

9 TREE AND SHRUB PEST MANAGEMENT

Trees and shrubs enhance a property and add to its value. Choosing the right plant for the right place is important in the home landscape, as is providing the proper care for each plant. Know what's normal for the plants. For example, evergreens lose their leaves. One- to six-year-old inner leaves or needles turn yellow then brown but new growth remains green. On pines old needles drop off in the fall of the year, but hollies drop old leaves in the spring. Pest infestations and pruning, watering, and fertilization practices may affect the health of plants around the home.

When a pest problem arises, you need to decide what can be done about it. Use an integrated approach to managing pest problems. In some cases pruning out infested portions of plants may be all that is needed. If a pesticide is required, choose the least toxic one available that will still give good control of the pest. You may be able to monitor pests to help you time control measures accurately. For example, in the case of foliar-feeding scale insects, to monitor when activity of crawlers begins, place a piece of double-sided sticky tape around twigs and branches a few weeks before crawlers are expected; using a magnifying glass, check the tape for crawlers every three to four days. Control measures for scale crawlers, in general, should be applied five to seven days after activity begins.

GROWING DEGREE-DAYS

As we learn more about the biology of insect pests, we will be able to make timely management decisions. More accurate timing will allow us to reduce the number of pesticide applications needed. A system using Growing Degree-Days (GDD), which are more accurate than calendar dates,

is used to determine when to apply pesticides to ornamental trees and shrubs. The climatological calendar begins on March 1, and the base temperature is 50° F. The GDDs are additive, giving a cumulative total for each day of the growing season. Insect development can be tied directly to GDD accumulations, especially in the spring, when most activity begins. Apply the pesticide when your GDDs have reached the levels listed in the tables.

The following formula, in degrees Fahrenheit, is used to determine GDD for each day:

$$\frac{\text{Maximum} + \text{minimum}}{\text{daily temperature}} = \text{Mean temperature}$$
$$2$$
$$\text{Mean temperature} - 50 = \text{GDD}$$

Consult your county Cooperative Extension agent for local GDD data for pest management. Known GDD information is included in Part II, Table 11.

PLANT PHENOLOGICAL INDICATORS (PPI)

Phenology is the study of recurring biological phenomena (events) and their relationship to weather. Periodic events such as flowering are recurring biological phenomena that occur only after a definite amount of heat energy accumulates within any given plant, as determined by its genetic inheritance. Every year that event occurs at the same "time," but not as calculated by the calendar. The same forces likewise affect the arthropod pests of any given plant. The insect and its food plant overwintering together are synchronized so well that the insect will appear at a rather precise time (i.e., egg will hatch, larva will break diapause) and be ready to feed when the host plant has what the insect needs.

To provide a readily visible plant phenological event (flowering fruit color, seed drop), one needs only to observe another plant species in flower that coincides with the insect pest of concern. For example, the honey-

locust plant bug will be present and vulnerable on honeylocust trees when Japanese quince begins to flower. Many other plants are in flower at the same time and they, too, may be used as phenological markers. In Part II, we have combined the basics for three timing systems—Growing Degree-Days (GDD), PPI, and calendar. GDD and PPI work independently. A finely tuned GDD system and PPI complement one another. Fine-tuning is a continuous process. These predictor systems are indispensable to IPM scouting and the application of management techniques.

KEY PLANTS AND KEY PESTS

Knowing which pests are most common and cause the most damage can also be helpful. Arborists and landscape contractors who manage pest problems are faced with more than 140 insect pests and 110 different diseases, but not all of these occur every year in damaging numbers. One goal in an integrated pest management approach is to monitor the major pests of the most common and significant plants in each landscape. Table 10 lists key plants and key pests and may help in planning your annual inspection schedule. The pests are grouped according to the first months in which they should be managed or controlled. Certain pests, such as aphids and mites, may continue to be pests for many months.

SAMPLE IPM PROGRAM

The gypsy moth, a forest and shade tree pest that can cause widespread defoliation, is an introduced insect that has few natural enemies in our country. Management options for homeowners include planting resistant species; improving plant health by watering and fertilizing properly; removing and destroying egg masses anytime from September through mid-April; assessing the population and potential damage when young larvae are present in late May or early June and treating if needed; using bands around trees to trap larger

larvae or to prevent larvae from entering the canopy; and destroying pupae as found.

Gypsy moth traps are available, but we do not recommend them as a control measure. They are very useful in monitoring the spread of gypsy moth into new areas, but they trap only male moths, which does not significantly reduce the population. We are continuing to learn about natural biological controls that play a part in the gypsy moth picture. Natural biological controls, including parasites

and predators, play a role in suppressing gypsy moth populations over large geographic regions but are unlikely to protect individual trees or properties adequately during outbreaks. Recently the fungus *Entomophaga maimaiga* was found causing the collapse of large numbers of gypsy moth larvae. Scientists do not know whether the fungus will continue to give control, however, because weather conditions and pest populations influence the survival of the fungus. We hope that this and other natural enemies will continue to play a part in suppressing

this pest. Many parasites have been introduced, but none has yet provided satisfactory control of this major pest.

Table 11 lists common plants and pests along with biological notes and nonpesticidal means of managing them.

When treatments are listed as dormant, it indicates the period just before budbreak. At that time, insect activity is beginning to accelerate, there is no foliage canopy, and complete coverage is obtained.

Pesticide guidelines are found in Part II.

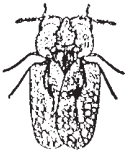
Table 10. Key tree and shrub pests

<i>Month (ideal time to manage)</i>	<i>Pests</i>	<i>Principal Hosts</i>
March (dormant)	spider mite	evergreens, crabapple
	elongated hemlock scale	hemlock
	maple gall mite	maple
	pine bark adelgid	white pine
	eastern spruce gall adelgid	white and Norway spruces
	tuliptree scale	tuliptree
	euonymous scale	pachysandra, euonymus
Early April	black knot	plum, flowering cherry
	white pine weevil	white pine (main shoot) spruce
Mid- to late April	tent caterpillar	cherry, crabapple
	European pine sawfly	Mugo, scots, other pines
	anthracnose	maple, ash, oak, linden, dogwood
	hawthorn leaf spot	hawthorn
	honeylocust plant bug	honeylocust
	scab	apple, crabapple, hawthorn
	juniper twig blight Diplodia blight	juniper, cedar pines (especially Austrian)
Early May	birch leafminer	birch
	aphid	deciduous plants
	dogwood borer	flowering dogwood
	euonymous scale	euonymus, pachysandra
	Cooley spruce gall adelgid	blue spruce
	white pine aphid	white pine
	cankervorm	oak, linden, beech, elm
	pachysandra blight viburnum leaf beetle	pachysandra viburnum
Mid- to late May	gypsy moth	oaks, maple, many trees
	spruce spider mite	spruce, juniper, arborvitae
	rhododendron borer	rhododendron
	lacebug	sycamore, walnut
	woolly beech aphid	beech
	black vine weevil	rhododendron, azalea, yew
	Verticillium wilt black spot, mildew	maple rose

Table 10. Key tree and shrub pests (continued)


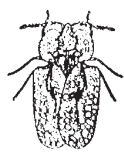
<i>Month (ideal time to manage)</i>	<i>Pests</i>	<i>Principal Hosts</i>
Early June	lacebugs	andromeda
	bronze birch borer	birch
	elongate hemlock scale	hemlock
	rose chafer	rose
	spruce canker (Cytospora)	spruce, fir
	Phytophthora wilt	rhododendron and azalea
Mid- to late June	bagworm	arborvitae, juniper
	leafhopper	maples, deciduous plants
	juniper scale	juniper
	white prunicola scale	flowering cherry and plum
July	Japanese beetle	many deciduous plants
	fall webworm	many deciduous plants
	spider mite	evergreen and deciduous plants

Table 11. Tree and shrub pest management

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Andromeda (<i>Pieris</i> sp.)	Fungal leaf spot	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts.
	 Lace bug (<i>Stephanitis</i> spp.)	Stippled, yellowish to silvery leaves and brownish-black “varnish” spots; bugs may be seen on undersides of leaves. Natural enemies rarely abundant enough to control damaging populations. Blast insects off undersides of leaves with a jet of water. Avoid growing plants in full sun or warm, exposed sites. Water to prevent drought stress. Some cultivars are moderately resistant, especially <i>Pieris floribunda</i> and hybrids such as <i>Browers Beauty</i> .
		Spider mites
Arborvitae (<i>Thuja</i> sp.)	Arborvitae leafminers	Tips of shoots and foliage turn brown. Remove and destroy infested leaves from fall to early spring. Parasites usually not abundant in specimen trees.
	Arborvitae weevil	Chewed foliage and dieback; roots damaged by larvae. Nursery plants die rapidly. No cultural control is recommended.
	Bagworm	Sparse foliage, spindle-shaped bags attached to twigs or foliage. Handpick bags from trees and destroy. Bags easier to see in fall and winter.
	Scales	Unthrifty plant; dead twigs, honeydew, and sooty mold may be present. For a small infestation, it may be possible to prune out affected plant parts. Identify scale species.
	Spider mites	Often feed on old needles. Stippled, off-color foliage may turn reddish-brown. Predaceous mites often keep spruce spider mite under control. Water to prevent drought stress.

continued


Table 11. Tree and shrub pest management (continued)

Plant	Pest/Disease	Description/Cultural Management
<p>Azalea (<i>Rhododendron</i> sp.)</p>  <p>Black vine weevil — larva and pupa</p>  <p>Lace bug</p>	Fungal leaf spot	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants. Improve growing conditions.
	Leaf gall (<i>Exobasidium vaccinii</i>)	Remove galls by hand and discard or destroy before white, powdery spores appear.
	Azalea bark scale	Scale insects infest stems, causing an unthrifty plant and dead twigs. For small infestations, prune out affected plant parts.
	Azalea crown borer	Prune out infested branches at root crown.
	Black vine weevil	Notched leaves and bark removed from root crown. Handpick in small plantings. Pitfall traps or beating sheets can help monitor adult activity. Pitfall or burlap collar traps catch night-feeding weevils. Entomophagous nematodes may be used for soil-dwelling stage (larvae) when larvae are present.
	Lace bug	See Andromeda. Resistant cultivars are available.
	Spider mites Whitefly	See Andromeda. Sooty mold, discolored foliage, yellowish mottle; whiteflies usually present on undersides of foliage. Plant resistant azalea varieties. Large populations may require use of pesticides.
<p>Birch (<i>Betula</i> sp.)</p>	Aphids	Unthrifty plant, honeydew or sooty mold, distorted, pale green foliage, reduced shoot growth. Aphids have many natural enemies, including lady bird beetles, syrphid fly larvae, and wasp parasites. Natural enemies usually found with high populations. “Blast” with water (high pressure water spray); pinch off heavily infested leaves.
	Birch leafminer	Dark greenish spots on leaves expanding to blotch mines covering half or more of leaf. Exotic parasites have been established. Birch leafminer has two annual generations; control of first generation is most important. Some species are resistant.
	Birch skeletonizer	Brown skeletonized leaves. No cultural controls available.
	Bronze birch borer	Dieback of tree from tip down and dead crown or leader, Keep trees growing vigorously. Resistant birch species are available. Adults begin to emerge in early June.



Birch leafminer injury

Table 11. Tree and shrub pest management (continued)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Boxelder (<i>Acer negundo</i>)  Boxelder bug	Boxelder bug	Remove female seed-bearing trees.
Boxwood (<i>Buxus</i> sp.)	Canker (<i>Volutella buxi</i>)	Prune infected branches, remove and discard old leaves. Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tool between cuts. Fertilize to maintain vigor.
	Fungal leaf spot	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts.
	Boxwood leafminer	Yellowish mines; most noticeable on undersurfaces of leaves. Remove infested leaves by hand.
	Boxwood mite	Yellow to bronze stipple on infested foliage. Few parasites exist.
	Boxwood psyllid	Upward-cupped leaves, especially new growth; symptom remains for about two years. English box is less severely attacked. Prune tips of plants in winter or early spring before eggs hatch every few years. Remove prunings.
Clematis (<i>Clematis</i> sp.)	Leaf spot and stem rot (<i>Aschochyta clematidina</i>)	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tool between cuts.
	Blister beetle	Handpick (wear gloves) and destroy.
	Borer	Bores in roots. Dig out larvae by hand.
Cotoneaster (<i>Cotoneaster</i> sp.)	Fire blight	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tools between cuts. Prune to thin plants. Avoid crowding plants; allow air to circulate around and within plants. Avoid heavy nitrogen fertilization. Plant resistant species: <i>C. adpressa</i> , <i>C. microphylla</i> , <i>C. dielsiana</i> var. <i>elegans</i> , <i>C. francheti</i> , <i>C. simonsi</i> .
	Borer	Dig out larvae. Borers can be removed with a knife and a piece of wire with a sharp point or barb. Cut with caution, being sure not to remove more wood than necessary. Carefully cut wounds usually heal without noticeable injury to tree. Keeping plants healthy and vigorous by proper cultivation, fertilization, pest control, and watering will help infested plants overcome effects of borer injury.
	Lace bug	<i>Corythuca</i> spp. Stippled, yellowish to silvery leaves; brownish-black "varnish" spots on undersides of leaves. No cultural controls available. Some species are resistant: <i>Cotoneaster apiculatus</i> , <i>C. adpreosus</i> var. <i>praecox</i> , <i>C. horizontalis</i> var. <i>persipullus</i> .

continued

Table 11. Tree and shrub pest management (*continued*)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Cotoneaster (<i>Cotoneaster</i> sp.) (<i>continued</i>)	Pearleaf blister mite	Off-color foliage, blisters (undersides of leaves) turn brown at end of season. No cultural controls available.
	Pearslug (sawfly larva)	Larva causes skeletonization of leaves; two or three generations. No cultural controls available.
	Scales	See Arborvitae.
Crabapple (<i>Malus</i> sp.)	Cedar apple/ cedar-hawthorn rust	Remove nearby juniper trees. Plant less susceptible varieties: Ellwangerina, Henry Kohankie, Ormiston Roy, or Red Baron.
	Fire blight	See Cotoneaster. Plant less susceptible varieties: Adams, Albright, Callaway, David Dolgo, Indian Summer, Jewelberry, Liset, Profusion, Red Baron, robusta cv. Persicifolia, Selkirk, or Sentinel.
	Powdery mildew	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Prune to thin plants. Disinfest pruning tool between cuts. Avoid crowding plants; allow air to circulate around and within plants. Plant less susceptible varieties: Adams, Arctic Dawn, baccata cv. Jackii, Bob White, Callaway, Donald Wyman, Ellwangerina, floribunda, sieboldii var. zumi cv. Calocarpa.
	Scab	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Prune to thin plants. Disinfest pruning tool between cuts. Avoid crowding plants; allow air to circulate around and within plants. Plant less susceptible varieties: Adams, Albright, Baskatong, Christmas Holly, Cotton Candy, Dolgo, Donald Wyman, floribunda, Henningi, Henry Kohankie, Jewelberry, Liset, Ormiston Roy, Prof. Sprenger, robusta cv. Persicifolia, Robinson, rocki, sargentii cv. Tina, Sentinel, sieboldii var. zumi cv. Calocarpa, Snowdrift, Sugartime, or White Angel.
	Aphids	See Birch.
	Eastern tent caterpillar	Devours new foliage as it unfolds in spring; constructs nests of silk in branch crotches. Remove caterpillars by hand. Prune off egg masses encircling twigs by late winter.
	Japanese beetle	Skeletonized foliage, lacy appearance. Handpick beetles. Grub is a turf pest (see turf section). Pheromone and feeding traps are available but may attract more beetles than they catch. Some resistant varieties and cultivars exist.
	Leaf tiers and rollers	Skeletonization and folded or rolled leaves (insects feed by tying or rolling leaves with silk around themselves). Handpick and destroy small infestations.
	Roundheaded appletree borer	Holes in bark near base of tree; tree may appear unthrifty. Remove borers from trees with a knife and a sharply pointed or barbed piece of wire. Clear away litter around base of tree to help locate borers. Younger borers can usually be cut out; older ones can be killed or impaled by forcing a wire into external hole that leads to borers' tunnel. Cut with caution, being sure not to remove more wood than necessary.



Japanese beetle




Roundheaded appletree borer

Table 11. Tree and shrub pest management (*continued*)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Crabapple (<i>Malus</i> sp.) (<i>continued</i>)		Carefully cut wounds usually heal without noticeable injury to tree. Keeping trees healthy and vigorous by proper cultivation, fertilization, pest control, and watering will help infested trees overcome effects of borer injury. If tree is young, put tree wrap around it to prevent egg laying.
	Scales	Dead branches, sooty mold, presence of scale insects. If infestations are small, prune out affected plant parts. Identify scale species if additional measures needed.
Dogwood (<i>Cornus</i> sp.)	Anthracnose	Clean up fallen leaves in autumn and prune diseased twigs as they become apparent throughout the season. Disinfest pruning tool between cuts. Plant resistant species and cultivars: <i>C. florida</i> 'Spring Grove' and 'Sunset,' <i>C. kousa</i> , <i>C. kousa x florida</i> hybrids, 'Constellation,' 'Ruth Ellen,' 'Star Dust,' 'Stellar Pine,' and 'Celestial.'
	Crown canker (<i>Phytophthora cactorum</i>)	Prevent mechanical injuries and borer damage to base of trunk. Remove discolored wood down to heartwood; also remove healthy wood for 1.5 in. around discolored area. Remove trees with cankers encircling more than half of stem. Do not replant with dogwood.
	Fungal leaf spot	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Practice plan sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. If severe, verify diagnosis.
	Cottony maple scale, cottony maple leaf scale	Honeydew and sooty mold accumulate on leaves of branches, twigs die back, foliage drops prematurely. Several effective predators and parasites available. Summer scale form is found attached to undersides of leaves.
	Dogwood borer	Dead branches and adventitious growth. No effective parasites or predators available. Prune or remove and discard or destroy affected plant parts. Keep trees growing vigorously. Drenching bark with beneficial nematodes in late summer has provided some control. Resistant species and cultivars include <i>Cornus kousa</i> and <i>C. kousa x C. florida</i> hybrids: 'Aurora,' 'Constellation,' 'Galaxy,' 'RuthEllen,' 'Stardust,' and 'Stellar Pink.'
	European fruit lecanium scale	Sooty mold and dead twigs. Many effective parasites available. Avoid killing parasites; scout thoroughly.
Douglas fir (<i>Pseudotsuga taxifolia</i>)	Cooley spruce gall adelgid	Yellow spots on needles and crooked needles on host. No effective parasites available. Do not plant Douglas fir with blue spruce. Damage rarely serious.
	Rhabdocline needlecast	Yellow spots on needles in late fall; yellow-brown to red-brown needles in early spring; needle drop begins in early summer. Purchase Douglas fir for planting only in spring. Examine stock for diseased needles and reject trees with suspicious symptoms.

continued

Table 11. Tree and shrub pest management (continued)

Plant	Pest/Disease	Description/Cultural Management
Douglas fir (<i>Pseudotsuga taxifolia</i>) (continued)	Swiss needlecast	Yellow to brown needle discoloration during summer months, resulting in needle drop by late August. Black fruiting bodies visible on undersides of needles with a hand lens. Purchase Douglas fir for planting only in spring. Examine stock for diseased needles and reject trees with suspicious symptoms.
Dutchman's pipe (<i>Aristolochia</i> sp.)  Mealybug	Fungal leaf spot	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts.
	Mealybug	White waxy masses and sooty mold. Mealybug destroyer, a biological control, is available.
	Scales	See Arborvitae.
Elm (<i>Ulmus</i> sp.)	Dutch elm disease	Wilting leaves, death of individual branches high up in canopy (flagging), brown streaking pattern on tissue beneath bark (fungus <i>Ophiostoma ulmi</i> or <i>O. novo-ulmi</i> infects vascular system of tree; fungus spread by elm bark beetle). American elms very susceptible. Some crosses with oriental varieties have been made in an attempt to gain some resistance, but keeping upright vase-like shape of American elm has been difficult.
	Elm leaf beetle	Skeletonized leaves. Parasites and predators not abundant enough to provide control. Elm species differ in suitability as food for this beetle.
Euonymus (<i>Euonymus</i> sp.)	Crown gall	Rogue plants: remove and discard or destroy entire infested plant and immediately surrounding soil or soil clinging to roots. Practice crop rotation: set plants in a location different from where they grew previously. If that is not possible, for small shrubs remove infested soil and replace with fresh soil.
	Euonymous scale	Yellow spots on leaves and scurfy material on twigs and leaves. Effective parasites and predators available. A predatory lady beetle, <i>Chilocorus kuwanae</i> , has been introduced. Scout thoroughly. If infestation is small, prune out affected plant parts. Some species and cultivars are resistant, e.g., 'Manhattan' and <i>E. fortunei</i> .
Firethorn (<i>Pyracantha</i> sp.)	Fire blight	See Cotoneaster.
	Scab (<i>Fusicladium pyracanthae</i>)	In autumn, rake and discard or destroy all fallen berries. Plant more resistant Yunan firethorn (<i>Pyracantha fortuneana</i>).
	Lace bug	See Cotoneaster. Some cultivars or species are less preferred: <i>P. angustifolia</i> 'variegata' and <i>P. elatantoides</i> 'Aurea.'
	Scales	See Arborvitae.

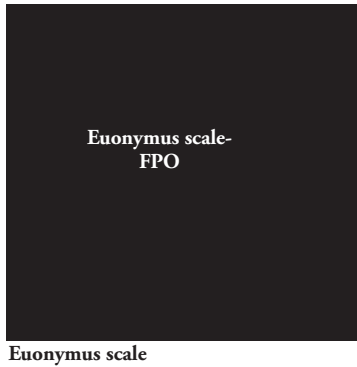



Table 11. Tree and shrub pest management (*continued*)

Plant	Pest/Disease	Description/Cultural Management
Flowering peach, cherry, and plum (<i>Prunus</i> sp.)	Black knot	Practice plant sanitation in winter: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tool between cuts. Improve air circulation. Rogue infected wild cherry trees in surrounding area.
	Cherry leaf spot	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches.
	Cytospora canker	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Fertilize properly. Water during drought.
	Monilinia shoot blight	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tool between cuts.
	Peach leaf curl	Remove affected leaves before powdery spores appear.
	Aphids	See Birch.
	Borers (peachtree borer and lesser peach tree borer)	Peachtree borer may girdle at soil line; lesser peachtree borer causes twig or branch dieback and galleries in bark; bark fragments and frass collect on external bark along with gum, and suckers grow below injury site. Pheromone lure traps helpful for monitoring and provide some control. Borers strongly attracted to damaged bark. Do not pile mulch against <i>Prunus</i> stems.
	Eastern tent caterpillar	See Crabapple.
	European fruit lecanium scale	See Dogwood.
	Japanese beetle	See Crabapple.
	Spider mites	See Arborvitae.
	White prunicola scale	Weakened branches, white coated trunk and twigs, dieback. Two generations per year. Predators and parasites abundant but not reliable for control. Scrub infested bark with soft brush dipped in milk soap solution.
 Japanese beetle		
Forsythia (<i>Forsythia</i> sp.)	Crown gall	Rogue severely infested plants: remove and discard or destroy entire infested plant and immediately surrounding soil or soil clinging to roots. Practice crop rotation: set plants in a location different from where they grew previously. If that is not possible, for small shrubs remove infested soil and replace with fresh soil.
Hawthorn (<i>Crataegus</i> sp.)	Cedar-apple/cedar hawthorn rust	Plant resistant cockspur (<i>Crataegus crus-galli</i>).
	Diplocarpon leaf spot	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Do not plant English hawthorns. Instead, plant resistant hawthorns such as Cockspur.
	Fireblight	See Cotoneaster.
	Borer	See Crabapple—Roundheaded appletree borer.

continued

Table 11. Tree and shrub pest management (*continued*)



<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Hawthorn (<i>Crataegus</i> sp.) (<i>continued</i>)	Lace bug	See Cotoneaster. Cockspur, <i>Crataegus crus-galli</i> , appears to be resistant. (note: under Diplocarpon it says cockspur IS resistant)
	Leafminer	Blotches on distal half of leaf. Two wasp parasites often provide control. <i>Crataegus mollis</i> rarely mined.
	Scales	See Arborvitae.
	Spider mites	See Arborvitae.
Hemlock (<i>Tsuga</i> sp.)	Elongate hemlock (<i>Fiorinia</i>) scale	Yellow needles and premature needle drop. Several parasites and predators exist but have little effect in reducing populations. Wind blows crawlers to other trees. Avoid nitrogen fertilizer on trees with uncontrolled infestation.
	Hemlock scale	Yellowish foliage and premature needle drop. Parasites usually keep this scale in check. It is easily confused with another hemlock scale, <i>Nuculaspis tsugae</i> .
	Hemlock woolly ageldid	Cottony sacs attached to twigs (may look like light snow covering); premature leaf drop and dieback. No effective parasites available. Do not apply nitrogen fertilizer to infested hemlocks. Western hemlocks appear to be resistant.
	Spider mites	See Arborvitae.
Holly (<i>Ilex</i> sp.)	Cottony maple leaf scale	See Dogwood.
	Holly leafminer	Linear mines in leaves; feeding punctures. Insect reproduces only on <i>Ilex aquifolium</i> . Adults may feed on other holly species. Handpick infested leaves and destroy before May.
	Native holly leafminer	Lineal to small blotch leaf mines (insect lays eggs on underside of leaf; larvae mine predominantly in palisade cells). Handpick and destroy infested leaves before May.
	Scales	See Arborvitae.
	Twobanded Japanese weevil	Notches of various depth in leaves. Natural enemies have not been studied. Females parthenogenetic (no males).
Honeylocust (thornless varieties) (<i>Gleditsia</i> sp.)	Nectria canker	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tool between cuts. Fertilize properly. Water during dry periods.
	Honeylocust plant bug	Tiny yellowish to brown spots in leaves; many leaves distorted. No effective predators or parasites available.
	Honeylocust pod gall midge	Deformed, pod-shaped leaves. No effective parasites available. Eggs often laid on newly opening buds.
	Scales	See Arborvitae.
	Spider mites	See Arborvitae.
Honeysuckle (<i>Lonicera</i> sp.)	Herpobasidium leaf blight	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches.

Table 11. Tree and shrub pest management (*continued*)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Honeysuckle (<i>Lonicera</i> sp.) (<i>continued</i>)	Honeysuckle aphid	Witches' -brooming on new shoots; distorted, folded, and dwarfed leaves. Several predators exist but not effective. Resistant honeysuckle cultivars available.
	Leafroller	See Crabapple.
	Spider mites	See Arborvitae.
	Whitefly	See Azalea.
Horsechestnut and buckeye (<i>Aesculus</i> sp.)	Leaf blotch (<i>Phyllosticta paviae</i>)	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches.
Ivy (Boston) and Virginia creeper (<i>Parthenocissus</i> sp.)	Phyllosticta leaf spot	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tool between cuts. In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants.
	Powdery mildew	In autumn, rake and discard or destroy fallen leaves, fruit, and branches. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants.
	Japanese beetle	See Crabapple.
	Scales	See Arborvitae.
	Spider mites	Stippled foliage. Wash off with water occasionally as needed. A strong stream of water can be used to remove many spider mites from plants.
Ivy (English) (<i>Hedera helix</i>)	Anthracnose	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Disinfest pruning tool between cuts. Avoid crowding plants; allow air to circulate around and within plants. In autumn, rake and discard or destroy all fallen leaves.
	Bacterial leaf spot (<i>Xanthomonas hederae</i>)	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Disinfest pruning tool between cuts. Avoid crowding plants; allow air to circulate around and within plants.
	Scales	See Arborvitae.
	Spider mites	See Ivy, Boston.
Juniper (<i>Juniperus</i> sp.)	Cedar-apple/cedar hawthorn rust	Remove galls in early spring. Apply sulfur, if needed, according to label directions. Plant resistant varieties: <i>Juniperus chinensis</i> : Femina, Keteleeri, or var. <i>sargentii</i> ; <i>J. communis</i> : Aureo-spicata var. <i>depressa</i> , var. <i>saxatilis</i> , or <i>Suecica</i> ; <i>J. sabina</i> : all varieties; <i>J. squamata</i> var. <i>fargesii</i> ; or <i>J. virginiana</i> cv. Tripartita.

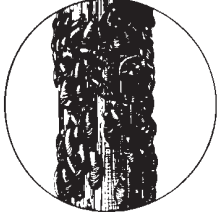
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Table 11. Tree and shrub pest management (continued)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Juniper <i>(Juniperus sp.) (continued)</i>  Juniper tip blight  Juniper scale	Tip blight	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Disinfest pruning tool between cuts. Avoid crowding plants; allow air to circulate around and within plants. Overwatering increases tip blight; Water sparingly if at all. Plant resistant varieties: <i>J. chinensis</i> : Femina, Iowa, Keteleeri, Pfitzeriana Aurea, Robusta, var. <i>sargentii</i> , <i>sargentii</i> cv. Glauca, or Shoosmith; <i>J. communis</i> : Ashfordii, Aureo-spica, var. <i>depressa</i> , Hulkjaerhus, Prostrata Aurea, Repanda, or var. <i>saxatilis</i> ; <i>J. sabina</i> : Broadmoor, Knap Hill, or Skandia; <i>J. scopulorum</i> Silver King; <i>J. squamata</i> : Campbellei var. <i>fargesii</i> , <i>Prostrata</i> or <i>Pumila</i> ; <i>J. virginiana</i> cv. Tripartita. Avoid excess fertilizer.
	Arborvitae leafminers	See Arborvitae.
	Juniper scale	Yellowed foliage. Parasites not effective. Prune out infested areas as much as possible.
	Juniper webworm	Webbed twigs; brown foliage Several effective natural enemies available. Plant resistant varieties: <i>J. chinensis</i> Pfitzeriana or <i>J. sabina</i> .
	Spider mites	See Arborvitae.
Laurel (<i>Kalmia sp.</i>)	Fungal leaf spot	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants. Verify diagnosis.
	Black vine weevil	See Azalea.
	Borer	See Cotoneaster.
	Lace bug	See Andromeda.
	Whitefly	See Azalea.
Lilac (<i>Syringa sp.</i>)	Bacterial blight <i>(Pseudomonas syringae)</i>	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants. Avoid high nitrogen fertilizer.
	Powdery mildew	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants.
	Lilac borer/Ash borer	Dwarfed or pale foliage and holes; sawdust may collect on bark. Woodpeckers most important predators. Sex pheromone traps useful for monitoring to determine treatment date. Avoid pruning when moths are active. Dig out larvae. Remove borers with knife and piece of wire with sharp point or barb. Cut with caution, being sure not to remove more wood than necessary. Carefully cut wounds usually heal without notice-

continued

Table 11. Tree and shrub pest management (*continued*)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Lilac (<i>Syringa</i> sp.) <i>(continued)</i>  Oystershell scale	Lilac leafminer	able injury to tree. Keeping plants healthy and vigorous by proper cultivation, fertilization, pest control, and watering will help infested plants overcome effects of borer injury.
	Oystershell scale	Blotch-type mines on both lilac and privet. Little is known about natural enemies. Handpicking and destroying infested leaves on small plants may be effective.
	Twobanded Japanese weevil	Weakened, unthrifty plant with dead twigs. If scale infestations small, prune out affected plant parts. Parasites usually present but do not prevent host damage.
	White prunicola scale	See Holly.
Linden, littleleaf (<i>Tilia</i> sp.)	Japanese beetle	See Crabapple.
London plane (Sycamore) (<i>Platanus</i> sp.)	Anthraxnose	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. London plane trees less severely affected than American sycamore trees.
	Powdery mildew	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants.
	American plum borer	Red frass on loose bark, oozing sap on trunk. Borer has been recorded on several shade and flowering fruit trees. Several effective wasp parasites available. Avoid injured bark, which may increase susceptibility.
	Lace bug	See Cotoneaster.
	Scales	See Arborvitae.
Magnolia (<i>Magnolia</i> sp.)	Magnolia scale	Scale insects are 1/2-inch, round, white dusty to varnish brown. Sooty mold, small leaves, dead twigs. Several effective parasites and predators available. Prune out affected plant parts. Carefully scrape off scales. Remove large female scales by hand in July before crawlers emerge.
	Sassafras weevil (also known as yellow poplar weevil)	Blotch leafmines and irregular holes in leaves. Both larvae and adults injure plants. Several parasites exist, but pupal parasites most important. Knock weevils into soapy water or handpick and destroy when present.
Mahonia	Leaf scorch	Plant where protected from wind.
Maple (<i>Acer</i> sp.)	Anthraxnose	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches.
	Decline	Prune dead limbs in dormant season. Water and fertilize properly.
	Girdling roots	Plant carefully, spread out roots. Excavate and prune offending roots on established trees, then water and fertilize.

continued

Table 11. Tree and shrub pest management (*continued*)

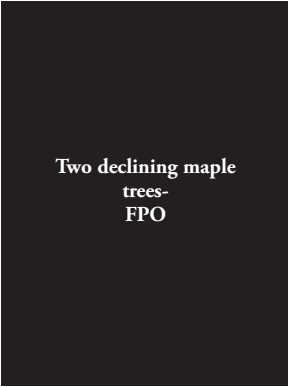
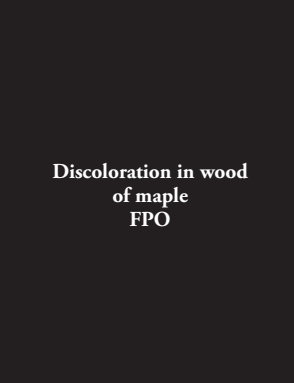


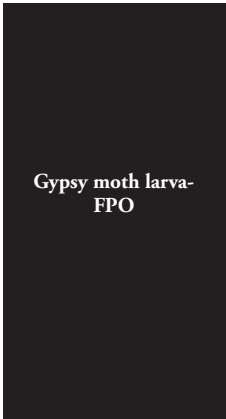
<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Maple (<i>Acer</i> sp.) <i>(continued)</i>  <p>Two declining maple trees trees- FPO</p>	Leaf scorch	Avoid use of deicing salt nearby. Water during drought.
	Tar spot	In autumn, rake and discard or destroy all fallen leaves and branches. Verify diagnosis. Disease usually not severe except on Norway maple.
	Verticillium wilt	Fertilize properly. Water during dry periods. Verify diagnosis. Accurate diagnosis required before more specific treatment.
	Aphids	See Birch.
	Borer	See Cotoneaster.
	Cottony maple scale, Cottony maple leaf scale	See Dogwood. If infestation is small, prune out affected plant parts.
	Maple bladdergall mites	Small ($\frac{1}{16}$ to $\frac{1}{8}$ in.), globular, pouch-like galls on foliage, especially that of silver maple. Galls unsightly but usually of little or no consequence to tree. Mites' abundance varies with season. No parasites known; predators unpredictable.
 <p>Discoloration in wood of maple of maple FPO</p>	Discoloration in wood of maple branches infected with Verticillium wilt	
		 <p>Leaf scorch on maple trees- FPO</p> <p>Leaf scorch on maple trees</p>
Mountain ash (<i>Sorbus</i> sp.)  <p>Mountain ash sawfly</p>	Cytospora canker	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Fertilize properly. Water during drought.
	Fire blight	See Cotoneaster.
	Mountain ash sawfly	Partial defoliation with petiole and main vein remaining; young larvae feed gregariously, devouring leaves one at a time. No information available about effects of natural enemies. Prune off and destroy infested foliage while larvae present but small in size.
	Roundheaded appletree borer	See Crabapple.
	Spider mites	See Arborvitae.

Table 11. Tree and shrub pest management (*continued*)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Oak (<i>Quercus</i> sp.)	Anthracnose and other leaf spot diseases	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches.
	Leaf blister	In autumn, rake and discard or destroy all fallen leaves, fruit and branches.
	Gypsy moth	Complete or partial defoliation of tree. Several introduced and native parasites available. Damaging populations of moths often occur in 7- to 10-year cycles. Remove and destroy egg masses anytime from September through mid-April, assessing population and potential damage when young larvae present, and treatment if needed, using bands around trees at proper time to trap larvae, destroying pupae as found, and helping tree by watering and fertilizing properly, especially if severe defoliation occurs. Pheromone traps useful for monitoring in some areas. Some species such as ash and tulip poplar rarely attacked.
	Leaf tiers	See Crabapple.
	Oak blotch leafminers	Blotch mines; severity varies by season. Parasites have not been studied. Mines usually no threat to tree. Rake and discard fallen leaves.
	Oak leaf galls	Galls on leaves; overall tree health usually not affected. Controls work under special circumstances only. On small trees, where practical, handpick and destroy galls before gall-makers emerge.
	Oak skeletonizer	Skeletonized leaves. Natural enemies may affect their numbers in cycles.
	Scales	See Arborvitae.
	Twig galls	Where possible, prune out and destroy galls before gallmakers emerge. For specific galls, seek further information. There may be no practical controls for some galls.



Gypsy moth larva



Leaf blister on oak

continued

Table 11. Tree and shrub pest management (*continued*)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Pachysandra (<i>Pachysandra</i> sp.)	Volutella blight	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants. Rogue plants: remove and discard and destroy entire infested plant and immediately surrounding soil or soil clinging to roots. Do not plant pachysandra in sites where direct sunlight exceeds two hours per day.
	Euonymous scale	Prune out infested plant parts. See Euonymus.
Periwinkle (<i>Vinca</i> sp.)	Stem canker (<i>Phomopsis livella</i>)	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Disinfest pruning tool between cuts. Avoid crowding plants; allow air to circulate around and within plants. Rogue plants: remove and discard or destroy entire infested plant and immediately surrounding soil or soil clinging to roots.
Pieris	See Andromeda.	
Pines (<i>Pinus</i> sp.)	Diplodia twig blight (<i>Sphaeropsis</i>) (especially Austrian pine)	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tool between cuts. Dispose of fallen cones. Water during drought.
	Lophodermium needlecast	Improve air circulation.
	White pine blister rust	Practice plant sanitation: when foliage is not wet, carefully prune and discard or destroy affected plant parts. Disinfest pruning tools between cuts. Rogue severely infested plants: remove and discard or destroy entire infested plant. Plant currants and gooseberries at least 500 feet away.
	Aphids	Unthrifty plants, sooty mold, distorted foliage, and reduced shoot growth. Many natural enemies. Predators usually found with high aphid populations.
	European pine shoot moth	Damaged or dead buds and shoots. Many effective parasites; at times may keep population in check. Pheromone traps useful for monitoring. Prune out dead buds and dying shoots.
	Gypsy moth	See Oak.
	Nantucket pine tip moth	Dead buds, shoots, or both. Many parasites and other natural enemies; none has provided satisfactory control. Prune out dead portions.
	Pine bark adelgid	Small cottony spots on trunk bark, branches, and twigs and occasionally at base of needles on new shoots. Spruce is



Volutella blight
FPO


Volutella blight on pachysandra leaves



White pine blister
FPO

White pine blister rust canker on white pine trunk

Table 11. Tree and shrub pest management (*continued*)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Pines (<i>Pinus</i> sp.) (<i>continued</i>)		secondary host, but adelgid can repeatedly reproduce itself on pine. Natural enemies have not been studied. Scrub infested bark with soft brush and mild soap solution; or “blast” off with high-pressure water.
	Pine needle scale	From a distance foliage may look white to gray; needles turn yellowish, then brown. Be sure of scale’s identification. Several treatments usually required. Parasites rarely effective under landscape or plantation conditions. Pruning out infested branches may be helpful.
	Pine sawflies	Total or partial defoliation. Most conifer sawflies live in colonies. Some sawflies may have two generations per year and may appear anytime during growing season. Remove by hand and destroy when seen on small trees.
	Pine spittlebugs	Spittle masses on shoots (<i>Aphrophora parallella</i>) and yellowed foliage followed by dead twigs (<i>Aphrophora saratogensis</i>). Winter and spring weather conditions have major effect on populations. <i>A. parallella</i> is aesthetically damaging, <i>A. saratogensis</i> adult is economically damaging. Scouting for adults is necessary. Eliminate nearby sweetfern and alternative hosts (blackberry, other weeds) for <i>A. saratogensis</i> .
	Pine tortoise scale	Sooty mold, short needles, dead branches. Parasites usually not found until population is massive. Pruning may be helpful if population is small.
	White pine weevil	Dead leader. Natural enemies do not provide control. Cut out wilted or dead leaders and destroy by end of June.
 Pine tortoise scale	Zimmerman pine moth	Dead branches and terminals, pitch accumulation in whorl area. Natural enemies not very effective. Prune out where practical.
	Privet (<i>Ligustrum</i> sp.)	
	Anthracnose	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tool between cuts. Fertilize properly. Water during drought. Plant resistant privets: Amur, Ibot, Regal, and California.
	Privet rust mite	Premature leaf drop, silvery stipple to foliage. Mites may be present from May through November. Predaceous mites most effective natural enemy.
	Privet thrips	Chlorotic flecks or dusty grayish appearance of leaves. No dependable parasites or predators.
	Scales	See Arborvitae.
Twobanded Japanese weevil	See Holly.	
White prunicola scale	Prune out severely infested branches. See Flowering peach, cherry, and plum.	

continued

Table 11. Tree and shrub pest management (*continued*)



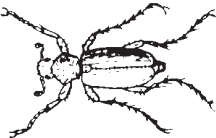
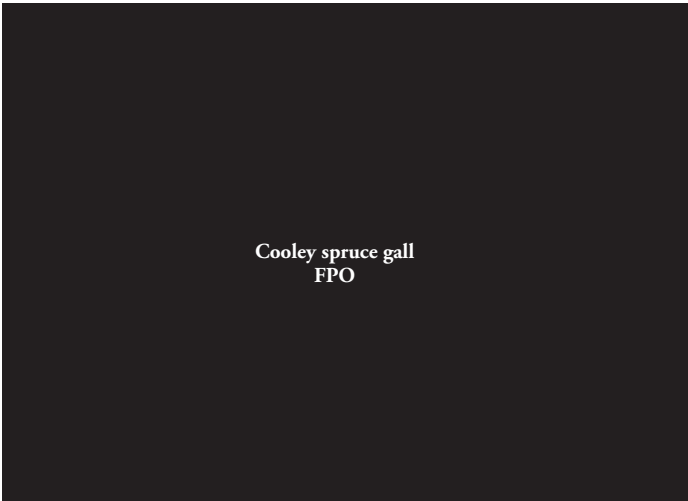
<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Pyracantha	See Firethorn.	
Quince (<i>Cydonia</i> sp.)	Crown gall	Rogue plant: remove and discard or destroy entire infested plant and immediately surrounding soil or soil clinging to roots. Practice crop rotation: set plants in a location different from where they grew previously. If that is not possible, for small shrubs remove infested soil and replace with fresh soil.
	Fireblight	See Cotoneaster.
	Rust	None.
Rhododendron (<i>Rhododendron</i> sp.)	See Azalea.	
	Rhododendron borer	Drought-stressed appearance; holes in bark, often at limb crotches. Sex pheromone traps useful to provide spray timing data. Natural enemies not effective for control. Prune out and destroy infested portions or carefully cut out borers, damaging as little wood as possible.
	Rhododendron gall midge	Distorted or deformed foliage; open-grown plants and those with good air circulation less susceptible to injury. Weekly removal of infested leaves can reduce infestation. Natural enemies have not been studied. Some species and cultivars resistant or not susceptible.
Roses (<i>Rosa</i> sp.)	Black spot	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Avoid wetting foliage overnight or for long periods of time. Many species and cultivars resistant. Some black spot disease-resistant rose hybrids include: Hybrid teas (Charlotte Armstrong, Duet, First Prize, Mister Lincoln, Peace, Tiffany, and Tropicana); Floribunda/Grandifolia (Angel Face, Carousel, Goldilocks, Love, Montezuma, Queen Elizabeth, Razzle Dazzle, and Sunsprite); Shrub roses (All that Jazz, Carefree Wonder).
		
	Botrytis blight (Gray mold)	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants.
	Crown gall	Rogue plants: remove and discard or destroy entire infested plant and immediately surrounding soil or soil clinging to roots. Practice plant rotation: set plants in a location different from where they grew previously. If that is not possible, for small shrubs remove infested soil and replace with fresh soil.
	Powdery mildew	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Prune to thin plants and plantings; avoid

Table 11. Tree and shrub pest management (*continued*)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Roses (<i>Rosa</i> sp.) <i>(continued)</i>  Japanese beetle  Rose chafer		crowding plants; allow air to circulate around and within plants.
	Rust	Prune to thin plants and plantings; avoid crowding plants; allow air to circulate around and within plants.
	Aphids	Reduced shoot growth and distorted or pale green foliage; unthrifty plant with sooty mold present. Many natural enemies; predators usually found with high aphid populations.
	Japanese beetle	Skeletonized leaves and damaged flowers; partial to roses. Handpick beetles.
	Leafhoppers	Stippled and sometimes distorted or otherwise deformed foliage, swollen shoots, honeydew, sooty mold. Natural enemies rarely effective for control.
	Mossy rose gall	Mossy growth on stems of plants (caused by gall wasp). Prune out on appearance.
	Rose chafer	Skeletonized leaves and damaged flowers. Handpick beetles and destroy.
	Rose midge	Blackened and dead buds and leaves. Remove and destroy affected buds as soon as you spot them.
	Roseslugs (sawfly larvae)	Skeletonized upper leaf surface. If infestation small, remove affected leaves. Handpick large sawfly larvae. Wash “slugs” from plants with strong jet of water.
	Spider mites	See Arborvitae.
Spruce (<i>Picea</i> sp.) 	Cytospora canker	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Prune to thin plants and plantings. Avoid crowding plants; allow air to circulate around and within plants. Disinfest pruning tools between cuts. Fertilize lightly and water during drought. Avoid wounding branches.
	Cooley spruce gall adelgid	Pineapple-shaped galls on new spring growth (usually affects Colorado blue, Englemann, Sitka, and oriental spruces). Pick galls (prune out) before gallmakers emerge (July) and destroy (bury or burn) to kill gallmakers. No effective parasites available. Some trees resistant to adelgids. Do not fertilize infested trees. Douglas fir is an alternate host. Do not plant blue spruce and Douglas fir together.

continued

Table 11. Tree and shrub pest management (*continued*)




<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Spruce (<i>Picea</i> sp.) <i>(continued)</i>  White pine weevil	Eastern spruce gall adelgid	Galls at base of new shoots (primary pest of Norway spruce). On small trees, prune and destroy green galls before insects emerge. No effective parasites or predators. Some trees resistant to adelgids.
	Sawfly	See Pines.
	Spruce bud scale	Sooty mold, dead twigs, and branches. Parasites effective. Manually remove scale if practical.
	Spruce spider mite	To monitor, tap branches over white piece of paper. If more than 10 mites per tap, treatment is recommended. Use lower threshold on Alberta spruce. Cool-season pest. See Arborvitae.
	Twospotted spider mite	See Andromeda, spider mites. Populations favored by hot, dry conditions.
	White pine weevil	See Pines. Remove and destroy infested leaders as soon as they are noticed.
Sycamore	See London plane.	
Taxus (Yew) (<i>Taxus</i> sp.)  Black vine weevil injury	Black vine (taxus) weevil	See Azalea.
	Fletcher scale	Sooty mold, unthrifty plant. If scale infestations small, prune out affected plant parts.
	Mealybug	Sooty mold, unthrifty plants, thin foliage. Natural enemies have not been studied.
		 Black vine weevil
Viburnum (<i>Viburnum</i> sp.)	Downy mildew	In autumn, rake and discard or destroy all fallen leaves, fruit, and branches. Prune to thin plants and plantings. Disinfest pruning tool between cuts. Avoid crowding plants; allow air to circulate around and within plants.
	Aphids	See Birch.
	Cottony maple leaf scale	See Dogwood.
	Viburnum leaf beetle	Skeletization of leaves May–June by larvae, oblong cutouts in leaves by adults July–September. Prune and destroy twigs with egg masses (rows of black bumps on underside of current year’s growth) in late fall or early spring. Some viburnums resistant, including <i>V. carlesii</i> , <i>V. burkweedii</i> , and <i>V. rhytidophyllum</i> .
Vinca	See Periwinkle.	
Willow (<i>Salix</i> sp.)	Black canker and twig blight	Practice plant sanitation: when foliage is not wet, carefully prune or remove and discard or destroy affected plant parts. Disinfest pruning tools between cuts. <i>Salix babylonica</i> (weeping willow) and <i>S. pentandra</i> (laurel willow) are somewhat resistant.

Table 11. Tree and shrub pest management (*continued*)

<i>Plant</i>	<i>Pest/Disease</i>	<i>Description/Cultural Management</i>
Willow (<i>Salix</i> sp.) (<i>continued</i>)	Aphids	See Birch.
	Borers	See Crabapple.
	Imported willow leaf beetle	Skeletonized and notched leaves. Several parasites available. Pupal parasite effective in population control.
	Scales	See Arborvitae.
Yew	See Taxus.	

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