



COMMON RUST OF ROSES

Common rust of roses (*Rosa* spp), first described in 1665, is now widespread in North America and Europe. The disease has also been reported in most other countries where ornamental roses are grown. Though widespread, rust is not a serious disease except in certain areas because the rust fungus has specific temperature and moisture requirements for spore germination, infection, and survival.

In the United States, rust is a continual and serious problem only in areas along the Pacific Ocean where cool temperatures and high moisture at certain times of the year are conducive to disease development. In Illinois, and most other areas of the Midwest, extreme temperatures in summer and winter limit the survival and spread of rust fungi, even though moisture conditions may be adequate for infection. In the Midwest, rust infections largely originate on rose plants shipped from nurseries along the Pacific Coast.

Nine species of the fungus genus *Phragmidium* cause rust diseases of roses in the United States. Only *P. mucronatum* and *P. tuberculatum*, however, occur to any extent on cultivated roses, and the disease they cause is called common rust or common leaf rust to distinguish it from other rust diseases. Only members of the genus *Rosa* are attacked. No cultivated hybrids and species of roses seem immune to common rust. Hybrid teas, climbing hybrid teas, hybrid perpetuals, and other roses with large, firm leaflets are especially susceptible.

Rose rootstocks that are infected include *Rosa alba* (Jacobite rose or the white rose of New York), *R. canina* (Dog rose or briar rose), and *R. laxa* (also know as *R. x canina froebelii*). In nurseries along the Pacific Coast, where *R. laxa* is used as a rootstock for bush roses, the rust fungi may produce severe defoliation by late summer. A plant may be reduced to a naked stem topped by a small cluster of new leaves. Young shoots may be distorted or even die back, and plant vigor declines.

Rust normally first appears on the lower leaves of a plant and continues upward as long as the environmental conditions for infection are favorable.



Figure 1. Angular dead spots on the lower surface of a rose leaflet caused by the rust fungus.

For further information contact Nancy R. Pataky, Extension Specialist and Director of the Plant Clinic, Department of Crop Sciences, University of Illinois at Urbana-Champaign.

SYMPTOMS

In early spring, minute, glistening, orange-red spots (spermagonia or pycnia) appear on the upper surfaces of the leaves. Within a few days, yellow spots (aecia) appear on the underleaf surfaces. As the somewhat circular aecia enlarge and form masses of powdery aeciospores that rupture the lower leaf surface, their color changes to bright orange. When viewed from the upper side of the leaf, they appear light yellow or orange and slightly cup-shaped. The aecia, which average one millimeter (1/25th of an inch) in diameter, are sometimes bordered by a narrow light green or reddish zone. Petioles, green stems, calyxes, sepals, and fruit may also be infected. On young stems, the lesions are long and narrow. The elongated stem lesions may cause distortion, curving, and destruction of the buds. Sometimes the spring symptoms (pycnial and aecial stages of the rust) go unnoticed.



Figure 2. The summer or uredial stage of common rust on rose leaflets and stems.

The summer stage of the disease is the most conspicuous and serious. Very small, reddish orange pustules (uredia), which consist of powdery masses of bright yellow-orange spores (urediospores), form on the lower leaf surfaces and petioles. When viewed from the top side of the leaf, the uredia appear as angular dead spots up to 1 ½ millimeters (1/16 of an inch) long (Figure 1). The summer stage is cyclic and may repeat every 10 to 14 days in favorable weather. The leaves are reinfected over and over by urediospores produced in the summer pustules. Heavily rusted leaves may become twisted and wilt, wither, and fall off within 5 to 10 days from the onset of symptoms. Infected young shoots may become distorted and turn reddish (Figure 2). These symptoms are followed by a general decline in plant vigor. In mild climates, such as along the Pacific

Coast, the uredial stage continues for most of the year.

In Illinois and most of the United States, masses of black spores (teliospores) begin to form during late summer or early fall in new pustules on the leaves and stems, or they gradually replace the orange urediospores in the old pustules, turning them a dark chocolate-brown to black (Figure 3). The black pustules may appear crustlike on the stems (Figure 4).

DISEASE CYCLE

In spring, the thick-walled, black teliospores, which have overwintered in black pustules on dead leaves and stems, germinate and produce basidiospores. The basidiospores are blown about by air currents and infect nearby young rose leaves and stems. Fungal hyphae develop within the rose tissues and form a mycelium that produces several pycnia, which are the first, minute, orange-red circular spots on the upper surfaces of the leaves in the spring.



Figure 3. Close-up of rose rust (overwintering or telial stage) on the undersurface of a rose leaflet. The pustules are orange and turn black late in the growing season (photograph courtesy of Lester P. Nichols).

Another type of mycelium then develops from the pycnia and grows through the leaf and stem tissues, producing within a few days the aecial stage of the rust fungus. The aecia are the yellow pustules that



Figure 4. Black overwintering stage of rose rust: infected branches on left; close-up of pustules on right (Illinois Natural History Survey photograph).

appear on the lower surfaces of the leaves in spring. Each aecium matures into a thick-walled, cuplike structure that breaks through the lower epidermis of the leaf and releases numerous orange aeciospores into the air. When these spores land on a leaf and conditions are favorable for infection, the spores send out a germ tube that infects the leaf. The mycelium that develops produces the large, reddish orange uredial pustules on the lower surfaces of the leaves in summer.

The urediospores are carried by air currents to other rose leaves, green stems, and fruits. They germinate under favorable temperature and moisture conditions. Penetration and infection occur mainly through the lower surfaces of leaves. New pustules appear within 10 to 14 days. The summer (uredial) repeating stage is the principal source of new infections.

As late summer and autumn approach, the resistant black teliospores replace the bright orange urediospores, thus completing the disease cycle.

Where winters are mild, the mycelium that produces the aecia and aeciospores can remain alive perennially within the stems of infected roses. In the spring this mycelium produces the aecial stage. Thus, in this situation, there are two sources of primary infection in the spring: the teliospores that have overwintered on rose debris and the aeciospores produced by the perennial mycelium in the stems. Because the long cold winters in Illinois kill urediospores, new spring infections in Illinois must come from the basidiospores formed by the teliospores of the black rust stage.

Germination of the aeciospores, urediospores, teliospores, and basidiospores takes place only if the surface of the plant remains continuously wet (from rain, fog, or dew) for at least two to four hours and the temperature is favorable. All types of spores germinate within a temperature range of 6° to about 27°C (34° to 81°F), with an optimum range of 15° to 21°C (59° to 70°F). At or above about 28°C (82°F) no infection by urediospores occurs under otherwise favorable conditions, and the spores remain viable for only about a week. Thus, even when rust does form during the spring in Illinois—most commonly from infected plants grown in coastal California—normal summer temperatures prevent extensive spread of the rust fungus.

CONTROL

Cultural

Good sanitation should eliminate sources of infection. The following cultural controls promote good sanitation.

1. Purchase only top-quality, disease-free plants from a reputable nursery. Examine all newly acquired plants carefully for any evidence of rust. If any disease is found, prune out and destroy (burn, bury, or haul away with the trash) all infected parts.

2. Remove and destroy infected leaves as they appear during the growing season. Do not handle or work among plants when the stems and foliage are wet.
3. Give the rose garden a complete cleanup just before winter protection is applied. Remove and destroy old leaves, both those still on the stems and those on the ground. Carefully prune out and destroy all infected canes in the fall and again in early spring, before new leaves appear, according to type and cultivar. These practices, if carefully followed, should eliminate the overwintering stage of the rust fungus.
4. Whenever possible, destroy nearby wild or uncared-for roses. These plants may serve as a source of infection for ornamental roses.
5. In greenhouses, provide adequate ventilation and heat to prevent condensation on the leaves and stems, which promotes infection and disease development. Avoid overhead irrigation and syringing the foliage, especially in late afternoon or evening. Use a soil soaker hose or other method that will not wet the foliage.
6. Rose hybrids and cultivars differ greatly in their resistance to common rust (Table 1). Tea roses are normally highly resistant, while hybrid teas, ramblers, and polyantha types generally show a considerable degree of resistance. Because of the existence of strains or physiologic races of the rust fungi, the relative resistance or susceptibility of rose cultivars may vary from one location or from one year to another.

Chemical

If the cultural practices outlined above do not control rust, applications of a suggested fungicide may be required on a 7- to 10-day schedule. Several of the fungicides recommended to control black spot disease and powdery mildew do not control rust. Current chemical recommendations to control rose diseases are given in Illinois Homeowner's Guide to Pest Management. This circular is revised annually and available at your nearest Extension office. All above-ground parts of each rose plant, including both leaf surfaces, should be thoroughly covered with spray. Start applications as the buds break open in the spring and continue until the weather turns hot and dry.

Spraying is more efficient than dusting. Sprays are required at 7- to 10-day intervals to keep the young, susceptible growth adequately covered and protected. If the period is unusually rainy, the spray interval should be shortened to 5 days; if dry, lengthened up to 10 or 14 days. If possible, sprays should be applied before it rains. In general, one gallon of spray mix will cover 10 to 20 rose bushes. Spray to the point of run-off (plants begin to drip). When spraying hard-to-wet stems and foliage, add a small amount of a household detergent (about ½ teaspoonful per gallon of spray) or use a commercial surfactant if your preparation does not already contain a surfactant. Follow the directions on the container label.

A dormant spray of liquid lime-sulfur applied to stems and surrounding soil just before adding the winter protection and again just prior to budbreak in the spring helps control rust, black spot, powdery mildew, cankers, and other diseases and insect pests. Do not apply lime-sulfur after budbreak. Add one part of liquid lime-sulfur to nine parts of water. Lime-sulfur is caustic, will discolor paint, and is disagreeable to apply. It is sold as Acme Lime Sulfur Spray, Miller Lime Sulfur Solution, Orthorix Spray, Security Lime Sulfur, and F & B Lime Solution. Do not allow lime-sulfur to freeze. Use lime-sulfur alone; it is not compatible with most fungicides and insecticides.

Table 1. The Relative Resistance of Some Cultivated Roses to Common Rose Rust

Very Susceptible to Susceptible		Moderately Susceptible	Highly Resistant to Apparently Immune	
Acapulco	Jeanie	Apollo	Alain	Jass Fest
Americana	Josephine Bruce	Autumn	American Heritage	John F. Kennedy
Arlene Francis	Konrad Adenauer	Aztec	Angel Wings	John S. Armstrong
Baby Blaze	Kordes Perfecta	Broadcaster	Aquarius	Joseph's Coat
Betsy McCall	Mojave	Circus	Audie Murphy	Lilac Dawn
Bewitched	Montezuma	Commanche	Betty Prior	Lucky Lady
Big Red	Mrs. P.S. DuPont	Crown Jewels	Blithe Spirit	Ole
Blue Moon	New Yorker	Diamond Jubilee	Burma	Pink Favorite
Bob Hope	Night	Duet	Camelot	Pink Parfait
Buccaneer	Nocturne	El Capitan	Capistrano	Queen Charlotte
Burnaby	Peace	Etoile DeHollande	Century 2	Radiance
Charles Mallerin	Permanent Wave	Firelight	Chic	Redgold
Charlotte Armstrong	Piccadilly	Garden Party	Command	Red Ruffles
Christopher Stone	Picture	Gold Cup	Performance	Roman Holiday
Chrysler Imperial	Pink peace	Golden Girl	Donald Prior	Ruby Lips
Confidence	Polonaise	Heat Wave	Encore	Sante Fe
Coronado	Polynesian Sunset	Indiana	Fashionette	Sarabande
Dearest	Portrait	Jiminy Cricket	Fire King	Saratoga
Ebony	Rapture	K.A. Victoria	First Prize	Scarlet Knight
Elizabeth of Glamis	Siren	King's Ransom	Fragrant Cloud	Sierra Dawn
Embers	Sister Therese	Los Angeles	Fred Howard	Simon Bolivar
Eiffel Tower	Spartan	Beautiful	Frensham	Snow Bird
First Love	Summer Sunshine	Ma Perkins	Gene Boerner	Summer Snow
Fragrant Cloud	Sutter's Gold	Mark Sullivan	Golden Slippers	The Duke
Fusilier	Swarthmore	Matterhorn	Gov. Rosellini	Trade Winds
Golden Masterpiece	Tanya	Mexicana	Grenada	Tropicana
Golden Rapture	The Doctor	Mrs. E.P. Thorn	Granslam	Wildfire
Hawaii	Tom Brenneman	Pascali	Irish Mist	
Helen Traubel	Virgo	Pink Radiance		
Independence	Vogue	Queen Elizabeth		
Irish Gold	Wendy Curssons	Red Radiance		
Isobel Harkness	White Knight	Rex Anderson		
Jantzen Girl	White Swan	Royal Canadian		
		Talisman		
		Tiffany		
		White Bouquet		