



Issue # 5: Shrubs in the Landscape

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Shrub Selection for Valley Gardens

Pamela Geisel

Shrubs are major components of most landscapes. They are used to screen, direct traffic, as accents, for wildlife habitats, as windbreaks, as fill and foundational plantings and for color and texture in the landscape. How we use shrubs should dictate the species selection for any given landscape. Before purchasing any shrubs, decide the ultimate use and make sure that the chosen plants fit the needs. Also make sure that cultural practices are appropriate for the species. For example, it isn't uncommon to see flowering quince sheared into a boxy shape resulting in an odd flowering habit associated with the incorrect pruning method for the species (see next article on pruning shrubs for maximum flowering).

Consideration should also be given to the need for color. There are many deciduous and evergreen shrubs that contribute not only flower color but also berry, bark, and foliage color to the landscape. For example, leaves with white or yellow variegation can brighten up a dark corner. Spring flowering shrubs such as hydrangea contribute large showy flowers in spring. Evergreen shrubs such as juniper come in a variety of foliage colors and contribute significantly to a garden in winter.

Shrub form is also important. Shrubs may be columnar, round headed, spreading and prostrate, or pyramidal. These shapes can add dimension and movement to a landscape. The columnar shape of a juniper repeated down a long driveway can add a sense of drama to the approach of your home.

The key to successful shrub selection however, is ultimate size. Shrubs are a permanent part of the landscape. They should be enjoyed for many years with little maintenance. We often plant shrubs (or small trees) that are too large for the site and as such must be frequently pruned to keep them confined. It is important that the ultimate size of the shrub be taken into consideration prior to planting to avoid the frequent maintenance requirements. Inside this newsletter are several tables that I've compiled to help in appropriate shrub selection for landscape use in San Joaquin Valley Gardens.

Outstanding Shrubs for San Joaquin Valley Gardens

Short Shrubs (1- 3 feet in height)				
Common Name	Genus and species	Cultural Conditions	Exposure	Notes
Azalea	Rhododendron sp.	Organic well drained soils	Part to full shade	Many cultivars and colors available. Evergreen
Emerald Carpet Manzanita	Arctostaphylos "Emerald Carpet"	Require excellent drainage, with deep infrequent irrigation	Full sun to part shade, especially in afternoon	Many other cultivars available. Evergreen
Dwarf Coyote Brush	Baccharis pilularis	Good drainage and monthly watering	Full sun to part shade,	Nice green mat or ground cover. Evergreen
Japanese Barberry	Berberis thunbergii	Regular water	Full sun to light shade	Deciduous, red-leaf
Blue Mist Caryopteris	Caryopteris x clandonensis	Low mounding shrub. Needs moderate water.	Full sun, shear after bloom for repeat bloom	Deciduous with clusters of blue flowers in summer
Carmel Creeper Ceanothus	Ceanothus griseus horizontalis	Low growing shrub; width 5-15 ft.	Best in part shade to full sun, some summer water. Prune after bloom	Purple to blue flowers. Many dwarf to large cultivars available.
Pyreness cotoneaster	Cotoneaster congestus	Best in dryer conditions with little pruning.	Full sun	Lovely red berries, excellent draped over a wall.
Dwarf juniper	Juniperus sp.	Regular water	Full sun to partial shade	Many dwarf species and cultivars. Avoid water logged soils.
Crape Myrtle	Lagerstroemia hybrid 'Chickaswa' true dwarf	Moderate water	Full sun	True dwarf deciduous shrub to 20 inches.
Lavender	Lavendula sp.	Moderate water with excellent drainage	Full sun	Many species, best sheared after bloom for compact growth.
Siberian carpet cypress	Microbiota decussata	Moderate water with excellent drainage	Partial shade	Lovely evergreen low sprawling shrub 1.5 ft. high to 7 ft. wide.
Harbour dwarf nandina	Nandina domestica "Harbour Dwarf"	Little to moderate water	Full sun to partial shade.	Spreads by underground rhizomes.
Dwarf Carnation-flowered Pomegranate	Punica granatum 'Chico'	Moderate water	Full sun	Tolerant of many soils, orange red flowers.
Azalea	Rhododendron hybrids	Moderate water	Partial shade	Many cultivars but the Southern Indica hybrids most hardy
Sarcococca	Sarcococca hookerana humilis	Moderate water	Partial to full shade	Low growing glossy green foliage
Small Shrubs (3-5 feet in height)				
Common Name	Genus and species	Cultural Conditions	Exposure	Notes
White forsythia	Abeliophyllum distichum	Regular water	Full sun to partial shade	White flowers similar to forsythia in late winter. Deciduous
Woollybush	Adenanthos meisneri	Little to moderate water. Needs good drainage	Partial shade in hot areas	Purplish summer flowers.
Japanese Boxwood	Buxus m. japonica	Regular water, clip often to keep small. <i>Compacta</i> an extra dwarf cultivar	Full sun to partial shade	Cold winters cause foliage to become bronze in color.
Euonymus	Euonymus japonica	Many cultivars, regular water	Full sun, heat tolerant	Prone to some insect pests.
Lion's Tail	Leonotis leonurus	Little to no water	Full sun	Bright orange flowers in summer.
Myrtle	Myrtus communis	Little to moderate water. Needs good drainage	Full sun or partial shade	Glossy green foliage, fragrant when crushed. Good informal hedge, screen or topiary.
Oleander	Nerium oleander 'Little Red or Petite Pink'	Little to moderate water	Full sun	Great shrub for tough conditions.

Small Shrubs (3-5 feet in height) - continued

Common Name	Genus and species	Cultural Conditions	Exposure	Notes
Low growing Pyracantha	<i>Pyracantha coccinea</i> 'Red Elf', 'Ruby Mound', Tiny Tim'	Moderate water	Full sun	Low varieties useful in landscapes with red berries.
Indian Hawthorn-Low growing cultivars.	<i>Raphiolepis indica</i> 'Ballerina', 'Enchantress', 'Indian Princess', 'Springtime'	Little to regular water	Full sun	Pink blooms in spring, compact form.
Dwarf Rosemary	<i>Rosmarinus officinalis</i> 'Benenden Blue', 'Irene', 'Ken Talyor', 'Miss Jessup'	Little to moderate water	Full sun	Evergreen shrub. Many cultivars that grow tall or sprawling type ground covers. Blue flowers.
Ternstroemia	<i>Ternstroemia gymnanthera</i>	Regular to ample water. Well drained soil	Partial to full shade	Glossy, leathery foliage. Good for shade plantings.

Medium Shrubs (4-8 feet in height)

Common Name	Genus and species	Cultural Conditions	Exposure	Notes
Glossy Abelia	<i>Abelia grandiflora</i>	Regular water, some dwarf cultivars	Full sun to part shade	Pink to white flowers, evergreen to semi-evergreen.
Butterfly Bush	<i>Buddleia davidii</i>	Moderate water. Needs good drainage	Full sun. May die to ground in severe cold. Prune to shape	Flowers spike similar to lilac with pinkish flowers.
Beautyberry	<i>Callicarpa bodinieri</i>	Deciduous shrub needs moderate water.	Full sun to light shade	Small lilac or pink flowers are followed by clusters of round violet fruits that persist into winter.
Camellia	<i>Camellia japonica</i>	Evergreen shrub; requires regular water. Can grow to 20 feet but most often lower	Best in light shade. Prefers more acid, organic soils	Many flower types, colors and forms.
Bush anemone	<i>Carpenteria californica</i>	Best with some summer water	Best in light shade. Prune after bloom	White flowers in spring. Cutting grown "Elizabeth" variety is nice.
Pink Breath of Heaven	<i>Coleonema pulchrum</i>	Needs fast drainage, regular water	Full sun to light shade	Shear after bloom for compact growth
Forsythia	<i>Forsythia</i> hybrids	Moderate regular water	Full sun	Deciduous with yellow flowers. Many cultivars. Prune after bloom.
Lavender Star Flower	<i>Grewia occidentalis</i>	Regular water	Full sun	Fast growing sprawling shrub. Lavender bloom in late spring. Prune after flowering.
Wilson Holly	<i>Ilex x altaclerensis</i> 'Wilsonii'	Regular water	Full sun or partial shade	One of the best hollies for inland valley. Good espalier, screen or hedge. Red berries.
Texas Ranger	<i>Leucophyllum frutescens</i>	Little to moderate water	Full sun	Evergreen silver leafed shrub. Lavender blooms.
Oregon Grape	<i>Mahonia aquifolium</i> 'Orange flame'	Little to regular water	Best in light shade inland	Shear as formal hedge or cut individual shoots to ground.
Pieris hybrid	<i>Pieris</i> 'Forest Flame'	Regular water, excellent drainage	Filtered sunlight or partial shade, acid organic soil similar to azaleas	Nice cultivar with brilliant red foliage and profuse bell shaped bloom.
Mugo pine	<i>Pinus mugo mugo</i>	Regular water	Full sun to light shade	Compact evergreen.
Cape plumbago	<i>Plumbago auriculata</i> 'Royal Cape' or 'Imperial Blue' are best selections for blue flower color	Little to regular water	Full sun or light shade	Bright blue flowers on semi-evergreen willow shrub. Shear for compactness.
Weigela	<i>Weigelia</i> hybrid 'Bristol Ruby'	Regular water	Full sun to light shade	Many hybrids, deciduous shrub. Cut oldest stems to ground after bloom.

Large Shrubs (9-15 feet or more in height)

Common Name	Genus and species	Cultural Conditions	Exposure	Notes
Japanese Aucuba	<i>Aucuba japonica</i>	Regular water, can be kept lower by pruning.	Full shade. Tolerant of deep shade	Many green and variegated cultivars. Has red berries.
Boxleaf Azara	<i>Azara microphylla</i>	Slow growing, needs fast drainage.	Needs shade from hot afternoon sun	Evergreen, great wall plant.
Bottlebrush	<i>Callistemon viminalis</i>	Moderate water, with fast pendulous growth. Little John is a dwarf form.	Can become a small tree which requires training to shape well. Full sun.	Lovely red brushes of flowers that are attractive to hummingbirds.
Spice Bush	<i>Calycanthus occidentalis</i>	California native. Requires some water.	Easy to grow native shrub good for background planting	Deciduous shrub can be trained to small multi trunked tree. Reddish flowers in spring.
Cocculus	<i>Cocculus laurifolius</i>	Regular water	Shade or sun	Willowy branches can be grown on a trellis as a screen.
Pineapple Quava	<i>Feijoa sellowiana</i>	Regular water for best fruiting.	Full sun	Edible fruit, good as screen, hedge, espalier or small tree.
Toyon	<i>Heteromeles arbutifolia</i>	Moderate water	Full sun or partial shade	California native, bright red berries (especially H. a. "macrocarpa").
Beauty Bush	<i>Kolkwitzia amabilis</i>	Regular water	Full sun to part shade	Deciduous shrub with arching form, pink blooms. Prune after bloom.
Crape Myrtle	<i>Lagerstromia hybrids</i> or <i>L. indica</i>	Moderate water	Full sun	Hybrids have better mildew resistance. Prune in winter.
Sweet Bay	<i>Laurus nobilis</i>	Moderate water	Full sun to part shade	Easily sheared, dark green foliage. Needs good drainage.
Japanese Privet	<i>Ligustrum japonicum</i>	Regular water	Full sun to partial shade	Widely used hedge or screen.
Oleander	<i>Nerium oleander</i> 'Sister Agnes' is most vigorous	Little to moderate water	Full sun	Great shrub for tough conditions. Single white bloom.
Osmanthus, Sweet Olive	<i>Osmanthus fragrans</i>	Little to regular water	Full sun to partial shade	Clean shrub with fragrant small blooms.
Mock Orange	<i>Philadelphus x virginalis</i>	Moderate to regular water	Best in partial shade inland, especially in afternoon.	Deciduous shrub with elegant arching white blooms. Prune after bloom by cutting shoots off oldest wood at plant base.
Photinia	<i>Photinia fraseri</i> 'Birmingham'	Moderate to regular water. Avoid excessively wet soil	Full sun	Excellent informal hedge or screen.
Shrubby Yew Pine	<i>Podocarpus macrophyllus</i> 'maki'	Regular water	Full sun to partial shade.	Dense upright growth. Lovely structural form
Evergreen viburnum	<i>Viburnum japonicum</i>	Regular water	Full sun to partial shade	Hardy evergreen shrub.
Laurustinus	<i>Viburnum tinus</i>	Regular water	Full sun	Leathery foliage with pink buds, white blooms.
Xylosma	<i>Xylosma congestum</i>	Moderate water	Full sun to partial shade	Semi-evergreen with loose spreading habit.



Spectacular Spring Flowering Shrubs for Landscapes

Pam Geisel

In early February, many of the spring blooming shrubs show off their flowering glory. Flowering quince, lilac and forsythia are some of the most colorful deciduous spring flowering shrubs. So many of them are considered to be “old fashion” but they add so much color, fragrance and charm to even the most stylized gardens. They do need to be properly pruned to maximize their bloom potential and you need to make sure to choose the best cultivars to fit the space available. Many tend to be overly large unless selected for compactness or short stature. If you must severely prune them to keep them in bounds, they will have reduced blooms.

What are some of the better deciduous shrubs for spring bloom? If you have large spaces that can accommodate larger shrubs (10-20 x20 ft.) then include the deciduous **Viburnums**, particularly the Japanese Snowball Viburnum (*Viburnum plicatum* or *V. p. tomentosum*) because they have large white round flower heads and dark green foliage that turns red in autumn. However, viburnums do not do well in areas with hot afternoon sun. They also prefer somewhat acid soils, good drainage and regular irrigation.

Flowering magnolias—especially the star magnolias (*Magnolia x loebneri* or *M. stellata*) are also wonderful spring bloomers. Considered slow growing large shrubs or small trees, they are great for entryway gardens or in front of a wooded background or as a specimen shrub.

Hydrangeas are also quite spectacular in spring. There are the larger shrubs with large panicle white flowers and variegated foliage (*H. paniculata* “Grandiflora”) or smaller dwarf cultivars no taller than 1.5 ft. high (*H. macrophylla* “Pink Elf”).



Flowering lilacs (*Syringa sp.*), are another favorite which have some wonderful cultivars that bloom well in our warm valley climate. Some that are particularly beautiful have very dark magenta colored flowers, like

“Monge”, Charles Joly, and Burgundy Queen. L.E. Cooke Company Nursery produces these varieties on their Visalia growing grounds.

Mock Orange (*philadelphus x virginalis*) is an old fashioned medium-large spring flowering shrub. Miniature Snowflake is a compact cultivar that only grows 3-4 ft high and wide, but still has lovely, large double flowers.

Flowering Quince is another favorite because it performs well in cut flower arrangements. You can get tall ones that grow upright to 5-6 ft. or low plants that only grow 2-3 ft. high. The flowers range in colors from red, salmon, pink, to white. Apple Blossom flowering quince is a tall white and pink variety. “Rowallane” has the darkest red flowers on a 3-4 ft. high bush.

Forsythia (*Forsythia x intermedia*) is prized because of its early bloom and bright sunny yellow blossoms. A lot of hybridizing has been done on the Forsythia groups such that you can purchase varieties as short as 20 inches high to shrubs that are 10 feet high. The best short variety is one called “Goldtide”. The best tall variety is “Karl Sax” which is very similar to the more common “Beatrix Farrand” but is slightly lower growing, neater in appearance and has a more graceful habit.

The best time to purchase deciduous shrubs is when they are in bloom so you can be sure of blossom color. Many times they are also available as bare-root plants during the dormant season. Container plants can be planted most anytime but success is best in spring or fall.



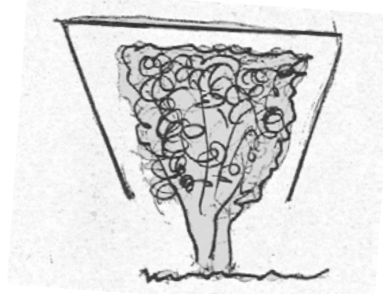
The best time to prune spring blooming deciduous shrubs is only after they are done blooming. Avoid topping the shrub. Instead take out individual shoots close to the ground or cut back to lateral or side branches in early summer.

Pruning Tips for Evergreen Hedges

1. Start training your hedges very early. A well-shaped hedge will have been trained regularly and carefully from planting throughout the life of the hedge.
2. Start with nursery stock that has multiple stems if possible. Cut plants back 6-8 inches when planting to induce low branching and more “bushy” growth. Late in the fall or before bud break in the spring, prune off half of the new growth. The following year trim that off by half again.
3. In the 3rd season, begin to shape the hedge. Know what sort of shape you want from your hedge at planting time. If you want a solid screen from top to bottom, it is important to keep the bottom wider than the top. Otherwise the top foliage will shade out the lower foliage leaving an open hedge at the base.

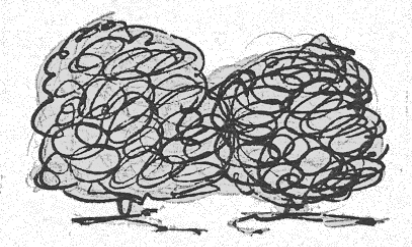


Correct hedging technique

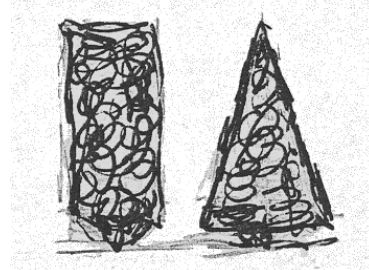


Incorrect

4. Many people hedge plants so that they have a flat top. This usually isn't successful and is a shape that is difficult to maintain without very frequent hedging. This is also true of hedges that have straight lines instead of peaked or rounded form. It is best to allow the shrubs to grow in a rounded shape, which is what nature intended. This shape will also require much less trimming.



Rounded forms require less frequent trimming



Straight lines require more frequent trimming

5. Trimming or shearing frequency will depend on the form and on the species of hedge. Generally, they should be sheared before the growth exceeds 1 foot. Boxwoods and other slow growing hedges will require pruning before that to maintain a clean shape and neat appearance.
6. If hedges have grown out of bounds and have become severely overgrown, it may be better to replace the hedge than try to rejuvenate them. Evergreen shrubs are less tolerant of the severe pruning that is usually required to get them back into shape. If some rejuvenation is possible, start by cutting the shrubs back each year by no more than 20-30% of the overall growth until the hedge is at the desired height and shape. Shear frequently to keep plants full. Deciduous shrubs can be cut back to a foot below the desired height in the spring before the new leaves appear. Then trim regularly for the next few years until the hedge has grown into the desired shape and fullness.



Informal hedge



A formal border of boxwood hedge at Versailles, France.

NUTRIENT DEFICIENCIES & COMMON PESTS of Woody Plants

Compiled by Michelle Le Strange from Pests of Landscape Trees and Shrubs UC Pub #3359

Plants require certain mineral nutrients for healthy growth. Deficiencies cause foliage to discolor, fade, distort, or become spotted, sometimes in a characteristic pattern that can help you identify the cause. Fewer leaves, flowers, and fruit may be produced, and these can develop later than normal and remain undersized. More severely deficient plants become stunted, exhibit dieback, are predisposed to other maladies, and can die.

Nutrient deficiency symptoms in woody landscape plants usually are not due to a deficiency of nutrients in soil. Fertilization of woody plants is not recommended unless insufficient soil nutrients have definitely been diagnosed as the cause.

Inadequate nitrogen, phosphorus, and potassium are rare in established landscape trees and shrubs, except in containers or planter boxes, fruit and nut trees, and palms. Nutrient deficiency symptoms usually result from other causes, like adverse soil conditions and anything that injures roots or restricts root growth. Common causes of deficiency symptoms include high pH, inappropriate irrigation, physical injury to roots, poor drainage, and root decay pathogens.

IRON: Insufficient iron is probably the most common deficiency in Valley landscapes even though sufficient iron is present in most soils. Many plants, such as azaleas, citrus, gardenias, and rhododendrons are adapted to acidic (low pH) well-drained, aerated soils high in organic matter. These plants are especially prone to iron deficiency because iron is less available and plants are unable to absorb iron if the soil is alkaline (high pH), high in calcium, poorly drained, waterlogged, too cool, or root health is impaired by pathogens, etc.

Iron deficiency causes new foliage to be bleached, chlorotic, or pale with green veins. Fading appears first around leaf margins, then spreads inward until only the veins are green. Brown spots can develop in leaves because iron deficiency inhibits plant metabolism and chlorophyll availability, making leaves susceptible to sunburn. Damaged leaves dry and drop prematurely.

Cures: One quick method is to spread an iron chelate evenly over the soil beneath the plant canopy or apply it to foliage according to the product label. Foliage appearance is only temporarily restored by chelates, so if used, apply them in combination with measures to improve the plant's culture, environment, and soil conditions.

Regularly placing composted organic matter such as mulch on top of the roots of established plants will eventually (slowly) remedy iron deficiency. Iron is taken up by roots as soil becomes more acidic and organic matter decays. Conifer needle mulch reportedly is more acidifying than mulch from broadleaf plants. Allow fallen leaves to remain on the soil over plant roots or gather and compost leaves and other organic debris, and then spread this mulch over the soil. Mulch provides many benefits in addition to increasing nutrient availability.



INSECT MANAGEMENT MITES

Mites are common in landscapes, but in most situations they are not serious pests. Some are plant feeders, but many are beneficial predators. Mites often go unnoticed because they are tiny and natural controls such as weather and predators frequently keep their populations low. Their damage to plants can usually be observed before noticing the mites themselves. Mites overwinter as adult females or eggs on bark or in litter. In most areas of California all stages of mites can be present year-round on evergreen plants.

Pest mites puncture plant cells with their mouthparts, and then suck the exuding fluid. This causes leaves to appear stippled or flecked with pale dots where tiny areas of leaf tissue have been killed. Mite feeding on fruit appears as a silvery or brownish sheen called russetting. Some mites cover leaves, shoots, or flowers with large amounts of fine webbing; other species cause plant tissues to become distorted, thickened, or galled. Prolonged heavy infestations slow plant growth, cause leaves or fruit to drop prematurely, and may kill young plants.



Severe infestations often result because natural controls such as predators are disrupted by pesticide applications or excessive dust. Vigorous plants tolerate extensive stippling or tissue distortion with little or no loss in plant growth or fruit yield.

SCALES

Scale insects are common and damaging pests. They are easily overlooked because they are small and immobile for much of their lives and do not resemble most other insects. Most scale species are either armored scales or soft scales.

Damage: Scales feed by sucking plant juices and some may inject toxic saliva into plants. Some scales weaken a plant causing it to grow slowly. Infested plants appear water stressed, leaves turn yellow, and foliage and fruit may become black from sooty mold or may drop prematurely. Branches or other plant parts that remain heavily infested die; if they die quickly, the dead brownish leaves may remain on branches, giving them a scorched appearance.

Several years of severe infestations may kill young plants. The importance of infestations depends on the scale species, the plant species and cultivar, environmental factors, and natural enemies. Populations of some scales can increase dramatically within a few months, especially when honeydew-seeking ants protect scales from their natural enemies.

Plants are not harmed by a few scales, and even high populations of certain species apparently do not damage plants. However, scale infested plants may become sticky from honeydew and foliage may blacken from the resulting sooty mold growth. Sticky and blackened foliage may be bothersome to people even when scale populations are not harming the plant.

ARMORED SCALES: *Armored scales, such as the greedy, oystershell, and San Jose scale, do not excrete honeydew. Most armored scale species have several generations each year.*



Greedy scale infestation

Most armored scales are less than 1/8 inch long and have a platelike shell. This cover usually can be removed to reveal the actual scale body underneath. Armored

scale covers often have concentric rings, which form as each nymphal stage secretes an enlargement to its cover. Covers often have a different colored, slight protuberance formed from the covering of the first-instar nymph. Once the crawler stage settles to feed, armored scales generally lose their legs and cannot move. Other common armored scales include: CA red scale, cycad scale, obscure scale, oleander scale, euonymus scale, and minute cypress scale.

SOFT SCALES: *Soft scales, including black and brown soft scale, are prolific honeydew excreters. Most species have only one generation per year.*

Female soft scales may be smooth or cottony and usually are 1/4 inch long or shorter. The scale's surface is the actual body wall of the insect and cannot be removed. Immature soft scales retain their barely visible legs and antennae after settling and are able to move very slowly. Common soft scales include: black scale, brown soft scale, calico scale, citricola scale, green shield scale, lecanium scale, kuno scale, irregular pine scale, tulip tree scale, wax scales.



Female European fruit lecanium scales

UC Statewide IPM Project
© 2000 Regents, University of California

Cottony cushion scale: Cottony cushion scale can occur on many woody plants, including acacia, boxwood, citrus, magnolia, nandina, olive, pittosporum, and rose. It usually is not a pest because most populations are well controlled by effective natural enemies, unless biological control is disrupted.

The cottony cushion scale female is bright orange, red, yellow, or brown. It is distinguished by its elongated, fluted, white cottony egg sac, which contains from 600 to 800 eggs. Eggs hatch in a few days during warm weather, but take up to two months to hatch in winter. Crawlers are red with dark legs and antennae. First and second instar nymphs settle on twigs and leaves, usually along veins. The third instar is covered with a thick yellow cottony secretion, which disappears after it molts.



Cottony cushion scale

The vedalia beetle (*Rodolia ardinialis*) is the most famous natural enemy of cottony cushion scale. This red and black lady beetle was introduced from Australia in the 1880s and helped save California's fledgling citrus industry from destruction by the prolific scales. Adult beetles feed on scales, and females lay their eggs underneath the scale or attached to scale egg sacs. The young reddish beetle larvae feed on scale eggs; more mature larvae feed on all scale stages.

APHIDS

Aphids are small, soft-bodied insects that suck plant juices. Over 200 species are occasional or frequent pests of landscape shrubs. Plants can usually tolerate extensive feeding by aphids, and established woody plants are not killed by them. A few species of aphids can infest many different herbaceous and woody plant species. These pests with broad host ranges include bean aphid, green peach aphid, and melon aphid. Most species on woody ornamentals, including gall-making and woolly aphids, are host-specific.

The most bothersome aspect of aphids is the honeydew they produce. Honeydew is sugary water excreted by many homopterans that ingest phloem sap. It is harmless to plants, except if it becomes so abundant that extensive black sooty mold grows on it, reducing light reaching foliage to the extent that it slows plant growth. Copious honeydew and sooty mold create a sticky and unsightly mess on trees, sidewalks, automobiles, and other surfaces beneath the plant.



Aphids often feed in dense groups on leaves or stems and do not rapidly disperse when disturbed. Adult aphids may be winged or

wingless. A pair of tubelike projections near the hind end of the body distinguishes most aphids from other insects. During warm weather, aphids may go through a complete generation in less than 2 weeks. A very simple cure for aphids is to just hose them off leaves with a strong stream of water, but this is not always practical.

DISEASE MANAGEMENT

Prevention is the most important method of disease management. Pathogens frequently kill plants that are poorly cared for, so it is important to avoid conditions stressful to plants. Stresses include soil that is kept continuously too wet, too dry, or compacted; over-fertilization; improper pruning, especially at budbreak or during early growth flush; and repeated insect defoliation. Physical damage to roots and trunks, changes in soil grade, excessive herbicides or salts, use of injections or implants, and planting species that are poorly adapted for local conditions also cause stress. Most pathogens require specific conditions to spread and infect plants.

ROOT and CROWN Diseases

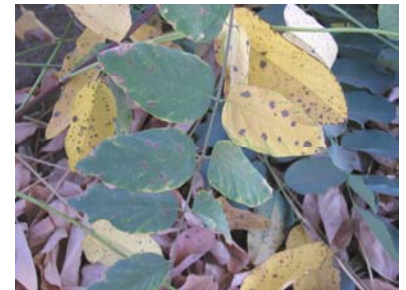
Several root and crown diseases commonly affect landscape shrubs. These include Armillaria root rot, Phytophthora root and crown rots, and Dermatomphora root rot. Because roots transport nutrients and water to the rest of the plant, any root disease is likely to affect other parts of the plant as well. Several abiotic disorders such as too much or too little water, mineral toxicity, and herbicides, can also damage roots and cause symptoms that may be confused with root and crown diseases.

Often the first observed symptoms of root disease in broadleaves are wilting foliage or leaf discoloring that resembles a nutrient deficiency. In conifers, chlorotic or faded green foliage is often the first obvious symptom. In advanced stages, leaves discolor and die, and then branches and the entire plant are killed.

Once fungi that cause root disease become introduced in a location, they are often continuously present there in old roots, stumps, soil, or infected living or dead shrubs. In many landscape situations, fungicides are not available or effective in controlling root decay fungi. *The most effective control is to provide plants with proper cultural care to keep them vigorous and to prevent conditions that promote disease development.* Proper planting and appropriate irrigation are critical to controlling root diseases.

LEAF SPOTS

Leaves can develop discolored blotches, spots, or holes and can die and drop prematurely due to foliar infection by various different pathogens, common fungi, and occasionally bacteria that spread and infect when plants are wet. Discolored, dying leaves can also be due to other maladies and pests including adverse growing conditions, certain



insects, inappropriate cultural practices, and virtually anything that makes limbs or roots unhealthy. Anthracnose, Entomosporium leaf spot, scabs, Septoria leaf spot, and shot hole are common leaf spotting fungi.

RUSTS

Rusts infect many hosts, including birch, cottonwood, fuchsia, hawthorn, juniper, pear, pine, poplar, rhododendron, and rose. These parasitic fungi are named for the dry reddish, yellowish, or orange spore masses or pustules that many species form on infected tissue, commonly on the lower leaf surface of broadleaf plants or on the bark of conifers.

Moderate populations of rust pustules on lower leaf surfaces apparently do not harm plants. The upper surface of heavily infected leaves may turn yellow or brown, and infected leaves may drop prematurely. Orange, gelatinous masses appear on some infected evergreen hosts. Some rusts species damage bark, causing tissue swellings or galls, colorful spots, or cankers. These rust fungi can cause branch dieback and occasionally kill the entire plant. Rusts are spread primarily by windblown spores and possibly by water splashed spores. In addition to orangish pustules, many species also form black over-wintering spores on leaves in the autumn, which start the disease cycle in the spring. Many species have complex life cycles, alternating generations between two host species. Others, such as the rose rust are apparently restricted to one host genus. Each type of rust is specific to certain hosts.

Rust management: Rust fungi infect under mild, moist condition. Avoid overhead watering, which favors spore germination. Rake infected leaves or needles and clip and dispose of infected shoots and branches away from host plants as soon as infected parts appear. Prune and dispose of severely infected woody parts if pruning will not be so extensive that plants are seriously damaged. Fungicides applied in the spring can prevent or reduce some rust diseases. The frequent applications required to provide good rust control may not be warranted in many landscape situations.

CANKER DISEASES

A canker is a sunken area containing dead tissue on a woody stem or branch. It may not be clearly visible, or it may be a well-defined infection on woody parts that often becomes surrounded by layers of callus tissue. Cankerlike wounds can be caused by injuries such as sunburn or sunscald, as well as by disease-producing microorganisms. Consult table for common cankers.

Cankers are a serious concern because the pathogens associated with them can girdle and kill limbs or the entire plant. Cankers can cause foliage on infected branches to turn yellow or brown and wilt. Infected bark often discolors and may exude copious sap or resin (on conifers). Many different hosts are infected by certain canker diseases, including *Cytospora* and *Nectria* cankers. Other canker diseases can be identified largely based on the species of host plant they infect, including canker diseases infecting Chinese elm, cypress, pine, and sycamore (trees, not shrubs).



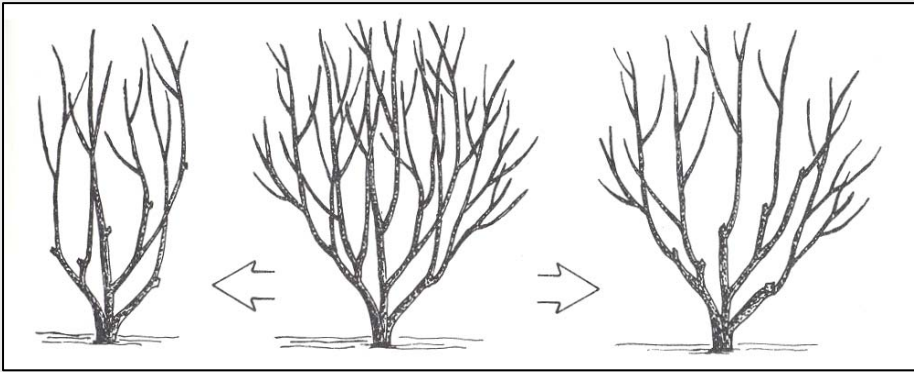
including canker diseases infecting Chinese elm, cypress, pine, and sycamore (trees, not shrubs).

Management of canker diseases: Most canker diseases, including *Botryosphaeria*, *Cytospora*, and *Hypoxylon* canker, damage primarily debilitated plants. Avoid species that are poorly adapted for local conditions. Provide plants with proper cultural care to keep them vigorous and to limit these diseases.

Some canker disease attack apparently vigorous trees or shrubs, like pitch canker on pines, Chinese elm anthracnose, and cypress canker of Leyland and Monterey cypress trees. The primary strategy for managing these diseases is to plant other species or resistant cultivars.

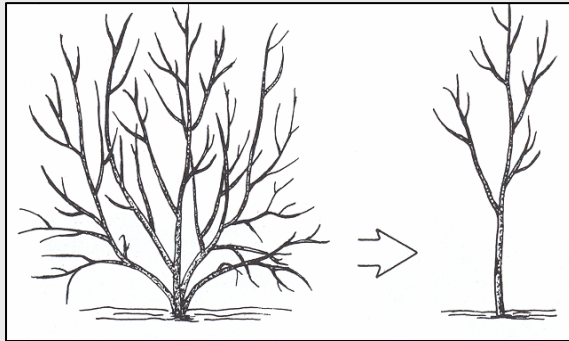
Prune dead and dying branches when they are first observed. Make the cuts in healthy wood beyond any apparent cankers. Once the main trunk is infected, pruning is of little value. Avoid heavy fertilization, which may promote disease development.

Cause of cankers in shrubs	Comments
Biotic	
Anthracnose	Associated with leaf spots and distorted terminals
Bacterial blight	Bark oozes during wet weather, elongated lesions may appear on twigs.
Botryosphaeria canker	Limbs and branches die back on many hosts, wounds ooze on some hosts.
Cypress canker	Affects cypress and sometimes arborvitae, <i>Chamaecyparis</i> , and juniper.
Cytospora canker	Many hosts, often causes sunken, elliptical lesions.
Fire blight	Preceded by twig and leaf damage, affects some plants in Rosaceae family.
Nectria canker	Many hosts; wilted foliage appearing first in the spring is a common symptom.
Phytophthora root/crown rot	Wilting, foliage discoloration, and premature defoliation are not common aboveground symptoms.
Abiotic	
injuries	Many causes
pruning wounds	Caused by pruning large limbs or by improperly making cuts
sunburn or sunscald	Young or severely pruned trees are commonly affected
underwatering	Summer rainfall-adapted plants are susceptible to sunburn from heat & light if lacking sufficient water.



A shrub (center) can be pruned so that it becomes more spreading (left) or more upright (right) in habit. Short stubs have been left to indicate where the cuts have been made.

from "Arboriculture: Care of Trees, Shrubs, and Vines in the Landscape" by Richard W. Harris.



An overgrown shrub can be pruned into an attractive small tree.

from "Arboriculture: Care of Trees, Shrubs, and Vines in the Landscape" by Richard W. Harris.

SOURCES OF INFORMATION – Shrubs

PUBLICATIONS FROM UC

Many items are available at no cost from local UCCE offices or can be downloaded from the world wide web at <http://anrcatalog.ucdavis.edu>

Pests of Landscape Trees and Shrubs, #3359, \$35.00

Pests of Landscape Trees and Shrubs, Set of 317 Slides, #94/104, \$269.00

Abiotic Disorders of Landscape Plants: A Diagnostic Guide, #3420, \$35.00

A Guide to Shrubs for Coastal California , #2584, \$1.50

Trees Under Power Lines – A guide for homeowners #21470, \$1.75

Protecting Trees When Building on Forested Land, #21348, \$10.00

CA Master Gardener Handbook –The new bible for California gardeners, #3382, \$30.00

INDUSTRY ORGANIZATIONS

Western Center for Urban Forest Research

<http://wcufr.ucdavis.edu>.

Western Chapter-Int'l Society of Arboriculture

<http://www.wcisa.net>

International Society of Arboriculture

<http://www.champaign.isa-arbor.com>

CA Urban Forests Council

<http://www.caufc.org>

American Society of Consulting Arborists

<http://www.asca-consultants.org>

CA Association of Nurserymen

<http://www.can-online.org>

Pesticide Applicators Professional Assoc. (PAPA)

<http://www.papaseminars.com>

UC Cooperative Extension Offices

Fresno: <http://cefresno.ucdavis.edu>

Tulare: <http://cetulare.ucdavis.edu>

Kings: <http://cekingdom.ucdavis.edu>

UC Web Pages

UC Ornamental Horticulture Information Center (UC OHRIC) www.ohric.ucdavis.edu

UC IPM Integrated Pest Management Information
www.ipm.ucdavis.edu

WEATHER & IRRIGATION

CIMIS - CA Irrigation Management & Info System
CA Dept Water Resources - www.cimis.water.ca.gov
UC IPM - Weather, day degree modeling and CIMIS
www.ipm.ucdavis.edu/WEATHER/weather1.html

GOVERNMENT

CDFA – CA Dept. of Food and Agriculture
www.cdfa.ca.gov

CDPR - Dept of Pesticide Regulation – pesticide license info
www.cdpr.ca.gov (916) 445-4300

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