

(*Puccinia heucherae*)

Many heucheras become infected by a rust fungus. Yellow spots appear on leaves and yellow, orange or rusty-brown coloured pustules develop. Infected leaves may drop early. There is no alternate host. Most plants in the Saxifrage family are affected.

Management:

Pick off and destroy infected leaves when the disease is first noticed. Sprays containing sulphur may help to control it in the garden. If disease becomes severe, there may be no choice but to replant with other species. Your garden centre may be able to recommend resistant or less-affected varieties.

Holly (*Ilex* spp.)

Insects

Holly Bud Moth

(*Rhopobota naevana*)

Tips of buds are destroyed or disfigured. Terminal shoots are tied together with silk. Look for caterpillars inside silk or terminal shoots, and greenish-grey caterpillars on developing buds. This caterpillar is also a major pest of cranberry production in B.C.

Management:

If only a few buds are affected each year, prune them out and destroy the caterpillars. If severe, spray holly when new leaf growth starts between April 1 and early May with malathion. Follow label instructions carefully. Do not spray during bloom.

Holly Leafminer

(*Phytomyza ilicicola*)

Blotches appear on leaves, making them unsightly. This discolouration is caused by mines formed by small maggots, which feed in the leaves. Adult flies, half as large as house flies, lay eggs during blossom time. Birds often pick the larvae out of the mines.

Management:

Damage is usually cosmetic and will not normally affect the health of the plants. Light infestations can be reduced by picking off and destroying infested leaves. No insecticides are registered for control of holly leaf miner in the home garden. However, due to the fact that the miners are inside the leaves, insecticides can't contact the pest, so they are relatively ineffective.

Holly Scale

(*Synspidiotus britannicus*)

This pest also attacks boxwood, laurel and privet. Scales cause yellow spotting of leaves, and reduced plant vigour. Holly scale is light brown, oval and about 2 mm in diameter. Black sooty mould may grow on the secretion (honeydew) of the immature stages (nymphs, or crawlers) of this insect. Nymphs overwinter on lower leaves of holly trees. Females become immobile and mature and in spring and early summer. Male scales are small winged insects. After mating, the female scale transforms into a long, white egg sac, from which nymphs emerge in late summer over a period of weeks in June and July. One generation is produced per year. Other scale species may also occur on holly.

Management:

Spray holly in late June to kill newly hatched ‘crawlers’ using malathion at label rates. Repeat this treatment in ten days. The sooty mould may be washed off with the garden hose. A treatment of dormant oil applied in early April before new growth occurs is also a useful approach. For best results, consider using both approaches to achieve season long scale control.

Root Weevils - See page 11-6 under Berries.

Diseases

Leaf and Twig Blight

(*Phytophthora ilicis*)

This foliar disease is caused by a fungal-like organism that only infects holly. Look for black spots on leaves, leaf drop and the presence of black twig cankers. Leaf spotting begins on lower branches in late fall and progresses upward during the winter. Berry clusters may become black and shriveled. Cool, rainy weather and poor air circulation favour the disease.



Phytophthora leaf blight of holly

Management:

Space and prune trees to permit good air circulation. Rake up and dispose of fallen leaves. Preventative applications of copper fungicides may reduce damage.

Green Algae

Leaves are covered with a dusty, green coating, which may later turn yellow or brown. This is common on holly and is not usually damaging to the plant.

Management:

Prune to increase air circulation. See “Algae, Lichens and Moss”, page 16-12

Hollyhock (*Alcea* spp.)

Diseases

Rust

(*Puccinia malvacearum*)

Look for orange to red, raised spots or pustules on the undersides of the leaves. The pustules contain rusty, powder-like fungal spores. Stems may be attacked also. If the disease is severe, leaves may dry up.

Management:

Remove and destroy the first leaves that show signs of rust. In the fall, plants should be cut back to the base and all old parts burned, buried or removed from the garden. If necessary, apply a sulphur dust or spray at label rates once or twice a week during the early part of the growing season.

Honey Locust (*Gleditsia*)

Insects

Honey Locust Pod Gall Midge

(*Dasineura gleditchiae*)

Growing tips become clumped, reddish and slightly swollen. Trees may be temporarily stunted as normal leaf growth and expansion is prevented. Tiny flies lay eggs in new growth. Maggot feeding causes the formation of these galls, which eventually dry up and drop off the tree. New flies emerge from the galls on the ground, new growth is again attacked. There are several generations per year.



Honeylocust pod gall midge

Management:

This pest is sporadic and does not warrant control measures.

Horse Chestnut (*Aesculus* spp.)

Insects

Winter Moth - See page 13-6 (under Tree Fruit).

Diseases and Disorders

Leaf Scorch and Blotch

(*Guignardia aesculi*)

Reddish-brown blotches with bright yellow margins appear on leaves in summer. Physiological or natural leaf scorch is common on horse chestnut leaves and does not damage the tree. It may be more severe under drought conditions or on trees under stress. Fungal leaf blotch disease looks almost identical to natural leaf scorch. A laboratory diagnosis may be needed to tell the symptoms apart. Leaf blotches caused by the *Guignardia* fungus contain fungal fruiting bodies that are visible under a magnifying lens. Spores continue to infect leaves throughout the summer during wet weather. Heavily infected trees may be damaged and suffer decline and dieback. Both conditions (physiological leaf scorch and fungal leaf blotch) can occur together on the same tree.



Guignardia leaf blotch of horse chestnut

Management:

No treatment is needed or available for natural leaf scorch. Regular watering during the summer may lessen symptoms on trees growing in droughty soils. Rake and destroy fallen leaves where the fungus over winters. Established landscape trees may be infected every year without serious injury or decline. Fungicide applications are not usually necessary or practical on large, landscape trees.

Juniper

Insects

Cypress Tip Moth - See “Chamaecyparis”, page 16-19.

Juniper Scale

(*Carulaspis juniperi*)

This insect also attacks arborvitae (*Thuja*) and yellow cedar (*Chamaecyparis*). Highly infested plants turn grey or yellow and produce little new growth. Scales are white in colour, 1.5 mm in diameter, with pinkish to yellow eggs and young. They feed on needles, cones and twigs. One generation is produced per year, with fertilized females overwintering. Eggs are produced in May and continue to hatch until late June.

Management:

In coastal areas, damage is usually confined to plants growing in dry, sheltered locations under roofs and adjacent to buildings. Plants better adapted to drought and shade should be used in such areas.

Prune out and burn all dead or dying branches if you are in an area where burning is permitted. Otherwise, bag the branches for disposal. In the Okanagan Valley, dormant oil applied in March provides effective control.

Juniper Webworm

(*Dichomeris marginella*)

This pest webs needles and the tips of twigs together as it feeds on needles, causing them to turn brown. Damage is caused by reddish-brown caterpillars with black heads, and three dark lines on the back. They have a light stripe along each side and measure up to 22 mm long. Larvae overwinter inside needles, emerging to feed again in spring. Small moths with a wingspan of about 15 mm emerge in June. Forewings are coppery-brown with white margins; the hind wings are grey and heavily fringed.

Management:

Prune out infested branches if possible. Alternatively, spray trees when caterpillars become active in the spring, usually in April. Apply Btk at label rate with enough pressure to penetrate webbed foliage. Check trees in July for new infestations and, if present, repeat treatment.

Diseases and Disorders

Twig Blight and Dieback

A number of fungi may cause individual branches or whole shrubs to turn yellow to brown and die. Dieback usually begins at the tips of affected branches. It may be more severe in the centre of the shrub where the branches join the trunk. However, before suspecting a fungal disease, check near the base of dead twigs for chewing damage from insects or voles which is a common cause of twig dieback on junipers. Breakage of branches in the centre from snow load may also cause dieback.

Management:

Prune out and destroy dead and drying branches. Avoid wounding healthy twigs. Avoid overhead watering in the evening. Spray at two-week intervals in the spring, beginning when growth starts, with copper spray.

Magnesium Deficiency

Magnesium deficiency is common in coastal B.C. and produces yellow and/or dead foliage in the centre of severely deficient plants.

Management:

In the coastal area, incorporate dolomite lime into the soil before planting junipers and periodically as a top dressing. If magnesium deficiency is suspected in a large planting, a soil test should be carried out before beginning a corrective program. For smaller plantings, magnesium sulphate (epsom salts) applied as a soil drench (at 10-20 mL/L of water) around the base of the plant will temporarily correct magnesium deficiency. It may also be applied as a foliar spray (at 5-10 mL/L of water) for a quick response, but again, is only a temporary measure. Repeat the application if necessary. A few drops of fish fertilizer may be added to the foliar spray solution as a spreader-sticker.

Pear Trellis and Other Rusts

(*Gymnosporangium fuscum*, *Gymnosporangium* spp.)



Pear trellis rust on pear



Pear trellis rust (gall) on juniper

Pear Trellis Rust: This fungal disease alternates between junipers and pear trees. The infections on junipers cause branch swellings that produce conspicuous orange jelly-like spore masses in the spring. In mid-summer, bright orange spots appear on leaves of pear trees adjacent to infected junipers. Spores can travel in large numbers up to 100 feet (30 meters) from junipers to pears. The junipers are not seriously damaged by the disease.

This disease is well established in Greater Vancouver and the Fraser Valley and on Vancouver Island as far north as Duncan. It has also been detected in some localized areas in the Okanagan. It is not known to be established in other areas of the province.

Other Rusts: Junipers are hosts of many rust diseases that also infect hawthorn and Saskatoon berry. These are common in the Interior. On juniper, the rust fungi usually form swellings or large woody galls on branches and twigs. These galls are not usually damaging to the juniper. But spores released from the galls infect the other hosts, where they can cause leaf drop and fruit damage.

Management:

Pear Trellis Rust: Do not plant junipers and pears close to one another (not within 100 feet or 30 m). Examine suspect junipers during wet weather in the spring for signs of orange, jelly-like spore masses. Remove infected junipers if possible before spring. If this is impractical, consider removing the infected pear trees. On pear trees with less than 10% infected leaves, it is worthwhile to pick off the leaves before the middle of August to prevent re-infection of more junipers. If you are in the Lower Mainland/ Vancouver Island area, do not move junipers from your garden to other parts of the province.

Other Rusts: Prune out galls when found. Burn where permitted, bury, or send to the landfill.

Root Rot

(*Pythium/Phytophthora* spp.)

Foliage develops a light green cast, and then gradually turns brown. Bark on the trunk at and below the soil line is dark-brown and may be punky. Roots are reddish-brown instead of white and may already be decomposing by the time foliar symptoms are noticed. Low-growing, recumbent junipers and junipers grown on slopes as ground covers are often severely affected by root rot.

Management:

Do not plant junipers in wet, heavy or poorly drained soils. Avoid excessive irrigation. Avoid sprinkler or drip irrigation at the base of juniper plantings. Do not replant junipers in sites where junipers, firs, Lawson's cypress or other plants have previously died from root rot, unless all soil and roots are removed and drainage improved. Arborvitae (*Thuja*) can usually be planted safely in such areas, however, it is best not to plant the variety 'Smaragd' which is somewhat susceptible to root rot in such soils.

Laurel

Most of the laurels used in the coastal area are actually evergreen species of *Prunus* and are subject to the same diseases and insects as other *Prunus* species. See "Cherry (flowering) above and "Peaches, Apricots, Prunes, Plums and Cherries", page 13-26).

Diseases

Bacterial Blight

(*Pseudomonas syringae*)

In coastal B.C., the same bacterium, *Pseudomonas syringae*, that causes bacterial canker and blight in early spring on flowering cherry, blueberry and lilac, also causes a leaf spot and shot-hole disease on cherry laurel. The disease does not usually warrant management unless whole shoots are dying back severely each year.

Management:

Cut out and burn infected parts immediately. Disinfect pruners between cuts with 10% household bleach solution (corrosive), Lysol, or other disinfectants. Avoid sprinkler irrigation. Also see "Bacterial Blight", page 16-8, and "Bacterial Canker" of "Flowering Cherry", page 16-21.

Lilac (*Syringa* spp.)

Insects

Lilac Leafminer

(*Caloptilia syringella*)

Colourless blotches appear on leaves and later turn brown. The tree looks scorched by midsummer. Discolouration of leaves is caused by tiny caterpillars that feed inside leaf tissue. There are two generations per year. Larvae are greenish-white while in the mines, but turn darker as they age. Larvae bore into the leaves where they initially feed, then exit and roll the leaf, continuing to feed in this shelter until full grown in mid June. These larvae pupate and small brown and silver moths with a 12 mm wingspan emerge in July. These summer moths lay eggs on new growth, the larvae emerge and feed until fall, when they drop to the ground to overwinter and pupate. In the spring, adults emerge and lay eggs on the new growth.



Lilac leafminer damage

Management:

On small plants, pick off infested leaves as soon as they are noticed. Rake and destroy fallen leaves whenever noticed during the growing season and in the fall. Leaf miners can also be managed by spraying lilac bushes just prior to bloom, and again 7 to 8 weeks later with malathion at label rates. This product has a strong odour.

Ash and Lilac Borer - See Ash page 16-14

Oystershell Scale - See page 13-15, under Fruit Trees.

Diseases

Powdery Mildew (*Microsphaera* spp.)

A white powdery growth appears on leaves usually late in the growing season. For management, see “Powdery Mildew”, page 16-9.

Bacterial Blight

(*Pseudomonas syringae* pv. *syringae*)

This disease is common at the Coast but less common in the Interior. Flowers become limp and dark brown. Young shoots and immature leaves darken and die quickly. Cool, rainy springs favour the development of this disease. Also see “Bacterial Blight”, page 16-8.



Bacterial blight of lilac

Management:

Young shrubs or very susceptible varieties may be severely affected. Older shrubs will not usually be damaged seriously, although bloom may be reduced in very wet springs on the coast.

Cut out and dispose of infected shoots. Disinfect pruners between cuts with 10% household bleach solution (corrosive), Lysol, or other disinfectants. Apply copper spray just prior to the start of fall rains. Apply copper octanoate 2-3 times at 10-day intervals in the spring, starting in early April. Note: copper sprays may burn young shoots under poor drying conditions. Follow label precautions and instructions. Small shrubs can be covered in clear plastic tents from January to April to prevent blight infection.

London Plane (*Platanus* spp.)

Diseases

Anthracnose

(*Apiognomonia veneta*)

London plane and the closely related western sycamore, are very susceptible to anthracnose in Coastal B.C. Young leaves turn brown and die in spring or develop large brown blotches. Twigs and branches may die back and early leaf drop occurs. Trees normally recover by mid-summer.

Management:

Rake and burn, bury or compost fallen leaves. Prune out dead twigs and branches on small trees. Fungicide sprays are not recommended. These are vigorous trees and usually recover naturally. If severe disease occurs every year, it is best to remove the tree and replace it with another species. Some varieties of *Platanus* including the London Plane are generally less susceptible to anthracnose. London plane trees release sharp, pointed

leaf hairs into the air that can cause allergies and breathing problems in some people so they are not recommended in landscape plantings.

Sooty Mold

Black to grey mold appears on leaves. It grows on honeydew produced on leaves due to feeding by aphids, whiteflies, scales, mealy bugs and leafhoppers.

Management:

Control insects to reduce sooty mold.

Maple (*Acer* spp.)

Insects

Aphids - These can be bad on sycamore maple. See Aphids, page 16-1.

Boxelder Bug - See page 19-4 (under Insects Around the Home).

Eriophyid Mites (Bladder Gall Mites)

These can be unsightly on leaves but do not cause serious damage. See page 16-51.

Tent Caterpillars - See page 16-4

Scale Insects - See pages 13-15 and 13-35 (under Tree Fruit).

Winter Moth - See page 13-6 (under Tree Fruit).

Diseases

Bacterial Blight

(*Pseudomonas syringae* pv. *syringae*)

Infections occur in cool, wet weather in spring and fall. Recent research in Oregon suggests that most infections in maple occur in the fall. Leaves, shoots and stems wilt and/or turn black in spring and early summer. For **management**: See “Lilac”, page 16-46

Anthracnose

(*Kabatiella* and *Discula* spp.)

Brown to white irregular blotches appear on leaves and dead white twigs have tiny black, fungal fruiting bodies. Leaves infected in the bud stage emerge deformed with missing margins as if chewed by insects. (Ragged leaves can also be caused by frost damage to buds in the spring).

Management:

Remove cankered twigs during pruning. Improve air circulation. Avoid wetting foliage with sprinkler irrigation. (See also anthracnose of “Oak”, page 16-53 and “Dogwood”, page 16-27.). Rake and burn fallen leaves, or send them to a landfill. Copper spray used for bacterial blight may be effective in arresting new infections.

Powdery Mildew

(*Sawadaea* spp.)

Powdery mildew on maple has become a common problem on landscape trees in B. C., particularly on red foliated ‘Norway’ maple. The disease appears as a white powdery growth on the surface of the leaves. While unsightly, this disease does not normally affect the health of the tree. However repeated annual infection beginning early in the season could eventually reduce tree health and vigour.



Powdery mildew on maple

Management:

When planting maple, avoid highly susceptible, red leaved ‘Norway’ maple, particularly the variety ‘Crimson Sentry’. Prune to promote good air circulation. Rake and remove or compost fallen leaves in the autumn. Dormant application of lime sulphur may also be beneficial to kill mildew fruiting bodies that have lodged in bark crevices or branch crotches. Summer oil or sulphur may be used on ornamental trees for powdery mildew control. To be effective, a fungicide program must begin before mildew is well established. Both of these fungicides have the potential to cause injury on some plants, so follow label instructions carefully, and avoid spraying during very hot weather. Also see “Pests Affecting Many Ornamental Plants”, page 16-9.

Tar Spot

(Rhytisma punctatum)

This fungal disease is seen on big leaf maple on the coast and can also attack other maple species. Spores are spread during rainy weather and cause roughly circular water-soaked spots that turn brown. Black fruiting bodies of the fungus appear as tiny dots on surface. The spots become slightly raised, black and tar like and leaves fall prematurely. The fungus overwinters in the tar like stroma on fallen leaves.



Tar spot of maple

Management:

Rake and burn or dispose of fallen leaves.

Verticillium Wilt

(Verticillium dahliae)

Verticillium is a soil-borne fungus that invades the roots and water conducting tissue of a wide range of plants. Maples are very susceptible. Infected trees wilt and die, usually one branch or one side at a time. Large trees may survive for many years whereas younger ones die frequently. When cut open, infected branches usually have black streaks in the wood or sapwood, under the bark.

Management:

See *Verticillium* under “Pests Affecting Many Ornamental Plants”, page 16-11.
Do not replant maples where they have died out.

Leaf Scorch

See “Plant Disorders Not Caused by Pests”, page 9-5.

Mountain Ash (*Sorbus* spp.)

Insects

Blister Mites

(Eriophyid family)

These mites are very tiny, white and shaped like sausages. They cannot be seen without magnification. Their feeding causes reddish-brown spots to appear on leaves. Leaves curl, twist or develop dead areas and may drop off. Mites feed within the blisters, galls, or spots on the leaves from spring to fall. Mites migrate to new buds in late summer and fall to spend the winter. Leaf damage is seldom serious enough to affect tree growth. Other deciduous trees can be affected by blister and gall mites.



Eriophyid mite galls on maple

Management:

If blister mites were present in the previous growing season, treat trees in the dormant stage with lime sulphur at 100 mL/L of water. Dormant oil will give some control and must be applied before bud break in the spring. Treatment during the dormant period is the only time sprays can reach the mites, which are more exposed on the buds at this time. Spray will not control mites during the growing season because they are protected within the leaf tissue.

Diseases

Fire Blight

See “Crab apple”, page 16-23 and “Apple and Pear”, page 13-2.

Rust

(*Gymnosporangium cornutum*)

Yellow leaf spots appear in early summer. They get larger, thicken and produce conspicuous spore-bearing threads or spiny growths later in the summer. Juniper is the alternate host of this rust fungus.

Management:

Do not interplant mountain ash with junipers or yellow cedars (*Chamaecyparis*) which are the alternate hosts for the fungus. The spores produced on mountain ash do not re-infect mountain ash but need to pass through the other host.

Oak (*Quercus* spp.)

Insects

Aphids - See page 16-1.

Bruce Spanworm and Winter Moth

Winter moth is a problem on Southern Vancouver Island particularly on Garry Oak (*Quercus garryana*) and in the Fraser Valley. See page 13-6 (under Tree Fruit).

Caterpillars - See page 16-2.

Jumping Gall Wasp (Oak Leaf Blister)

(*Neuroterus saltatorius*)

The jumping gall wasp occurs on Garry oaks throughout Southern Vancouver Island. In the spring, adult female wasps emerge from overwintering galls in the soil and lay eggs on opening oak leaves. Infested leaves develop yellow spots followed by scorching and early leaf drop. Small blister galls on the leaves produce a second generation of wasps in summer. These lay more eggs which produce small, orange, seed-like galls on the underside of leaves. These galls fall to the ground, jumping around due to the action of the larva inside. Eventually, they bury themselves in the ground where they overwinter.

Management:

At least 7 species of parasites attack the gall wasp. In addition, earwigs and ground beetles feed on them in and on the soil. Insecticide treatment is not practical on large trees. Maintaining good tree health and supporting severely scorched trees with fertilization in early spring and watering during dry periods will be helpful.

Oak Leaf Phylloxeran

(Phylloxera nr. glabra)



Oak phylloxera



Oak phylloxera damage

The oak leaf phylloxeran is a small (1 mm), orange/yellow sucking insect similar to an aphid. It is found on Garry and English oaks throughout Vancouver Island and the Gulf Islands. Phylloxera feed on young oak leaves causing yellow spotting and browning. Badly infested trees may be defoliated by mid-summer. Individual trees within a group tend to be attacked repeatedly year after year.

Management:

Ladybugs and lacewing larvae feed on phylloxera but are unable to control them on heavily infested trees. Spring fertilization and watering during drought periods is recommended to reduce stress on infested trees.

Oak Leaf Skeletonizer

(Bucculatrix ainsliella)

Small areas on leaves are skeletonized by yellowish larvae up to 7 mm long. Damage can be seen beginning in mid-June, and will continue until autumn. Full-grown larvae hang on silken threads and are an annoyance to people. There are 2 generations per year. The fall generation of caterpillars comes down off the trees via silken threads and migrate in large numbers to nearby cars and houses in search of overwintering sites. Tree health is usually not affected



Oak leaf skeletonizer damage

Management:

For small trees that can be easily sprayed, apply Btk or malathion at label rates, to the underside of leaves. Apply in mid-June and repeat 10 days later if caterpillars can still be found. For the second generation, spray in mid August. Once larvae begin spinning down looking for pupation sites (September), it is too late to attempt pesticide sprays.

Diseases and Disorders

Anthracnose

(*Apiognomonia* or *Discula* spp.)

Garry and other white oaks are attacked most seriously by this fungus. Black, red and scarlet oaks are rarely damaged. Brown leaf blotches develop on the leaves, commonly along the veins. Dead tissue may extend to leaf margins, eventually covering most of the leaf area. Defoliation may occur. Very susceptible or young trees may develop twig or branch dieback, although this is more common on Japanese maple, ash and sycamore. The disease is often worse on trees under stress and in years with warm, wet springs. Ash, elm, horse chestnut, maple, plane and sycamore trees are also affected by very similar fungi.

Management:

Rake up and compost, or burn fallen leaves (where permitted). If practical, prune out and burn diseased and dead branches. Spray small trees in the dormant stage with lime sulphur to reduce over wintering disease. Spraying of large trees is considered impractical and the disease does not usually cause serious damage on large trees. If it is necessary to spray large trees, it should be done by a commercial applicator using chlorothalonil as the fungicide of choice.

Leaf Scorch - See “Plant Disorders Not Caused by Pests”, page 9-5.

Peony

Diseases

Botrytis Blight (Grey Mold)

(Botrytis cinerea)

Young flower buds turn black and dry up, young stalks wilt and blacken, and larger buds turn brown. Plants may fail to flower and opening flowers may be destroyed. Infected tissues later become covered with a grey, felty mold. This disease can be very destructive during damp, rainy seasons.

Management:

In early fall, cut down old stalks below soil level and destroy the debris. Remove and burn diseased parts immediately. Apply a mulch to bury debris. Avoid planting in sheltered areas with poor air circulation. Plant peonies in full sun in well drained soil; heavy clay soils should be lightened with organic material such as compost or peat moss. Do not heap soil over the leaf bases. Avoid overhead watering. There are no effective “Domestic” labeled fungicides for home garden use. See “Pests Affecting Many Ornamental Plants”, page 16-9.

Photinia, Christmas Berry

Diseases

Fungal Leaf Spot (Fabrea blight)

(Diplocarpon mespili)

Small, dark red spots appear and come together to form blotches on the leaves. Leaves become unsightly and leaf drop may occur.

Management:

Rake up and destroy fallen leaves. Avoid sprinkler irrigation. Water early in the day so leaves can dry off quickly.

Pieris, Andromeda

Insects

Andromeda Lacebug

(*Stephanitis takeyai*)

Andromeda lacebugs are found in the Vancouver and Victoria areas throughout the growing season. Nymphs and adults feed on the undersurface of *Pieris japonica* leaves, and may also attack rhododendrons and azaleas. Leaf upper surfaces develop a yellow-speckled or mottled appearance. Damage seems to be mainly cosmetic and plant health is largely unaffected. Injury can be quite severe especially when *Pieris* is grown in full sun.

Management:

Wash off pests with water spray. Lacebugs are susceptible to most insecticides

Pine

Insects

Black Pineleaf Scale

(*Nuculaspis californica*)

Small, 1 mm, yellowish-brown to black, circular scales infest the needles. They suck sap and may injure needles and affect tree growth, if numerous. Scales are usually managed by naturally occurring beneficial insects. Repeated broad spectrum insecticide use will sometimes result in scale outbreaks.

Management:

Infestations are usually associated with injured or crowded trees with poor growth. Thinning, irrigation and fertilization should increase tree tolerance to scales. For persistent infestations, apply dormant oil up to bud break and treat with a foliar pesticide in early July for crawlers, as for Pine Needle Scale below.

Mountain Pine Beetle

(Dendroctonus ponderosae)

This beetle pest of pine trees is native to North America. In the late 1990s a massive outbreak resulted in the loss of millions of hectares of pine forest in British Columbia over the next 15 years. Pine beetle prefers mature lodgepole pine, but will attack other pine species and other conifers. Adult beetles fly in mid summer through fall, laying eggs in suitable trees. Larvae feed under the bark, spend the winter, and resume feeding in the spring. Larvae pupate in June and July. Large numbers of adult beetles infest each suitable tree. They are attracted to weakened or stressed trees, as well as pheromones released by other beetles. Trees are killed within the first year of beetle attack. The needles stay dull green for about a year after colonization, then needles appear red for 1-2 years, and after needles fall off, the decaying tree appears grey. White sawdust around beetle exit holes can be seen on the tree trunk during the late summer after beetles emerge.

Management:

Hot dry summers leave pine trees stressed and more susceptible to attack by pine beetles. If feasible, irrigate pines and other conifers at risk as required. In early fall or late spring, sustained temperatures of -25°C can kill beetles. During mid winter, however, temperatures must be consistently below -35°C to kill beetles.

Look for the mountain pine beetle during the July to September summer flight season. Look for holes and sawdust created by the beetles drilling into the bark, pitch tubes, increased woodpecker activity, or discoloured needles. Bark can be peeled away to expose larvae galleries and beetles. Beetle numbers are highest on the north facing side of trees. It is very important to check for beetles when moving pine firewood.

Start management activities before the summer flight season begins (late June through September). Infested or dying trees should be removed. Log, mill, or debark infested trees and logs. Bark should be burned, buried or submerged under water where appropriate. Infested logs can also be buried under ground until after the flight season, and then used. Logs can be wrapped in clear, heavy-gauge plastic tarps, which increases heat and will kill beetles. In the winter (to decrease fire risk), beetle-infested trees can be felled and burned on-site (where permitted). Stored logs should be occasionally rotated and not stacked higher than two layers.

Verbenone Pouch Mountain Pine Beetle Repellent is available for domestic use. This product deters beetle attack by releasing anti-aggregation pheromone slowly over time. Attach a pouch to each pine tree at risk before beetle flight in June-July. For best results, any infested trees should be removed before using Verbenone. See label for details of application. It is suggested that homeowners seek guidance from a certified arborist or forestry professional.

Sequoia Pitch Moth (*Synanthedon sequoiae*)
Douglas Fir Pitch Moth (*Synanthedon novaroensis*), and
Northern Pitch Twig Moth (*Petrova albicapitana*)

Pitch moths damage both ornamental and native pines in B.C. The sequoia pitch moth and Douglas fir pitch moth may attack any suitable host tree over 2 m in height, whereas the northern pitch twig moth is primarily a pest of saplings up to 3 m in height. The larvae of all species burrow into the main stem or branches. Damage is easily located by the large pitch masses produced at the entry points. Larval feeding can kill terminal shoots or produce weakened and crooked trunks.

Management:

There are no effective pesticide controls for pitch moths. Protect trees from injury; pitch moths more frequently attack pines that have pruning wounds or other injuries than uninjured pines. Prune off infested branches. It is best to prune in the fall so the wounds begin to close before the egg-laying adults emerge in spring. Physically remove pitch masses and kill the enclosed larva or pupa. There will be a single larva/pupa per mass. Physical removal can reduce re-infestations and control local moth populations. The insect will have emerged from masses that are 2 or more years old. Older masses are harder and darker in colour.

Pine Sawfly
(*Neodiprion* spp.)

There are at least 4 different species of sawflies that damage pines in B.C. The larvae, which range in length from 21-25 mm long, feed in groups, are voracious defoliators that can totally consume 1-year and older foliage. This gives the tree a bottle-brush appearance as the new growth develops. Larvae look like caterpillars with many legs. They overwinter as eggs; larvae emerge in the spring. Mature larvae drop to the ground in mid-June to pupate. The adults emerge in September and lay eggs in slits along the margins of current-season needles. There is one generation per year. Repeated defoliation can predispose trees to attack by other pests.

Management:

If sawfly larvae are abundant, spray infested trees with malathion, pyrethrins, or insecticidal soap. Good coverage of larval feeding area is necessary, and may only be achievable on small trees. One application should be adequate per season.

Pine Bark Aphid

(Pineus strobi)

This aphid feeds on the tree trunk and is covered with a white cottony material. Several generations are produced during the summer. See page 16-1, Aphids, at the beginning of this chapter.

European Pine Shoot Moth

(Rhyacionia buoliana)

Pine shoot moth is present in parts of the Vancouver, Kamloops and Nelson forest regions. This pest attacks most species of pine. Infested buds leak pitch. The following spring, new growth may be distorted or fail to develop. Look for brown, 6 mm long caterpillars with black heads. The caterpillars bore into buds during mid-summer.



Pine shoot moth pupa

Management:

Prune out and burn damaged shoots. This insect is usually controlled by natural parasites and insecticides are rarely needed.

If control is necessary, apply one or more sprays of Btk in dry weather when young caterpillars are first seen according to label directions. Apply at 10-day intervals, beginning the last week of June. Sprays must be applied before caterpillars bore into buds.

Pine Needle Scale

(Chionaspis pinifoliae)

This insect also attacks fir and spruce trees. Needles drop and tree vigour is reduced, and twigs and branches can die back from heavy infestations. Look for small, white, club-shaped scales on needles; these are the female scales. Red crawlers (nymphs) hatch from eggs from May to July. There is one generation per year.

Management:

Apply dormant oil in early spring, before new growth starts. To control the crawlers (nymphs), spray during June with insecticidal soap or malathion at label rates and repeat 2-4 weeks later if more crawlers are seen. Using insecticidal soap as a spreader with other insecticides will improve effectiveness.

Diseases

Elytroderma Needle Cast

(*Elytroderma deformans*)

This is a disease of ponderosa (3-needle pine) and lodge pole pines (2 needle pine) in the B.C. Interior. The previous year's needles turn bright red then gradually fade to a straw colour. Infected ponderosa pine needles are cast in early fall and lodge pole pine needles in late fall. Old systemic infections produce noticeable brooms on ponderosa and smaller brooms on lodge pole pine. Severe infections can cause all but the current season's needles to drop, producing a 'lion's tail' of bare branches with a tuft of short needles on the branch tips.



Elytroderma needlecast on pine

Photo courtesy of John W. Schwandt, USDA Forest Service, Budwood.org

Management:

Prune out brooms. Rake up and burn, bury or compost old needles. Replace severely infected trees with resistant species. No fungicide is specifically registered for this disease.

Lophodermium Needle Cast

(*Lophodermium seditosum*)

Scots pine is commonly affected. One or 2-year-old needles develop yellow to brown bands about 3 mm wide. Infected needles turn brown and fall, so trees may be left with only one year's needles. Most infections occur in late summer on new needles. Many pines drop older needles naturally and brown clusters of dead needles may appear on the trees in late summer, especially in hot dry summers at the coast. Saprophytic (non-disease-causing) species of *Lophodermium* fungus can often be found on these dead and dying needles.

Management:

Rake up and destroy fallen needles. Space plants to provide better air circulation. Avoid overhead watering. There are no effective "Domestic" fungicides.

Western Gall Rust

(*Endocronartium harknessii*)

Rough, globular galls, on branches or trunk, release orange spores in spring. They are commonly seen on native lodge pole or shore pine. No alternate host is involved. Hard pines such as lodgepole, mugho, Austrian, Scots and ponderosa are infected.

Management:

If practical, remove infected branches and/or susceptible trees within 100 feet (30 m) of infected trees. Spray valuable trees with commercial fungicides as for *Lophodermium* needle cast except that the applications should be made earlier. Observe galls and when orange spores are being released spray the needles so that spores landing on them cannot germinate.

White Pine Blister Rust

(*Cronartium ribicola*)

This fungus attacks all 5-needle pines. The rust infects living bark and cambium of white pine. In late April or early May, swellings on the branches and trunk rupture, releasing orange spores. The branch may die beyond the swollen area. Blister (canker) formation is usually accompanied by abundant pitch flow. Blisters eventually kill the infected branches.

New infections occur as a result of spores being blown from currants and gooseberries (the alternate hosts) during spring and back to white pines in the summer and fall.

Management:

In coastal areas and parts of Vancouver Island where currants and gooseberries are grown commercially, do not plant 5-needle pines for ornamental purposes. In gardens where both hosts are growing, decide which is more important and eliminate the other one. In the Interior, where white pine is a valuable timber tree, do not plant currants or gooseberries. See also "Currants and Gooseberries", page 11-20.



White pine blister rust

Poplar and Aspen (Cottonwood)

(*Populus* spp.)

Insects

Aphids - See page 16-1.

Aspen Leafminer (*Phyllocnistis populiella*)

This tiny moth pest occurs anywhere aspens grow. Moths overwinter on the ground, and lay eggs in the spring on opening aspen buds. Larvae emerge and will mine on both the top and bottom of leaves, in a serpentine pattern. Mines formed by the tunneling larvae can be seen from June onwards. Tree leaves appear silvery or grey when infested. After about 2 months, larvae pupate and moths emerge. Heavy mining can cause early leaf drop, and may decrease aspen growth with repeated annual heavy infestations.



Aspen leafminer pupa and damage

Management:

Maintain tree health with adequate irrigation. Natural predators and parasites may help keep this pest in check.

Petiole Gall Aphid

(*Pemphigus* spp.)

Aphids begin feeding in leaf petioles early in the season, causing the formation of petiole galls. Infested leaves often drop early. In summer once adults fly, they search for an alternative host, which is usually a vegetable crop such as lettuce or a brassicae crop, where aphids feed in the root zone. Once fall comes, aphids again fly back to host trees to spend the winter.



Petiole gall aphid damage on poplar

Management:

Rake up and dispose of leaves. No chemical control is available, and on big poplars, sprays would be impractical. Leaf drop does not appear to affect tree vigour.

Poplar and Willow Borer

(Chryptorhynchus lapathi)

Look for sawdust and sap being cast out of swollen scars, splits, and holes in the trunk or limbs. Old damage is evident by death of small stems 2-8 cm in diameter. Cream-coloured larvae up to 12 mm long with brown heads can be found in the holes. The adult is a grayish brown weevil with a wide cream coloured band across its midsection. Weevils are about 1 cm long and appear in mid summer. The life cycle takes 2-3 years to complete.

Management:

Control is usually not possible because, by the time sawdust is observed, the damage has occurred. Prevention is not practical, except for maintaining tree health via good watering and fertilization practices, and avoiding mechanical damage to trees. Plant trees other than poplar and willow in areas where borers are a problem. There are currently no registered insecticides for homeowners for the control of tree borers. Effective treatments may be available through commercial spray services.

Satin Moth

(Leucoma salicis)

Larvae are defoliators of poplars and willows. Adult moths are pure satin white. Caterpillars are black with red and white markings and grow up to 5 cm long. They appear in May and late July and skeletonize the foliage until fall. This introduced insect does not appear to cause lasting damage to established poplar and willow stands, even with significant defoliation annually.

Management:

On small trees, caterpillars can be removed by hand or if desired sprayed with Btk with larvae are small. Spraying big trees is neither practical or necessary.

Diseases

Leaf and Shoot Blight

(*Venturia tremulae*)

Leaves and shoots turn black and die quickly. These symptoms may be caused by bacterial blight (*Pseudomonas syringae*) or by one or more fungi. Leaves and shoots wither and may form a “shepherd’s crook” at the tip.

Management:

Prune out and destroy infected shoots if possible. Rake up and compost leaves, or dispose of fallen leaves in a landfill. If practical, apply copper spray as leaves begin to unfurl in the spring and repeat two weeks later. Avoid close spacing and sprinkler irrigation of small trees. Large trees usually outgrow the damage.

Leaf Blister

(*Taphrina* spp.)

Bright yellow-brown blisters of various sizes develop on the underside of the leaves in late spring to early summer after prolonged wet weather. These blisters eventually turn brown and early leaf drop often occurs.

Management:

Rake up and compost leaves, or dispose of fallen leaves in a landfill. Damage from this disease is usually minor and does not require a spray program. Lime sulphur application in late fall, and in spring before bud break may help to reduce disease.

Phellinus Rot

(*Phellinus tremulae*)

This fungus affects trembling aspen (*Populus tremuloides*). Symptoms include rot starting at the base of the tree and general decline and dieback. The fungus is soil-borne and usually affects a group or row of trees. The heartwood of infected trees is brown and discoloured starting at the base or butt of the tree.

Management:

Remove trees and replant with other species.

Rust (*Melampsora* spp.)

Rust is common on poplars at the Coast. Yellow to orange fungal pustules and spots develop on leaves in summer. Leaves may drop early. Severe disease may lead to eventual decline of the trees. Poplar rusts have alternate conifer hosts, including pine, fir, spruce, larch, tamarack and Douglas-fir. Presence of both poplar and susceptible conifers in an area allows the disease to complete its life cycle.

Management:

Increase tree vigour through proper watering, fertilizing, and mulching. Replant with non-poplar species if severe. Control with fungicides is not practical.

Rhododendron

Insects

Root and Vine Weevils - See page 11-6, under Berries. See your garden centre for availability of weevil-resistant varieties.

Andromeda Lacebugs - See page 16-55 (in this section)

Diseases and Disorders

Bud Drop (failure to flower)

Bud drop, or failure of flower buds to form, may occur naturally on young plants. Some rhododendrons only bloom sporadically during the first few years of growth. Too little fertilizer, or use of high nitrogen fertilizers, may limit flower production. Poor planting sites, with too much shade, or too much sun, may result in good vegetative growth but few flowers. Excessive mulch over the root ball, (more than 10 cm), may interfere with flower bud formation. Dry weather during the previous summer when flower buds are forming may result in poor flowering the next year. Flower buds that turn brown and fall off after a severe winter are usually the result of freezing injury.

Management:

To promote flowering, plant rhododendrons in well-drained soils in sites where there is protection from the hot summer sun. Avoid planting in dense shade; light shade is preferred. Water deeply and thoroughly during dry weather. Fertilize when new growth is elongating during the spring with a fertilizer specifically recommended for rhododendrons. Remove spent flowers to prevent seed formation. Use bark mulch (but not more than 10 cm) to prevent weed growth and to conserve soil moisture.

Leaf Scorch and Winter Drying

See “Plant Disorders Not Caused by Pests”, page 9-5.

Leaf Spot and Blight

(*Colletotrichum*, *Phyllosticta* and other fungal species)

Following winter injury, sunscald, or other injury, a number of fungi may invade leaf tissue as secondary pathogens and contribute to the appearance of spots, blotches or marginal browning on the leaves. Various molds and fungal fruiting bodies may be visible on the dead tissue during wet weather.

Management:

These fungi are seldom-aggressive and rarely require fungicides for control. In most cases, the fungi are only growing on tissue that has died as a result of environmental damage. Follow control for leaf scorch above. Prune out damaged leaves and shoots well below the damaged area to allow healthy regrowth from lateral buds.

Tissue Proliferation (gall)

Rhododendrons may develop galls at the crown that look like crown gall disease. However, no crown gall bacteria have been found in these growths and they are believed to be a natural, physiological condition that may weaken the stem but does not usually harm the plant.

Management:

Discard affected plants during propagation. On larger plants, remove infected stems during pruning when feasible.

Powdery Mildew

(*Microsphaera* spp.)

Some varieties of rhododendron are susceptible to powdery mildew, although the damage is usually less severe than on deciduous azaleas. Faint yellow spots or brown to purplish areas may form on the upper side of the leaf with white powdery fungal growth on the underside of these areas.

Management:

See “Azalea”, page 16-16.

Root Rot and Wilt

(*Phytophthora* spp.)

Phytophthora species are fungal-like microorganisms that can cause root rot of rhododendrons. Fibrous roots are rotted first, followed by the entire root system. The rot progresses up through the crown to the stem. The edge of the dead, dark brown tissue is distinct from healthy, uninfected tissue. As a result of root and stem rot, leaves wilt and become yellowish-green. The plant eventually dies with dead leaves remaining attached to the plant. In some cases, *Phytophthora* causes leaf blotches and twig dieback without crown and root rot. (Do not mistake this for the natural browning of older rhododendron stems).

Management:

Purchase only healthy plants and avoid planting rhododendrons in heavy, wet, poorly drained soils, or in sites where other plants have died from root rot. *Phytophthora* species causing rhododendron root rot have a fairly wide host range and can infect many other root rot-susceptible plants. Remove soil around dead, rotted rhododendrons before replanting.

Rusts

(*Chrysomyxa* spp.)

Two or more rust fungi commonly infect rhododendrons causing yellow to brown leaf spots and pustules on the underside of leaves. In other areas, spruce trees are an alternate host for these rusts, but no spruce infection has been observed in B.C. The rust spores produced on rhododendrons will continue to infect new leaves without the presence of an alternate host.

Management:

Remove and destroy infected leaves as soon as they are found. Bag infected leaves as you pick them and remove them from the garden to prevent spores from spreading. Check the underside of lower leaves, as this is usually where the rust infection starts and is most common. Rust spores spread easily in dry air. However, to reduce new infections, avoid sprinkler irrigation.

Rose

Insects

Aphids - See “Pests Affecting Many Ornamental Plants”, page 16-1.

Mites - See pages 13-11 and 13-32, under Tree Fruit, and 11-7 under Berries.

Winter Moth - See page 13-6, under Tree Fruit.

Rose Slug (Sawfly)

(*Caliroa [Endelomyia] aethiops*)

Leaves are skeletonized, and later turn brown. Damage is caused by small, yellowish-green, slug-like larvae. This insect is the larvae of a sawfly, not a true slug and cannot be controlled with slug control products. Sawflies are related to wasps. Larvae drop to the soil to pupate in late summer. Adult sawflies emerge the following spring. There is one generation per year.

Management:

The damage is mainly cosmetic, but feeding damage to leaves can occur rapidly. Hand-pick the larvae, or spray plants with a stream of water or insecticidal soap or malathion according to label directions. Because they aren't true caterpillars, Btk sprays have no effect. It is best to spray larvae when they are small.

Rose Midge

(*Dasineura rhodophaga*)

Larval feeding occurs within the emerging leaf and flower buds, which causes the buds to wither and turn black. Midge feeding can cause complete failure of a bloom cycle. Peak injury occurs from mid-June to early-July, and in late-August/September. Midge larvae can be seen as early as April and can continue through late summer, as there are multiple generations per season. Larvae drop to the ground to pupate, and overwinter as pupae. Adult flies emerge in early spring and lay eggs on new rose foliage. Midge populations build up over the summer.

Management:

Insecticides for controlling aphids will help control rose midge if applied before midge larvae move into unfolding leaves and flowers. In local trials, pyrethrins gave the best results for domestically available insecticides. Due to the multiple generations per season, a spray every 2 weeks may be needed. Repeated pesticide use can cause spider mite flare-ups in roses because natural predators of mites are killed.

Diseases

Bacterial Blight

(*Pseudomonas syringae* pv. *syringae*)

Roses are occasionally damaged by bacterial blight in Coastal B.C. Look for blackened 1 year-old canes and wilted and blackened new growth. Flower buds die without opening. Black streaks appear on one year old stems. The disease commonly occurs during cool, wet weather in spring. Diagnosis can be tricky since rose stems tend to turn black when killed by many different factors.

Management:

See “Pests Affecting Many Ornamental Plants”, page 16-8.

Black Spot

(*Diplocarpon rosae*)

This is a common fungal disease of roses in Coastal B.C. Look for circular, smudge-like black leaf spots with fringed margins. Severely affected leaves may yellow and drop and bloom size may be reduced. Spots can resemble those caused by downy mildew.

Management:

Plant resistant varieties. For recommendations, ask your garden centre. During the growing season, remove and dispose of infected leaves and avoid splashing leaves when watering. Rake up and compost or burn (where permitted) all plant debris at the end of the summer. Roses that flower on current season’s wood should be pruned back hard before growth starts in the spring. This will remove disease that may be overwintering in the buds.

In spring and early summer, apply a “Domestic” labeled rose dust or spray containing, copper or sulphur at label rates. Biofungicides containing *Bacillus subtilis* or citric+lactic acid are also registered for suppression of black spot. Apply treatments at 1 to 2 week intervals, periodically alternating the fungicide used.



Black spot (left) and downy mildew (right) on rose

Crown Gall

(Agrobacterium tumefaciens)

Rough, warty galls up to 5 cm or more in diameter appear on lower stem or roots. This is not the same as graft gall, a natural swelling of tissue at the graft union, which appears on some varieties. Crown gall is most commonly spread with nursery stock or cuttings from infected plants. Crown gall bacterium carries over in soil and affects a wide variety of woody plants. The bacterium spreads in irrigation water as well as soil and enters the plant through wounded tissue or natural openings. Crown gall bacterium can survive for at least two years in soil.



Crown gall on blueberry

Management:

There is no way to cure crown gall once plants are infected. Inspect new plant roots for small galls and do not plant any stock with root galls. Ensure that soil drainage water does not move from infected to uninfected roses in large plantings.

Remove plants, soil and roots from garden areas where crown gall has been diagnosed, before re-planting. Avoid wounding plants when cultivating or transplanting, as the bacterium enters through wounds. Disinfect pruners after cutting galled plants, using 10% household bleach solution (corrosive), Lysol, or other disinfectants.

Downy Mildew

(Peronospora sparsa)

Downy mildew causes extensive defoliation but can be difficult to diagnose due to systemic, latent infections. Purplish red to brown irregular spots appear on leaves and new shoots. Leaflets typically turn yellow and fall off, and plants are stunted. Greyish-white mold-like growth may appear on the lower leaf surface under very humid conditions but is not often seen. This fungal-like organism can persist inside the stems and crowns of infected plants. It also produces overwintering spores in dead leaves and stems. Unfortunately, many popular rose cultivars are susceptible to this disease.



Black spot (left) and downy mildew (right) on rose

Management:

Established roses will not usually become infected with downy mildew unless new, infected plants are brought into the garden. B.C. nursery growers are very aware of this disease and strive to sell only disease-free plants, but, because the disease can remain dormant inside infected plants, the symptoms may not appear until roses are planted out in the garden.

If symptoms appear, remove and destroy infected leaves and shoots. Rake up and dispose of dead leaves and petioles. Decrease humidity if possible and avoid overhead watering. In cool, wet weather in spring and fall, copper spray applied on a weekly basis may prevent spread of the disease to uninfected plants, but will not cure plants already infected. The disease will continue to recur if the fungus is inside the infected plants. If symptoms re-appear and plants continue to decline, it is best to remove them from the garden and replant. Many bush and mini-roses are severely affected. There is no good information on resistant cultivars. Some climbing roses can tolerate the disease and will continue to grow and flower well. However, they will produce spores that will spread and infect other types of roses in the garden.

Powdery Mildew

(*Sphaerotheca* species)

Some older, climbing varieties are particularly susceptible to this disease, especially when they are planted in damp or shady locations. Look for white, powdery growth on leaves and shoots. Young leaves curl and are more purplish in colour than normal.



Powdery mildew on rose

Management:

Plant resistant varieties – consult your garden centre for availability. Powdery mildew does not require control on most roses unless severe infection leads to excessive leaf drop, yellowing and browning. Washing leaves with water on sunny days when the leaves will dry off quickly helps to reduce powdery mildew. Rake up and remove all leaves at the end of the summer.

In the dormant season, apply lime sulphur using 1 part lime sulphur to 9 parts water. This treatment must be applied before buds start to grow. If disease is severe in spring and early summer, apply at one to two week intervals a rose dust or spray containing sulphur at label rates. Biofungicides containing *Bacillus subtilis* or citric+lactic acid are also registered for suppression of powdery mildew.

Rust

(Phragmidium spp.)

This fungus causes yellowish-orange to black pustules on under leaves surfaces and brown or yellow spots on upper leaf surfaces. Rust often appears on lower leaves first and may remain harmless unless upper leaves also become infected.



Rust on rose leaves

Management:

Pick off infected leaves at the base of plants as they appear. Bag them immediately to prevent spore dispersal. Avoid wetting leaves when watering. Rake up and burn all leaves at the end of the summer. In the dormant season, apply lime sulphur using 1 part to 9 parts water. This treatment must be applied before buds start to grow. A black spot or mildew spray program will also suppress rust.

Snapdragon (*Antirrhinum* spp.)

Diseases

Rust

(Puccinia antirrhini)

This fungus causes reddish-brown spots on the underside of leaves. Size of blooms is often reduced.

Management:

Most “giant” varieties are resistant. Pick off infected leaves (see rust of “Roses”, above). Avoid overhead watering. Do not over winter plants, as they are an infection source for new plants. To protect new foliage from infection, apply a dust or spray containing sulphur according to label directions, before the disease becomes widespread. Repeat applications at 10-day intervals.

Downy Mildew

(*Peronospora antirrhini*)

Snapdragons can be infected by a downy mildew fungus that causes purplish leaf spots, yellowing leaves, stunted plants and leaf drop. It is rarely a problem in garden-grown plants from seed but may appear on bedding plants after transplanting to the garden. This fungus only affects snapdragons and will not spread to roses or other plants in the garden.

Management:

Control is rarely needed. Applications of a fungicide containing copper spray will prevent spread to other snapdragons during cool, cloudy weather. If only a few plants appear to have symptoms, these should be removed.

Spruce (*Picea* spp.)

Insects

Cooley Spruce Gall Adelgid

(*Adelgid cooleyi*)

Terminal growth on spruce trees develops galls 2.5 to 5 cm long, green to purple in colour, which later become dry, hard and brown and resemble cones. Colonies of adelgids, which are similar to aphids, live inside the galls at the base of each needle. This adelgid also feeds on Douglas fir during part of its lifecycle, where it appears as tiny white tufts on the needles in the spring and early summer. For control on Douglas-fir, see page 16-29. Damage is most severe on immature spruce trees.



Cooley spruce gall adelgid damage on spruce

Management:

Prune off and destroy galls while they are still green, usually before mid-July. This kills the adelgids still within the gall. If they are too numerous to remove all galls, spray at bud-burst with insecticidal soap at label rates. Thorough spraying is required for good control and is impractical on large trees.

Green Spruce Aphid

(*Elatobium abietinum*)

Aphid infested trees usually drop all needles except for the current season's growth. The inside of the tree becomes bare. Damage is caused by a small, dull-green aphid, which may be present on needles from February to late spring in coastal areas. This insect can kill trees that are attacked 2 or 3 years in succession and not treated. Alberta spruce and Sitka spruce can be severely damaged. Douglas fir and pine can also become infested.

Management:

Damage often occurs when the aphid buildup goes unnoticed in early spring. In early February in coastal areas (later in colder areas) check for aphids by shaking a few branches vigorously over a piece of stiff white paper. As soon as aphids are detected, spray trees with insecticidal soap at label rates. Repeat the paper test every 2 weeks until mid-June and repeat sprays as long as the aphids are found which can be as late as June.

Spruce Budworm

(*Choristoneura fumiferana*) and other caterpillars

Spruce budworm and other early season caterpillars affect spruce, balsam fir, Douglas fir, pine, hemlock and larch. Spruce budworm caterpillars are dark reddish-brown with yellow stripes, and chew on opening buds and needles. These caterpillars hatch from eggs in late summer, overwinter in protected areas on host trees, and begin feeding in late spring on new buds. New foliage can be completely consumed by the time the larvae pupate in mid summer. Moths emerge in late summer, mate and lay eggs. There is one generation per year.



Western spruce budworm

Management:

This is a major forest pest in B.C. It can also cause significant defoliation in nurseries and landscape trees. Numerous natural enemies exist for budworms, including arthropod predators, parasites, and birds. Cold springs cause significant mortality to young larvae. If populations are low, larvae can be removed by hand-picking. If trees have been defoliated in previous years, insecticides (permethrin, malathion) applied at budburst up to 2 cm new growth will help control budworms. Btk can be used at 2 cm new growth for best results (caterpillars need to eat it).

Spruce Spider Mite

(Oligonychus ununguis)

Needles become yellow and covered with silky webbing. Mites are pale green when young and darken with age. They overwinter as eggs on twigs and needles. This mite also attacks *Juniperus*, *Thuja* and *Tsuga*. Damage occurs during the hottest part of the growing season.

Management:

If present, or if you have had problems with mites in the past, spray in early May when mite eggs hatch.

Spruce Needle Miner

(Endothenia albolineana)

These light green caterpillars, up to 6 mm long, tunnel into spruce needles in mid summer and emerge fully-grown by April. They web needles and “frass” (insect droppings) together forming a feeding shelter or ‘nest’. Moths fly in May, and lay eggs along needles. The entire crown of small trees may be killed. On large trees, impact of the pest is minimal on tree health, however, damage is unsightly.

Management:

Prune out infested branch tips and destroy them. If infestation is heavy, consider applying an insecticide for caterpillars in spruce (Btk, permethrin, malathion) during June to kill newly hatched larvae.

Sitka Spruce Weevil (White Pine Weevil)

(Pissodes strobi)

This insect affects Sitka, Englemann, and white spruce in B.C. Usually, only the leader (the top branch of the tree) is killed by these cream-coloured weevil larvae which bore into them. Adult weevils are reddish-brown with patches of brown or grey scales, and are 5 to 7 mm long. They are present most of the year, but egg laying takes place only from April to early July. This is a significant forestry pest. Annual attacks by this pest leave trees bushy and limit growth.

Management:

Prune off and burn wilting, dying or dead leaders. Tie a side branch into an upright position. This will form a new leader. There are no registered insecticides available for the home garden to control this pest. Contact a certified applicator if damage is severe enough to warrant treatment.

Diseases

Tip Blight

(Cold Injury, *Sclerophoma* spp.)

Blue spruce and some other spruce varieties are susceptible to spring cold injury that causes dieback of young growing tips. Sydowia's blight and other fungi cause tip dieback on blue spruce, but usually affect only young shoots damaged by cold or frost in the spring. Black fungal bodies are abundant on new needles. Shoot tips become distorted and brown.

Management:

Do not over-fertilize or fertilize with nitrogen in late summer. Late summer fertilizer application to lawns can affect trees as well if they are in the lawn or downstream from lawn drainage or runoff. Occasional cold injury to young growth will not damage the tree but if injury is repeated and affects the whole tree then the site is not suitable. Small trees can be wrapped for winter in colder areas.

Red Cedars, Arborvitae (*Thuja* spp.)

Insects

Cypress Tip Moth - See "Chamaecyparis", page 16-19.

Red Cedar Bark Beetle

(*Phloeosinus* spp.)

This bark beetle attacks weakened, recently transplanted, or dying cedars. Thinning and greying of foliage becomes evident, but usually only after the beetle population is high within the tree. Small round holes 2 mm in diameter can be found on the trunk and branches, and fine boring dust, where beetles have been active. Even small branches can be infested. Larvae feed within the cambium layer under the bark, and adult beetles feed on bark. Feeding from both adults and larvae causes girdling of branches and the trunk, and ultimately tree death.

Management:

Trees cannot be treated or recover from bark beetle infestations. Keep cedar trees healthy with adequate fertilization and water, especially after transplanting. Cedars are susceptible to drought, and this can predispose them to beetle attack. Beetles will not usually attack healthy trees. If trees become infested, remove and destroy them, to stop the spread of the beetles to other trees.

Spruce Spider Mite - See page 16-74.

Diseases and Disorders

Cedar Flagging (Physiological)

Isolated branches and branch tips of western red cedar turn yellow or red in late summer or early autumn. Some flagging is normal each year as old foliage is shed. Flagging may be more severe under poor growing conditions such as waterlogged soils in the spring and/or hot, dry weather in the summer.

Management:

Flagging does not damage the tree. Provide trees with adequate water during hot, dry weather. Fertilize the following spring to bring trees back into healthy, vigorous growth.

Winter Browning

Leaves exhibit brown to purple discolouration in winter and spring.

Management:

No control is necessary. Browning is caused by cold winter temperatures. Discolouration is usually temporary and the plants will green up again when temperatures rise in spring. Of the common hedging cedars, 'Smaragd' (also called 'Emerald') is the least susceptible to winter browning and 'Excelsa' is the most susceptible. Also see "Plant Disorders Not Caused by Pests" page 9-4.

Coryneum Blight (Berckmann's Blight)

(Seiridium cardinale)

This fungus is found on many cedars, but only causes a serious disease on 'Biota' cedars, also known as oriental cedar, "*Thuja orientalis*" or "*Platycladus orientalis*". Young leaves and shoot tips are infected in the spring and the branches turn grey during the summer. Infection worsens gradually over the years until the shrubs are severely disfigured.

Management:

'Biota' cedars are a poor choice for B.C. They are difficult to grow successfully in a cool, wet climate and are better adapted to Southern California. In Coastal B.C., they should be grown under an overhanging roof to keep the rain off or they must be sprayed twice each fall and again each spring with copper spray at 4 mL/L water to control this disease. They are not winter-hardy in the B.C. Interior.

Keithia Blight

(*Didymascella thujina*)

Small, irregular to circular brown to black 1-3 mm spots appear on scale leaves in late spring. The leaves then turn brown and affected areas fall out. Later, leaves drop, resulting in bare branches. It affects mainly *Thuja plicata* varieties such as “Excelsa” and “Atrovirens” as well as native red cedars. Closely spaced nursery trees are frequently infected, especially if they are grown in containers under sprinkler irrigation.



Keithia blight on cedar

Management:

Do not plant ‘Atrovirens’ in coastal areas. Examine ‘Excelsa’ closely prior to purchase and do not buy them if blight is obvious. Once planted out in the landscape, a low level of disease can be tolerated. It will not kill trees but may cause them to be somewhat unsightly, especially on the north side. Avoid wetting the foliage with sprinkler irrigation.

Armillaria root rot - See “Pests Affecting Many Ornamental Plants”, page 16-11.

Tulip

Insects

Bulb flies - See page 16-25 (Daffodils)

Diseases

Tulip Fire - (*Botrytis tulipae*)

Fire disease is by far the most serious disease of tulips and is the main reason why tulips cannot be grown successfully in the same soil year after year. The first infected plants to emerge in the spring are known as ‘fire heads’. They are stunted, brown and rolled and in wet weather are covered with masses of grey spores. If wet or drizzly weather continues, the spores quickly spread the disease to other tulip leaves and flowers. The flowers become covered with yellow to brown spots that also become covered with spores. The whole planting can turn into a blighted mess in a few days.

Management:

Examine bulbs carefully prior to planting and discard any with obvious lesions or adhering small black fungal bodies called sclerotia. Plant only in open, sunny locations with excellent air movement. Watch for fire heads and remove them as soon as they become apparent, taking care not to drop any fragments of soil or spores onto other tulip plants. Remove flowers promptly after they are past their peak and remove them from the garden. Dig bulbs in late summer and discard any with lesions or sclerotia. Rotate planting to a new location for the following year.

Viburnum

Insects

Viburnum Leaf beetle

(*Pyrrhalta viburni*)

Viburnum leaf beetle occurs on Southern Vancouver Island and in the Fraser Valley. Both the adult and larval stages feed exclusively on *Viburnum* species. European highbush cranberry (*V. opulus*), is a preferred host. Other *Viburnum* species are less susceptible. Heavy infestations can defoliate shrubs, causing die-back and death after 2-3 years of repeated infestations. It overwinters as eggs that are inserted into one- or two-year-old branches. Larvae can be found feeding in June. Adults are present in July, feed on leaves, and lay eggs under bark of twigs in noticeable rows from late summer through fall.



Viburnum leaf beetle larvae and damage

Management:

Plant less susceptible species where possible. Prune out and destroy twigs infested with eggs in late fall or early spring before hatch. In July, shake bushes to dislodge beetles, collect beetles on a ground sheet, and drop into soapy water to destroy. Control larvae and adults with insecticides registered for viburnum (pyrethrins). Note that Btk does NOT control beetle adults or larvae.

Diseases

Powdery mildew

(Microsphaera spp.)

A white powdery growth resembling talc covers leaves in late summer. The powdery mildew fungus infects a wide range of woody, deciduous host plants.

Management:

DO NOT use sulphur on Viburnum.

See “Pests Affecting Many Ornamental Plants”, page 16-9.

Willow (*Salix* spp.)

Insects

Giant Bark Aphid and Giant Willow Aphid

(Longistigma caryae, Tuberculachnus salignus)

Large greyish-black aphids, 2-4 mm long, nymphs and adults suck sap from branches and cause sooty mould. Secretions may also attract many wasps. Repeated infestations weaken trees, making them susceptible to other pests. Aphids are present on branches and stems, and populations build up over the season, peaking in mid summer.

Management:

See page 16-1 (Aphids).

Caterpillars - See page 16-2.

Fall Webworm - See page 16-5.

Poplar and Willow Borer - See page 16-62 (Poplar)

Willow Leaf Beetle - See “Elm Leaf Beetle”, page 16-6

Willow Leaf Gall

(*Pontania pacifica* and other species)

Small sawflies (wasp-like insects) deposit eggs into willow leaves. The larva feeds within the leaf, causing a swelling or bump to develop at that site. Different species will cause different types of leaf galls.

Management:

This insect does not seriously affect the vigour of the tree and control is not necessary. If the tree is small and damage is of concern, prune out infested leaves and destroy them.

Alder Flea Beetle

(*Macrohaltica [Altica] ambiens*)

The beetle is 6 mm long, metallic green to blue with yellow legs. It hops or jumps when disturbed. The larvae are a shiny black. The adult and larvae both skeletonize leaves, and can severely defoliate trees. Leaves look scorched and brown. However, damage usually lasts for only one year, and seldom causes serious long term injury to trees. Larvae are present from spring to late summer (August), pupate in the soil, adult beetles emerge in late summer, feed on leaves until late fall, and then overwinter. Beetles emerge from protected overwintering sites and lay eggs in the spring. The primary host is alder, but beetles will attack willow and poplar.

Management:

Usually none is required. Infested branches can be pruned off and destroyed.

Diseases

Blight

(*Marsonnina salicicola*, *Septoria* spp. and other fungi)

Marsonnina causes swollen, spindle-shaped cankers, which encircle small branches, causing branch tips to die. Black spots appear on leaves. These fungi over winter as twig cankers. During wet weather, new leaves and shoots become infected. Early leaf drop may occur.

Management:

Prune out and dispose of infected twigs at least twice per year. On larger trees, fungicides are not usually necessary or practical. No domestic fungicides are registered for control of these diseases on willow.

Wisteria

Diseases

Root Rot

(*Phytophthora* spp.)

Wisteria are susceptible to root rot, particularly if grown under sprinkler or drip irrigation. Foliage wilts and dies back and roots are darkened and rotted.

Management:

Avoid over watering. Avoid drip or sprinkler irrigation and do not over-fertilize. If watering practices are changed and the dead areas are cut out, the rest of the plant will usually survive and thrive.

Leaf Mosaic (virus)

Wisteria leaves develop a yellow mottle and may be distorted. This is a common disease of wisteria and does not usually damage the plant. Young plants may grow and flower poorly if severely infected. The virus does not infect most other garden plants.

Management:

Most plants will continue to grow and flower well despite the infection. However, young plants of severely affected susceptible varieties that are stunted and grow poorly when transplanted should be removed and discarded.