

# *Rose Diseases*



# Identification and Management

The rose is one of the most popular garden plants in Louisiana and throughout the world. The local environment allows for growth and beauty most of the year. Unfortunately, though, our warm, humid weather also encourages the development of several serious diseases that can seriously damage rose bushes. This publication describes the major rose diseases found in Louisiana and offers disease management tips. An understanding of the plant, the environment in which it is grown and the pathogens that can attack it will improve the chances of successful rose disease management.

## Foliage Diseases

### **Black Spot**

Black spot, caused by the fungus *Diplocarpon rosae*, is the most important rose disease in Louisiana. It is characterized by dark brown to black spots 1/10 to 1/2 inch in diameter on upper leaf surfaces. The spots are circular with feathery, uneven margins. Leaf tissue surrounding the spots turns yellow, and chlorosis extends throughout the leaflet until the leaf drops. Development depends on environmental conditions. In sub-optimal conditions the spots enlarge slowly, taking several weeks to reach the 1/2-inch size. In resistant cultivars, or when unfavorable environmental conditions occur, only tiny black flecks may form and leaves may not turn yellow or drop.

On susceptible cultivars, raised, reddish-purple irregular blotches develop on the immature wood of first year canes. Spots later become blackened and blistered. Lesions are often small and rarely kill branches, but they are extremely important in the survival of the pathogen over the winter.

Petioles and stipules may have inconspicuous black spots similar to those found on leaves. Petals occasionally have reddish flecks accompanied by moderate distortion.

Leaves are most susceptible while they are expanding. Infection occurs only after about seven hours of continuous moisture on the leaves. Symptoms appear in three to 16 days, depending on the temperature. Spores that continue the disease cycle are produced in a leafspot 10 to 18 days after infection. These spores are dispersed by wind, splashing water, by people during cultivation and by insects. Fallen leaves blown by wind may disperse the fungus locally.

The fungus does not survive in the soil, and spores adhering to tools remain viable no longer than one month. The fungus survives readily on fallen leaves or in infected canes. Environmental conditions in Louisiana are very conducive for development of black spot disease. Abundant rainfall, temperatures of 66 - 86 degrees F and a long growing season ensure an abundance of the disease and make its management difficult.

Leaves of susceptible cultivars that remain wet or are subject to high humidity for more than seven hours will surely get black spot. Overhead watering should be avoided. If it is necessary, it should be done only on sunny mornings with rising temperatures. Avoid excessive watering during cloudy, humid weather.

Good sanitation is important to reduce inoculum of the disease-causing fungus. Removing leaves from the ground and pruning canes that contain lesions will reduce overwintering of the fungus. To allow good air circulation through the leaf canopy, avoid dense plantings.

With the amount of disease pressure that exists in Louisiana, fungicides are usually necessary to maintain a healthy rose plant. As always, use fungicides according to label directions and consult your LSU AgCenter Extension agent for the latest recommendations.

## **Cercospora Leafspot**

Cercospora leafspot is a common disease on Louisiana roses. It is caused by the fungi *Cercospora puderi* and *C. rosicola*. Cercospora leafspots are 1/20 to 1/5 inch in diameter with dull gray centers and reddish-brown margins. Often the spots coalesce to form irregular lesions.

The fungus survives readily on fallen leaves, thus sanitation practices such as removal of fallen leaves are recommended to reduce inoculum. Although the disease is usually minor, occasionally fungicides need to be applied when warm rainy conditions occur. Please contact your local LSU AgCenter Extension agent for the latest list of recommended fungicides.

## **Downy Mildew**

Downy mildew is caused by the fungus *Peronospora sparsa*. Symptoms of the disease occur on leaves, stems, peduncles, calyxes and petals. Infection is sometimes restricted to young, apical plant growth. Leaves develop reddish-purple to dark-brown irregular spots followed by leaflets turning yellow. Defoliation may be severe on the most susceptible varieties. Foliar symptoms may resemble burns from pesticide toxicity.

In humid, cool conditions, fungal spores appear on the lower surface of leaves, but under less favorable conditions spore production is sparse or nonexistent. Purple to black areas varying in size appear on stems and flower stalks. Similar spots and dead tips develop on calyxes, and infected twigs may be killed.

Downy mildew is sometimes confused with powdery mildew. Downy mildew produces gray spores only on the lower surface of the leaf, and powdery mildew produces white spores on both surfaces of the leaf. Downy mildew also produces severe defoliation. Powdery mildew usually kills tissue only when infection is severe over an extended period. Downy mildew occurs early in the year during cool, rainy periods; powdery mildew occurs in the spring or fall during warm, dry periods.

Spores of the downy mildew fungus can be found in infected leaves, sepals, flower buds and stems. The fungus overwinters in stems, but it can survive on dried fallen leaves for as long as a month. Spores may be produced when high humidity and temperatures around 64 degrees F persist. Roses are generally unaffected by the disease when the humidity is lower than 85%. Although the humidity is generally high in Louisiana, spring temperatures (80 degrees F and above) usually keep this disease to a minimum. Downy mildew is a disease of sporadic occurrence, and it occurs primarily on container plants in retail nurseries. These plants are obtained from West Coast producers and have downy mildew present when shipped to Louisiana and other southern states. A severe disease outbreak occurred in the spring of 1992 in Louisiana and other southern states but did not reoccur the following year.

Fungicides to manage downy mildew are limited. Sanitation is important to prevent seasonal carryover of the pathogen. Destroy infected leaves, stems and flowers. Before purchase, inspect nursery stock for purple stem lesions or leaf infections.

## **Powdery Mildew**

Powdery mildew is caused by the fungus *Sphaerotheca pannosa*. Early symptoms include raised blister-like areas on the upper leaf surface. The white growth of the fungus appears as patches on the surfaces of young leaves, which become twisted and distorted and are commonly covered by the white powdery growth. Older leaves may not be distorted, but the powdery growth may be found in circular to irregular areas. Usually, mature leaves are not infected. Under favorable environmental conditions, affected leaves may fall.

Severe mildew damage reduces leaf growth, the aesthetic value of the plant, the ability of the plant to produce its food and therefore plant growth. The number of flowers

may be reduced. There are differences in susceptibility of rose cultivars to the powdery mildew fungus. Generally hybrid teas, ramblers and climbers are more susceptible. Additionally, the growth stage of the host tissue at the time of infection is important, because the fungus favors younger, more succulent tissue. Usually, tissues become more resistant as they mature. Typically, mildew development increases as new shoots develop and decreases as these shoots mature and begin to form flower buds. After flower buds are formed, there is a renewed increase in the disease as lateral buds break and new shoots develop.

Environmental conditions, too, influence the presence or absence of disease. Temperature, relative humidity and the presence of free water have a strong influence on the growth of the fungus. In the field, the most favorable conditions for powdery mildew are nighttime temperatures of 60 degrees F and relative humidity of 90% - 99%. Daytime conditions of 80 degrees F and relative humidity of 40% - 70% favor the maturation and release of the spores. Repeated cycles of these conditions are necessary for severe disease outbreaks. In contrast to many other diseases, powdery mildew development is adversely affected by the presence of a water film on the leaf surface. Some resistance to powdery mildew exists, but at low to moderate levels. During optimum environmental conditions for disease development, fungicidal applications are necessary. Please contact your LSU AgCenter Extension agent for the latest fungicide recommendations.

Sanitation also should be practiced. Pruning infected shoots and raking and destroying fallen leaves from around the bushes at the end of the season may inhibit overwintering of the fungus.

### **Rose Mosaic**

Rose mosaic is a virus disease with highly variable symptoms. They include chlorotic line patterns, ring spots, mottles, yellow netting and yellow mosaic patterns. Up to 15% reduction in saleable blooms has been observed in greenhouse rose production. Loss of plant vigor and a greater sensitivity to winterkill also have been observed with mosaic infection.

It is not unusual for infected plants to remain symptomless. The degree of symptom expression varies with the cultivar and the time of year as well as from year to year. In general, symptoms are most evident in the spring.

There is no evidence of insect transmission of viruses in rose. Virus transmission appears to be limited to vegetative propagation when virus-infected buds, scions or rootstocks are grafted to healthy plants.

Rose mosaic is controlled by removing infected plants and by using virus-free propagative plants. Heat treatment of infected plants can be used to obtain buds free of the virus. Buds taken from plants held at 100 degrees F for four weeks are usually free of this virus and can be used to propagate "clean" cultivars.

### **Rust**

Rust on roses is caused by any of nine different species of the genus *Phragmidium*. The disease first appears as orange pustules on lower leaf surfaces. Initially, the pustules are small and inconspicuous but later develop, giving rise to orange or brown spots on the upper surface of the leaf. Sepals and young stems may be infected and usually become distorted.

Cultivar susceptibility varies; symptom expression varies accordingly. Many susceptible cultivars will defoliate after severe infection; others will maintain their foliage.

Rust spores are windborne and, on germination, infect through the natural openings in the leaf. The spores infect best when temperatures are 64 to 70 degrees F and when two to four hours of continuous moisture are present. As temperatures rise, spore survival is reduced, thus reducing the development and spread of the disease. In old lesions,

black pustules will form. Black pustules overwinter within the leaf and stem tissues after leaf drop. In areas with mild winters, spores are produced in these fallen leaves for spring infection.

Disease management can be accomplished with sanitation and timely fungicide use. Leaves showing symptoms should be removed from the plant. Remove from the area leaves that fall. Fungicides, too, will give adequate protection. Please check with your LSU AgCenter Extension agent for the latest recommendations.

## Stem Diseases

### **Botrytis Blight**

Botrytis blight is a disease of the stem and flower of rose caused by the fungus *Botrytis cinerea*. The most severe expression of the disease occurs in storage or in transit, where plants have been kept in high moisture conditions.

In field-grown plants, during periods of wet weather and low temperatures, buds of infected roses fail to open and soon become covered with the grayish growth characteristic of the fungus. Infected flowers may droop, and blackish-gray lesions may be found extending down the stem from the base of the bud.

Necrotic, sunken areas, known as cankers, may form on canes where the fungus has entered through a wound. If environmental conditions are conducive for disease development, new canes are often infected at nodes, causing an eventual girdling and collapse of the stems.

*Botrytis* sp. develops most effectively at a temperature of 59 degrees F with a high moisture level. It usually requires a wound to invade the tissue.

All affected plant parts should be removed and discarded as soon as symptoms occur. Apply protective fungicide after pruning. Please check with your LSU AgCenter Extension agent for the latest fungicide recommendation.

### **Canker**

Several fungal pathogens, including *Coniothyrium fuckelii*, cause stem cankers on rose in Louisiana. Canker refers to a necrotic, often sunken, lesion on a stem, branch or twig of a plant. Wounds are generally necessary for infection. Cankers begin as small lesions of various colors that expand and become light to dark brown in their centers. The epidermal tissue within the canker begins to dry out, shrink and sometimes crack, exposing masses of spores. At times cankers may girdle the stem, causing a wilt or dieback of tissue above the canker.

Injury to rose canes should be avoided. Make pruning cuts immediately above a node without cutting into nodal tissue. Pruning tools should be clean and dipped between cuts in a 10% bleach solution to prevent spread of pathogens. Foliage sprays used for black spot management may aid in stem canker management.

### **Crown Gall**

Crown gall is caused by the bacterium *Agrobacterium tumefaciens* and can be a serious disease on roses grown in Louisiana. The disease appears as a soft or hard gall on roots, aerial plant parts or most frequently in the crown area of roses.

Galls are usually rounded with rough surfaces. The young gall is light green or white and soft, but as it matures, the gall becomes darkened and woody.

Losses caused by crown gall vary, but can be expressed as stunting, poor foliage and fewer flowers. The location of the gall on the plant likely determines the symptom and

the extent of damage. A single gall at the base of a plant may be more detrimental than several galls on the roots or canes.

The rate of gall development is determined by the type, vigor and growth of the host and the environmental conditions surrounding it. Fall infections may remain symptomless throughout the winter, not showing gall formation until late spring.

The pathogen is generally most abundant near the surface of the developing galls. Therefore, cutting through the galls with pruning tools will contaminate the tool and increase the chance to transmit the bacterium with subsequent cuts.

As galls in soil deteriorate, the pathogen is released and can be transported by moving water and soil. In the absence of host roots, the bacterial populations generally decline, but the bacterium can survive in soil for at least two years.

Disease management with crown gall is extremely important. Use only disease-free plants. Avoid injury to roots and crown during planting and cultivation. Plant only in properly fumigated or sterilized soil. Remove entire infected plants as soon as symptoms appear. Use only clean, disinfected pruning tools that have been dipped in a 10% bleach solution before each cut.

## **Dieback**

Dieback refers to a progressive death of shoots or branches with several possible origins. One cause of dieback is cankers girdling stem tissue. Non-canker infections that occur toward the tips of branches will cause dieback, too. Dieback also can be an above-ground expression of root damage, where disease, insect or noninfectious disorders (such as water imbalances) may be involved. In this situation, pruning may be necessary for aesthetics, but it will not manage the cause of the problem. When dieback is a symptom, complete investigation is necessary to determine the cause.

# Root Diseases

## **Nematodes**

Nematodes that attack roses are small, worm-like animals inhabiting the soil that feed on roots. Dozens of different types can attack plants, but only a few have actually been associated with rose injury. Many are widespread in Louisiana and have the potential for causing serious injury.

Roses damaged by nematodes usually show reduced vigor, smaller leaves and shoots, yellowing, wilting, leaf drop and produce smaller flowers. This general decline caused by nematodes is not rapid and may take several months to years before becoming serious. Although the above-ground portion of the plant is where symptoms are first noticed, the roots are where the nematodes actually injure the plant. Most nematodes do not produce any distinctive symptoms to the root system that can be used to separate one type from another. Most types of nematodes cause stunting, lesions or a general browning of the roots. Nematodes such as lesion (*Pratylenchulus* spp.), ring (*Criconemella* spp.), spiral (*Rotylenchus* sp. or *Helicotylenchus* spp.) or stunt (*Tylenchorhynchus* spp.) cause nondescriptive types of root symptoms. Root-knot nematode (*Meloidogyne incognita* or *M. hapla*) does produce galls or knots on the roots and can be identified easily.

If a nematode problem has been identified, several management practices can reduce damage to existing plants or future plants in this site. If plants have been severely damaged, replacement is probably necessary. If you remove a plant and simply replace it with another, however, then damage will usually show up within a year or two. If damage by the nematode is still slight, then several cultural controls may lessen damage or at least reduce the stress caused by these pests. Nutrients and pH are extremely important.

Add adequate levels of fertilizers, but avoid excessive levels, especially of nitrogen. The pH of the soil influences nutrient availability. Keep the pH between 6.0 and 6.5 to maximize nutrients available to the plant.

Watering regimes also are important. Since damaged roots are not as capable of taking in water as healthy plants, water becomes more critical. Provide deep, infrequent irrigations to promote a deep root system. Mulching with organic matter such as leaves or compost may be helpful. Mulches help with moisture retention, nutrient availability and aeration. Mulches may help stimulate many microorganisms that attack nematodes and use them as a food source.

If nematodes are severe and plants need to be replaced, do not return immediately to the same site with another plant. Planting some type of trap crop or resistant crop in the areas for several months will greatly reduce the number of nematodes in this location. Marigolds are effective in reducing root-knot nematode, which is a particularly widespread and serious pest in Louisiana. Marigolds are considered an exceptionally good trap crop since nematodes move readily into their roots but are quickly killed since they cannot successfully feed in the roots. Some other crops that can be planted in infected sites and seem to be resistant to root-knot are vinca, zinnia, coreopsis, cosmos, four-o'clocks, phlox, rudbeckia, stock, torenia and sweet alyssum.

These crops will not be helpful interplanted with roses. Since nematodes can move readily into both susceptible and resistant hosts, the trap crop will not provide adequate protection for roses.

Chemical controls for nematodes in the home yard are very limiting. A soil fumigant can be applied as a preplant material three to four weeks before planting. Treating areas in an established bed may be difficult because of the closeness of plants. If you can plan your bed in advance, planting a trap crop or even following a resistant crop the year before may reduce the need for chemical control.

### **Phytophthora Root Rot**

Phytophthora root rot is caused by the fungus *Phytophthora* spp. Below-ground symptoms are short, necrotic roots; above ground, the disease is expressed as chlorotic, wilted leaves with eventual dieback of the cane. Symptom expression can be slow or fast, depending on the environmental conditions present. *Phytophthora* spp. grows well in warm, poorly drained soil. The fungus overwinters as a spore or mycelia in infected roots or in the soil. In the spring the spores germinate and infect adjacent roots of susceptible plants. Under optimal environmental conditions, disease development may be rapid and symptom expression seen early in the growing season.

The most important feature of disease management of *Phytophthora* spp. is proper internal soil drainage. Well-drained soils are not conducive to *Phytophthora* spp. development. Plant roses in raised beds where the soil has been properly treated and sterilized.

## **Disease Management**

Several phrases describe activities that reduce plant disease. The simple phrase “disease control” is often used. Recently the phrase “disease management” has become more popular. Although the words are similar, the philosophy behind them differs greatly.

Disease control implies the total elimination of a pathogen within a biological system. It was a goal of pathologists and users of pathological methods for generations. As our understanding of ecology became more sophisticated, the emphasis was shifted to a management system rather than control. When a disease is properly managed rather than controlled, low levels of disease are acceptable because their elimination, if that

were even possible, would cost more than the value of having a “perfect” plant. Management schemes also take into consideration all ecological variables that have an impact on disease development. All are dealt with as much as possible. By doing so, a management system is in place.

For rose growers it is important that these two philosophies be understood. With our environment, disease management may not result in the “perfect” rose, but it is more ecologically and economically sound.

**Table I. Approximate time of year when disease management measures may be necessary.**

Disease		Winter	Spring	Summer	Autumn
<b>Foliage Disease</b>					
	Black spot				
	Cercospora Leaf Spot				
	Downy Mildew				
	Powdery Mildew				
	Rose Mosaic				
	Rust				
<b>Stem Disease</b>					
	Botrytis Blight				
	Canker				
	Crown Gall				
	Dieback				
<b>Root Disease</b>					
	Nematodes				
	Phytophthora Root Rot				

### Authors:

**Donald M. Ferrin, Assistant Professor (Plant Pathology)**  
**Clayton A. Hollier, Professor (Plant Pathology)**  
**Charles Overstreet, Professor (Nematology)**  
**Gordon E. Holcomb, Professor (Plant Pathology - retired)**

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**Louisiana State University Agricultural Center**  
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**Louisiana Agricultural Experiment Station**  
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