

ROSES IN THE GARDEN AND LANDSCAPE: DISEASES AND ABIOTIC DISORDERS

Integrated Pest Management for Home Gardeners and Landscape Professionals

A variety of plant pathogens may attack roses from time to time. By far the most common problem in California is powdery mildew, but a number of other diseases including rust, black spot, botrytis, downy mildew, and anthracnose may cause problems where moist conditions prevail. To limit problems with pathogens, choose varieties and irrigation practices carefully, promote air circulation through bushes with careful pruning and placement of plants, and remove severely infested material promptly. Although some rose enthusiasts consider regular application of fungicides a necessary component of rose culture, many others are able to produce high quality blooms with little to no use of synthetic fungicides, especially in California's dry interior valleys.

In addition to diseases caused by bacterial, fungal, and viral pathogens, roses may display symptoms similar to those that are the result of chemical toxicities, mineral deficiencies, or environmental problems. Such problems are termed abiotic disorders and can often be corrected by changing environmental conditions.

LEAF AND SHOOT DISEASES AND DISORDERS

Powdery mildew, caused by the fungus *Sphaerotheca pannosa* var. *rosae*, is recognized by its white to gray powdery growth on leaves, shoots, sepals, buds, and occasionally on petals. Leaves may distort and drop. Powdery mildew does not require free water on the plant surfaces to develop and is active during California's warm, dry summers. Overhead sprinkling (irrigation or washing)

during midday may limit the disease by disrupting the daily spore-release cycle, yet allows time for foliage to dry. The pathogen



white areas:
powdery mildew

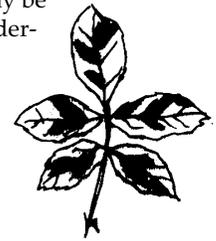
requires living tissue in order to survive, so pruning, collecting, and disposing of leaves during the dormant season can limit infestations, but may not entirely eradicate them; airborne spores from other locations can provide fresh inoculation. Rose varieties vary greatly in resistance; landscape (shrub) rose varieties are among the most resistant. Glossy-foliaged varieties of hybrid teas and grandifloras often have good resistance to powdery mildew as well. Plants grown in sunny locations with good air circulation are less likely to have serious problems. Fungicides such as triforine (Funginex) are available but generally must be applied to prevent rather than eradicate infections, so timing is critical and repeat applications may be necessary. In addition to synthetic fungicides, sodium bicarbonate (baking soda) in combination with horticultural oils has been shown to control powdery mildew of roses when used in a solution of about 4 teaspoons of baking soda per gallon of water with a 1% solution (or about 1 oz) of narrow range oil. The best time to apply this solution to avoid problems with phytotoxicity is during cool weather. Sodium bicarbonate is deleterious to maintenance of soil pH and soil structure and may leave white foliar deposits, so numerous applications with resulting runoff should be avoided. Commercial fungicides

containing potassium bicarbonate (Kaligreen, Remedy) are also available. Commercial formulations of neem oil will also control powdery mildew.

Downy mildew, caused by the fungus *Peronospora sparsa*, requires moist, humid conditions. Interveinal, angular purple, red, or brown spots appear on leaves, followed by leaf yellowing and abscission. Fruiting bodies of the fungus occasionally may be observed on the undersides of leaves.

Downy mildew can be reduced by increasing air circulation through pruning and avoiding frequent overhead irrigation.

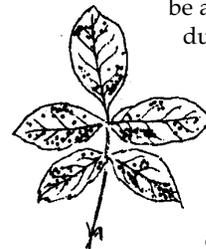
Control with fungicides is very difficult; environmental management is much more likely to be effective. Downy mildew is most likely to cause problems in coastal areas of California.



dark areas:
downy mildew

Rust, caused by the fungus *Phragmidium disciflorum*, is favored by cool, moist weather such as that found in coastal areas of California and may also

be a problem inland during wet years. Infected plants have small orange pustules on leaf undersides; upper sides of leaves may discolor and leaves may drop. Avoid over-



watering and prune back severely affected canes. During the winter collect and dispose of leaves remaining on the

plants as well as those that have fallen off. Low levels of damage can be tolerated without significant losses. Preventive applications of fungicides can be used, but frequent applications may be needed and may not be justified in garden or landscape situations.

Black spot, caused by the fungus *Diplocarpon rosae*, produces black spots



with feathery or fibrous margins on the upper surfaces of leaves and stems. Small black fruiting bodies are often present in spots on the upper sides of leaves.

There is no fungal growth on the undersides of leaves.

The fungus requires free water to reproduce and grow, so leaves should not be allowed to remain wet for more than 7 hours. (When hosing off aphids, do it in the morning so leaves have a chance to dry by midday.) Provide good air circulation around bushes. Remove fallen leaves and other infested material and prune out infected stems during the dormant season. Black spot is usually not a problem in most of California. Miniature roses are more susceptible than other types, although a few varieties are reliably resistant to all strains of black spot. If required, fungicides (such as chlorothalonil or triforine) can be applied preventively. A combination of sodium bicarbonate or potassium bicarbonate plus horticultural oil (as discussed above under "Powdery mildew") or neem oil has also been shown to be effective in reducing black spot.

Anthraxnose, caused by the fungus *Sphaceloma rosarum*, results in leaf spots.

When first formed, spots are red or sometimes brown to purple. Later the centers turn gray or white and have a dark red margin. Fruiting bodies may appear in the middle of the spot and the lesion may fall out creating a shot hole symptom. No information on management is



available. Hybrid teas and old-fashioned climbing and rambler roses are most often affected.

Viruses, including rose mosaic virus and others, may infect rose plants although damage may be mostly cosmetic with little reduction in plant vigor. Mosaic viruses can cause a variety of yellow zig-zagging patterns, splotching, or vein clearing. Symptoms are most pronounced in spring but may disappear almost completely during summer. Rose leaf curl virus causes leaves to curl downward and die, often with some overall yellowing. There is no known treatment for viruses. Tolerate or destroy infected plants and obtain virus-free stock for future plantings. Because mosaic viruses are not vectored by insects but rather are spread through propagation of plant parts, obtaining clean planting stock is the primary management strategy.

Nutrient deficiencies cause specific symptoms. Nitrogen deficiency causes leaves to yellow and older leaves to drop. Because many California soils have low percentages of organic matter, the nitrogen reserve is typically low and this nutrient should be added as inorganic fertilizer or from organic sources. Micronutrient deficiencies, especially iron and zinc, appear as interveinal chlorosis of new leaves. These elements may be deficient because soils are too wet or too alkaline, or because the soil type, such as sandy loam, is low in micronutrient content. Because inorganic forms of iron and zinc form insoluble precipitates in alkaline soils, iron and zinc may be applied directly to foliage. Iron and zinc in a chelated form may be applied to either soil or foliage.

Nutrient excesses may limit rose growth if the total salt level becomes too high. The results are a lack of vigor and short shoots, although no definitive leaf symptoms may occur. A few nutrients cause specific toxicities. Boron may be found in excess in some California soils and will cause stunting of plants, chlorosis, and marginal necrosis of the newest leaves.

Herbicide damage may be manifest in a variety of symptoms, which include cupped, curled, or yellowed leaves, small leaves, or death of the entire plant. The herbicide class and the dosage to the plant determine which symptoms appear and their severity. Injury from glyphosate (e.g., Roundup) is relatively common. Damage symptoms caused by this herbicide may not appear during the season of application, especially if application is made in autumn, but may appear the following spring as a proliferation of small shoots and leaves from buds. The plant will outgrow the injury if the dosage was not too high.

SYMPTOMS ON FLOWER PETALS AND BUDS

Botrytis blight, caused by the fungus *Botrytis cinerea*, is favored by high humidity. Affected plants

have spotted flower petals and buds that fail to open, often with woolly gray fungal spores on decaying tissue. Twigs die back and large, diffuse, targetlike splotches form on canes. Reduce humidity around plants by modifying irrigation, pruning, and reducing ground cover. Remove and dispose of fallen leaves and petals. Prune out infested canes, buds, and flowers. Botrytis blight is usually a problem only during spring and fall in most of California and during summer along coastal areas when the climate is cool and foggy.



CANKERS OR GROWTHS ON CANES

Botrytis blight (see above).

Stem cankers and dieback can be caused by a number of different fungi. Cankers are brown, often with gray centers or small, black, spore-producing structures on dead tissue. Provide proper care to keep plants vigorous. Prune out diseased or dead tissue, making cuts at an angle in healthy tissue just above a node. Avoid wounding canes. Cankers often develop after cold

temperature injury, so early spring pruning may not effectively eliminate them if late frosts occur, and additional late spring pruning may be necessary.

Winter injury from cold temperatures results in dead or dying flowers, twigs, and stems. Roses may be protected over the winter in cold mountain areas with a thick layer of leaf mulch. Winter injury may be followed by stem canker diseases caused by pathogens that move into injured tissue.

Sunburn appears as blackened areas, especially on the south and west sides of canes. Sunburn is caused by excessive temperatures on rose canes, usually as an indirect result of defoliation caused by drought stress or spider mite pressure. Reflected heat from masonry, vinyl siding, or rock mulch may also cause canes to sunburn.

Crown gall, caused by the bacterium *Agrobacterium tumefaciens*, affects many

woody plants including fruit trees, ornamentals, and roses as well as some herbaceous plants including chrysanthemums and daisies. Crown gall bacteria invade tissue after



wounding. Galls, in the form of large, distorted tissue growth, form at the base of the cane or sometimes on roots or farther up on stems.

Infected canes can be stunted and discolored. Do not plant susceptible

plants in infested soil or near infested plants. Purchase and plant only high quality planting stock.

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AUTHOR: J. F. Karlik
 TECHNICAL EDITOR: M. L. Flint
 DESIGN, COORDINATION, AND PRODUCTION: M. Brush
 ILLUSTRATIONS: Karen Ling.

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Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash nor pour pesticides down sink or toilet. Either use the pesticide according to the label or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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