- For more information, look for classes at public gardens, garden clubs, your local nursery or University of California Cooperative Extension Master Gardeners.

LESS-TOXIC CHEMICAL CONTROLS

If disease or pest problems are persistent in your garden, you may want to use one of these less toxic chemicals. Because these products prevent *but do not cure* disease, treatments must begin before symptoms are widespread. Be sure to coat both sides of the leaves. To decrease the possibility of burning leaves or flowers, water plants the day before you treat them and test a few leaves and petals before spraying the whole plant.

- Potassium bicarbonate is similar to common baking soda and can be used to prevent powdery mildew. It must be applied weekly. Or, use this baking soda mixture: 1 tablespoon baking soda, plus 2 tablespoons horticultural oil in 1 gallon of water. Spray when you first detect disease, and repeat when new symptoms appear.
- Sulfur can be effective against black spot, powdery mildew, and rust. Do not use when temperatures exceed 85F° because you will burn the leaves.
- Antitranspirants and horticultural oil have been observed to provide roses with protection from fungal diseases. They create a thin coating that can prevent spores from fungal diseases from invading the leaves. Treatment is begun when new leaves appear in spring and must be repeated whenever you see new growth.

  NOTE: In its ready-to-use form, the antitranspirant Cloud Cover is too strong for roses. The concentrate can be mixed 1 part Cloud Cover to 12 parts water to prevent burning. Use a 1% solution of horticultural oil and water (about 3 tablespoons of oil in 1 gallon of water).
- Neem oil can help prevent powdery mildew, black spot, and rust. Neem oil can be toxic to bees, so it is safest to spray it in the evening.
- Biofungicides attack and outcompete pathogens for nutrients and for space on leaves.

PRODUCTS AND RESOURCES

Examples of trade names of products listed in this fact sheet:

Horticultural Oil: Bonide All Seasons Spray Oil
Slow Release Fertilizer: Osmocote
Neem Oil: Rose Defense, Bonide Rose RX 3 in 1, Garden Safe Fungicide 3, Natria Neem Oil, Bonide Neem Oil
Potassium Bicarbonate: Kaligreen
Soil Probe: Check your nursery
Antitranspirant: Cloud Cover; Wilt Pruf
Biofungicide *Bacillus subtilus*: Serenade Garden Disease Control, Natria Disease Control

Recommended Reading

Contact local rose societies, nurseries, and Master Gardeners for lists of roses they recommend for your area.

Handbook for Selecting Roses, American Rose Society. 1998. Shreveport, LA. (318-938-5402)

Healthy Roses, University of California, Div. of Agriculture and Nat. Resources. 2002. Berkeley. (800-994-8849)

The Natural Rose Gardener, Lance Walheim. 1994. Ironwood Press.

The Organic Rose Garden, Liz Druitt. 1996. Taylor Publishing Company. Dallas.

The Rose Book, Maggie Oster. 1994. Rodale Press. Emmaus, PA.

PESTICIDES AND WATER POLLUTION

Common household pesticides show up in treated wastewater and in local waterways, sometimes at levels that can harm sensitive aquatic life. So, water pollution prevention agencies have teamed up with participating retail stores, pesticide distributors, and manufacturers to reduce the risks associated with pesticide use. This fact sheet is part of a series of fact sheets and store displays aimed at educating residents about less-toxic pest management. For the rest of the series of fact sheets, visit www.ourwaterourworld.org. Also, look for the **"Our Water Our World"** logo next to products in participating stores and nurseries. See the Pesticides and Water Pollution fact sheet for information on active ingredients in common pesticides that may cause water quality problems.

Pest control strategies and methods described in this publication are consistent with integrated pest management (IPM) concepts, and are based on scientific studies and tests in actual home and garden settings. **Use suggested products according to label directions and dispose of unwanted or leftover pesticides at a household hazardous waste collection facility or event.** For more information on pesticide disposal, call 1-800-CLEANUP or visit: www.1800CLEANUP.org. No endorsement of specific brand name products is intended, nor is criticism implied of similar products that are not mentioned.

ACKNOWLEDGMENT

The Central Contra Costa Sanitary District originally developed this IPM outreach program.

FOR MORE INFORMATION

For more information, contact:

Common Ground Organic Garden Supply and Education Center
(650) 493-6072
www.commongroundinpaloalto.org

Bio-Integral Resource Center (BIRC)
(510) 524-2567; www.birc.org

University of California Cooperative Extension Master Gardeners in your area (in the phone book)

University of California IPM website
www.ipm.ucdavis.edu

American Rose Society
http://www.ars.org/

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WONDERFUL ROSES!

To grow beautiful roses, you don't need to use pesticides and fungicides that may contribute to local water quality problems. By choosing appropriate rose varieties, planting roses properly, and carefully following recommended cultural practices, you can grow roses that are less susceptible to pests and diseases. Roses have certain minimum requirements, so if you have soil that drains slowly or a shady yard (roses need six hours of direct sunlight a day), look for plants that will be more appropriate for your garden.

The following tips can help you to protect your family's health and the environment while you grow strong, healthy roses with glorious blooms.

CHOOSING THE RIGHT ROSE

- Start with healthy plants. Look for glossy foliage and an evenly moist rootball. Avoid plants with spindly stems, discolored or spotted leaves, or roots that are coiled around the container.
- Choose rose varieties that are disease-resistant *and* suited to your particular climate. Some roses are difficult to grow successfully in the cool and foggy summers of our coastal areas. No roses are completely disease-free, but many can be grown with minimal care.
- Visit a local rose garden at various times during the growing season to see what particular varieties look like and to learn about different roses' growing habits and requirements.
- Ask local gardeners and rosarians for suggestions. Try to find people who are growing roses with minimal pesticides.
- Contact local rose societies, nurseries, and Master Gardeners for lists of roses they recommend for your area.

PLANTING ROSES

Before you plant, spend some time finding the best spot in the garden for your roses.

Where to plant

- Roses need full sun, which means at least six hours of direct sunlight per day. Sunlight encourages blooms and discourages disease.
- Roses require good drainage. In the spot you've chosen for planting, dig a hole the size of a gallon jug and fill it with water. If the hole doesn't drain in one hour, you should choose another spot or make a raised bed for planting the roses.
- Give your roses plenty of room to grow so that they won't be crowded. Get an idea of the mature size of the rose when you buy it. Good air circulation is crucial in preventing disease.
- Consider planting roses in mixed beds rather than traditional rose beds. This diversity of plants will attract beneficial insects and cut down on the spread of rose pests and diseases.

When to plant

- Roses purchased in pots can be planted any time of year, but the best selection is available in nurseries from December to May. Potted roses can be planted immediately, or they can remain in their pots for several months.
- Bare root roses (plants with no soil on their roots) are available December through February.

They should be planted right after you buy them so that they don't dry out. Soak the plants overnight in water before planting.

How to Plant

Planting in Containers

For container planting, choose roses that don't grow more than 4 feet tall. Choose a container at least 20" deep and wide. Use a premium commercial potting soil. You may also want to add organic matter such as compost or high-quality rose planting mix. Water well after planting.

Planting in the Ground

- Dig a hole the depth of the container and at least two times the diameter of the container. For bare root roses dig a hole that will comfortably hold the roots of the plant. Roots need to reach out laterally as far as possible in order to take advantage of water and nutrients.
- Do not amend the soil in the planting hole. Research has shown that soil amendments are not necessary in most soils, including clays.
- Place the rose in the hole so that the bud union (the knobby part of the trunk where the rose was grafted) is 2" to 3" above the soil. For roses grown on their own roots, look for the "root crown," the area where the roots meet the trunk. Plant with the root crown above the soil, but not so high the roots are exposed.
- Fill in the hole with the soil you removed and gently tamp it down.
- Water thoroughly. If the rose sinks after watering, you may need to remove it and replant it higher to keep the soil from touching the root crown or to keep the bud union at least 2" above the ground.
- Cover the soil with 2" to 3" of organic mulch. See below for more details.

CARING FOR YOUR ROSES

Watering

The amount of water your roses will need depends on the climate and the weather, the type of soil, and the type of rose. In areas with summer fog, roses will need less water than in areas with summer heat. You will have to water more frequently if you have sandy soil than if you have clay soil. It is important to give your roses the right amount of water. Waterlogged soil will kill roses, and drought conditions can stress plants, making them more susceptible to pests and diseases.

- Keep the soil moist. Use your finger or a soil probe to test the soil and check roses in pots at least twice a week.
- Watering with soaker hoses or a drip irrigation system delivers water to the soil without wetting the foliage. This can help prevent fungal diseases. If you water with a sprinkler, water early in the day so the foliage will dry out before evening.
- If you use granular fertilizer, water it in with a hose. Drip systems don't provide enough water to dissolve the granules.

Fertilizing

Roses prefer a slightly acidic soil (pH 6.2 to 6.8) that is not high in salt. Fertilizers such as alfalfa meal, cottonseed meal, blood meal, and bat guano can acidify the soil. Animal manures are generally high in salts.

- Use slow-release fertilizers such as compost or those listed above or encapsulated materials such as Osmocote. These fertilizers release nutrients slowly over a long period, preventing spurts of succulent growth which attract aphids and diseases. Organic natural fertilizers, including compost, will also provide soil structure and moisture retention and will improve food for essential soil organisms.
- If you choose a synthetic commercial fertilizer, choose one formulated for roses and try applying it at half-strength.
- If you have sandy soil that is deficient in nutrients and organic matter, you may need to apply fertilizer every month during the growing season. (Note that a slow-release fertilizer like Osmocote does not have to be applied every month.) Roses growing in clay soil containing organic matter may need fertilizing only once a year.
- Avoid using fertilizer/systemic insecticide combinations. These can cause stunted and deformed leaves, especially when the weather is cool. They may also harm soil-dwelling organisms.
- Fertilize during the growing season after the soil has warmed up. Plants will not take up fertilizer when the soil is cold.
- Sweep up any fertilizer that spills on driveways or paths and place around plants. Irrigation or rain can wash fertilizer into storm drains where it causes problems for aquatic life when it reaches a creek or the Bay.
- If you are concerned about the fertility of your soil and are considering an extensive fertilization program, have your soil tested by a professional lab first. The lab analysis will provide you with recommendations for specific amendments. (Try A&L Western Agricultural Labs, 1311 Woodland Ave., #1, Modesto, CA 95351; (209) 529-4080; www.al-labs-west.com).

Mulching

Mulching with organic materials, like compost and shredded leaves, helps to conserve moisture, control weeds, improve soil structure, and keep roots cool in summer heat. Mulch can also prevent the spread of diseases like black spot by keeping disease spores from splashing up onto the plant from the soil. Spread a two-to four-inch layer of mulch around each plant, keeping the mulch a few inches away from the trunk.

Pruning

Careful pruning can keep roses healthy and help to prevent disease and pest problems. Pruning allows you to remove dead, spindly or diseased plant material, helps to shape plants and promote flowering and new growth, and provides good air circulation to discourage diseases. Use sharp tools so you won't tear the bark or damage the cane.

- During the growing season, remove any leaves and shoots affected by disease but do not prune too heavily. The plant will respond with new, succulent growth that is susceptible to aphids and powdery mildew. During winter pruning (December to February), remove any diseased portions of the plant.
- Good sanitation is essential in reducing disease problems. Remove all diseased prunings and rake up any diseased leaves and blossoms as they fall. Do not compost them unless you have reliably hot compost that you turn regularly. Diseases can be transmitted from stems, leaves, and petals lying on the ground and from diseased plant material.
- The modern Hybrid Tea Roses and Floribundas only produce flowers on new growth so prune to remove last year's wood. Cut these bushes back every winter, leaving 2/3 of the canes' height at the base for light pruning, 1/2 of the height for medium pruning, and 1/3 of the height for heavy pruning.
- Arching shrub roses should be pruned lightly so their naturally elegant shape is not destroyed. Thin the canes so they do not cross or rub, and cut back the lateral shoots.
- Climbers should also be pruned lightly. Don't cut back long canes. Train them into a horizontal or diagonal position to encourage lateral shoots that produce flowers all along the cane rather than just at the tip. Trim back lateral shoots to 2 or 3 nodes. Remove canes that cross or rub.
- Roses that bloom once in the spring should be pruned right after they have flowered.

MANAGING COMMON ROSE PESTS AND DISEASES WITHOUT PESTICIDES

Inspect plants regularly to detect any diseases or pests before they become a problem. Become familiar with the pests and diseases that are common in your area. Before you treat plants for insect problems, look for beneficial insects such as ladybugs, lacewings, syrphid flies, and orange-and-black soldier beetles. If you see these natural enemies of rose pests, refrain from using an insecticide because you will kill more useful insects than pests. (See following page for less-toxic chemical control for rose diseases.)

Aphids

Tiny (1/8"), sucking insects that feed on plant sap. Often found in clusters on new shoots and flower buds, especially on over-fertilized plants. May cause leaves to discolor or turn black with sooty mold. Natural predators can reduce their numbers. **Controls:** Wipe off by hand or spray off with water, prune off infested growth, spray with an insecticidal soap, use slow-release fertilizers to prevent growth spurts.

Black Spot

Optimum conditions for infection: 64°F to 75°F and 95% relative humidity. Spores must be continuously wet for 7 hours for infection to occur. **Symptoms:** circular black spots with fringed edges on leaves and stems. Leaves may yellow and drop. Spores overwinter on infected stems and fallen leaves and are spread by splashing water, cultivation, and insects. This disease is more common along the coast. Inland it may indicate excessive moisture, insufficient light, or poor air circulation. **Controls:** Choose resistant varieties, prune away and destroy infected plant material, increase air circulation, destroy fallen leaves, mulch to prevent spread of spores.

Powdery Mildew

Optimum conditions for infection: Night — 61°F and 95% to 99% relative humidity; day — 81°F and 40% to 70% relative humidity. Grows well only on new growth. **Symptoms:** curled leaves and a white or gray powdery coating on leaves, shoots, and flower buds. Spores overwinter on leaves and leaf buds, and are spread by wind. **Controls:** Plant disease-resistant varieties, wash leaves in early afternoon with a strong spray, avoid heavy fertilization or heavy pruning that causes spurts of new, highly susceptible growth.

Rust

Optimum conditions for infection: 64°F to 70°F and continuous moisture for 2 to 4 hours. Cold winters and very hot summers limit development. **Symptoms:** small orange or yellow spots on any green portion of the plant. On the leaves, symptoms start on the undersides and progress to the upper surfaces. Infected leaves may drop. Overwinters on leaves and stems and is spread by wind, rain, and overhead watering. **Controls:** Choose resistant varieties, remove and destroy fallen leaves, mulch to prevent spread of spores, remove and destroy infected shoots (look for dark, corky lesions). Use soaker hoses or drip irrigation.

Choose less toxic products for your home and garden. Look for this symbol before you buy.