

The Plant Doctor

Black Spot, Cercospora Leaf Spot, and Powdery Mildew of Roses



Black spot, cercospora leaf spot, and powdery mildew

Most common during spring and fall when turf is emerging from or entering dormancy.

Weather

Leaf wetness periods of about 12 hours, but can be much less in high humidity; temperatures in the 50s to 90s for symptoms, but spore germination can occur as low as 32°F.

Plants affected

Black spot: All roses, but especially hybrid tea types.

Cercospora leaf spot: All roses.

Powdery mildew: Usually antique and climbing roses.

Quick symptoms

Black spot: Black or very dark brown, small (pencil lead-sized) spots to large spots as much as three-quarters of an inch in diameter. All spots will have a fuzzy margin, but you may need a hand lens to see it on small spots.

Cercospora leaf spot: Very circular spot, usually with smooth edges and a brown/purplish ring surrounding a gray or light tan center.

Powdery mildew: White material on the surface of the leaves that may rub off. Young leaves may be distorted.

Most plants require timely watering, fertilization, and pruning, but many roses also require good healthcare, as well. As head gardener, you are the primary physician for your roses. As physician, you must understand the cycle of diseases that can wreak havoc upon your garden friends.

Periods of heavy dew, rainy weather, and high humidity favor development of some major rose diseases: black spot, cercospora leaf spot, and powdery mildew. This means these diseases will almost always be present in the South—so you must keep ahead of them using preventive techniques.

Black Spot of Roses

Black spot, caused by the fungus *Diplocarpon rosae*, is a common disease of roses. As the name implies, the most prominent symptom of this disease is a black spot, which may occur on either side of the leaves or on the cane. A number of other diseases cause dark spots on the leaves, but you can distinguish black spot by the darker color and the “fringed,” “hairy,” or “feathery” borders of the spots. Black spot also infects the stems or canes. Cane lesions may not have the “fringed” border.

The combination of the genetics of the rose plant and the genetics of the fungus determine the disease symptoms seen, but

the general pattern of the disease stays the same. The first symptom of the disease will be a small, pin head-sized lesion. The black spot may grow to the size of a dime, or the leaves may fall soon after infection, before you even notice the black spots. Premature defoliation is a symptom of the disease.

Depending on the susceptibility of the plant to black spot, you may see a little to a lot of chlorosis, or yellowing, around the black spot lesion. In general, the more chlorosis, the more quickly the leaf is likely to fall from the plant. The leaves of some rose varieties will show no yellowing, whereas the leaves of very susceptible varieties will yellow even around a small black spot lesion.

Continued attack by the pathogen results in unattractive plant foliage as well as reduced size, number, and quality of blooms. If left unchecked, the plant may defoliate completely. Successive defoliations weaken the plant and increase its susceptibility to other injuries, such as cold injury. The fallen leaves and stem lesions harbor the fungus through the winter.

Black spot is most troublesome following rainfall and periods of high humidity, which generally accompany spring and summer here in the South. This means more attention to the disease is needed during periods when showers and heavy dews are common. It also means proper plant spacing and pruning that encourages good air circulation, and therefore, leaf drying, are the first lines of defense.

If you water roses from overhead, do so early in the morning so that the foliage has dried by the time the dew has evaporated, or during the day after the dew has dried and before nightfall so that the water evaporates from the rose leaves relatively quickly (see Extension Information Sheet 1670 *The Plant Doctor: Watering and Plant Disease*). This cultural procedure is important in reducing infection.

The first black spot lesions of the season usually occur on the lower leaves and move upward as the season progresses. This is because the fungus overwinters in fallen leaves and cane



Figure 1 a–c. Black spot can be distinguished from other rose leaf spots by the “fringed,” “hairy,” or “feathery” borders of the black lesion. These images were taken from the same garden, but each leaf is from a different rose cultivar. The images show some of the different host reactions to the disease. The leaf in image c had already fallen from the plant.

lesions. Spring rains dislodge last season's spores (small fungus seeds) from the ground litter and splash them upward to the lower leaves. Spores formed on the black spot lesions on the lower leaves are splashed upward to higher leaves. Therefore, the second line of defense, after proper watering, spacing, and pruning, is sanitation. Pick up fallen leaves and debris and destroy them. Remove all diseased leaves from around the plants, particularly at the end of the growing season. In beds where black spot was a problem last season, you may wish to remove and replace the old mulch, which will contain many infected leaf fragments. This is best done in late fall or early winter.

Once on the plant, the spores require water and high humidity to germinate. The longer free water (dew, rain, irrigation) is present, the lower the humidity can be. The higher the humidity is, the shorter time free water needs to be present. The fungus can germinate and infect the plant from 32°F to almost 92°F, but at the lower and higher temperatures, the infections will not express until more favorable temperatures are reached. The most favorable temperature for disease development is in the range of 64°F to 75°F. In other words, infections may occur at very cool temperatures, but the black spot lesions may not appear until much later when the temperatures reach 50°F–60°F.

The third line of defense for susceptible roses is a regular, thorough coating of the plant with something that inhibits fungal growth—a fungicide. It's important to realize that fungicides protect plants from infection, and once the black spot fungus has invaded foliage, fungicide applications will only prevent further spread. Few fungicides can cure an infection that you already see. For this reason, keep susceptible plants covered with a fungicide at all times during the growing season, including early spring.

A regular fungicide spray program throughout the growing season can help manage black spot on susceptible roses. Dust formulations of rose fungicides generally don't provide the same level of control as liquids. Please read and

follow the label of the fungicides you decide to use. Some fungicide labels recommend that a small amount of a spreader-sticker be added to the spray solution. Doing so will improve how well the fungicide works.

During late winter and early spring rains, protect newly emerging leaves with a topical fungicide such as mancozeb (**Table 1**), sprayed at intervals determined by the weather and allowed by the label. Topical fungicides include the active ingredients mancozeb, chlorothalonil, captan, sulfur, and copper-based fungicides. Topical fungicides coat the outside of the plant, making a barrier that kills the fungal spores that land on it.

Different topical fungicides kill fungi in different ways, which helps keep fungi from developing tolerance to the fungicides. The Fungicide Resistance Action Committee assigns a letter and/or a number (FRAC code) to each of the different ways fungicides kill fungi (modes of action). The FRAC for topical fungicides reflects the multiple modes of action by using the letter M, followed by a number to indicate the different mode of action. Mancozeb /chlorothalonil/ captan fungicides can be applied anytime without worrying about tolerance developing. You can tank mix most topical fungicides with most penetrant fungicides (described in the next paragraph). Many rose growers use mancozeb-based fungicides (**Table 2**) because they cause little foliage "burn" or discoloration during the heat of the summer. Refer to individual product labels for instructions regarding dilution rates, timing, and other application instructions.

Penetrant fungicides move into the plant, protecting it from fungal infection from the inside. Penetrant fungicides kill fungi using a single mode of action, and some fungal populations are known to become insensitive to them. This can be hard to avoid because different kinds and trade names of penetrant fungicides may have similar modes of action.

To avoid fungi developing tolerance to penetrant fungicides, select penetrants with different FRAC codes (**Tables 1 and 2**). This is especially important if you are not mixing a topical

fungicide with the penetrant fungicide. One large-use/commercial fungicide (Spectro 90 WDG) premixes the topical fungicide chlorothalonil (M5) with the penetrant fungicide thiophanate-methyl (**Table 2**).

During the summer growing season, either spray a mixture of a mancozeb and a penetrant fungicide or alternate a penetrant fungicide with one of the topical fungicides to prevent tolerance. Penetrant fungicides labeled for residential use include propiconazole, tebuconazole, triadimefon, and triforine. Several more are labeled for large-scale/professional use (**Table 2**). Refer to individual product labels for instructions regarding dilution rates, timing, and other application information.

During the early spring, when the canes are bare or leaves are still forming, avoid the FRAC code 3 group of fungicides. If you use a penetrant fungicide during this time, you should use another FRAC group. Examples of these active ingredients include thiophanate-methyl or a strobilurin fungicide such as azoxystrobin, pyraclostrobin, or trifloxystrobin.

After the plant has leafed out, the triazole-type penetrant fungicides (Table 2, FRAC code 3) may be used. (Some examples are Banner Maxx; Honor Guard; Fertilome Liquid Systemic Fungicide; Bayer Advanced Garden Disease Control for Roses, Flowers, & Shrubs Concentrate; Bayer Advanced All-In-One Rose and Flower Care.)

A fungicide program should be tailored to the needs of specific varieties and to the garden's micro-climate. A program for relatively susceptible hybrid tea roses might start with mancozeb alone in the early spring until the plant is leafed. Then, you might mix mancozeb with an "azole" type fungicide such as propiconazole, tebuconazole, tridimefon, triticonazole, myclobutanil, or triforine, followed 10 days later by mancozeb mixed with thiophanate-methyl. Rotating fungicide chemistries in this way will help prevent the pathogen from developing resistance. If you do not mix a contact fungicide with the penetrant, you should rotate the FRAC code number of the penetrant fungicide used with each spray.

A fungicide developed by a Cornell researcher has given good control of powdery mildew and of black spot on roses that tend to be more tolerant of black spot. It is made by adding 1 tablespoon of baking soda and 1 tablespoon of a light horticultural oil to 1 gallon of water. You may add insecticidal soap if you wish. Shake well before and during application so the additives won't separate. This product works well on slightly to moderately susceptible roses. If the threat of disease is high (moist, humid weather), you will need to spray every 5–7 days.

Before using any fungicide, it is a good idea to test spray a small area of the rose bush several days before spraying the entire plant. Examine the sprayed area for signs of burn or distortion. If abnormal symptoms are observed, do not spray with that solution again.

Cercospora Leaf Spot of Roses

Cercospora leaf spot behaves similarly to black spot, but the cercospora spot looks different. The leaf lesion is smooth and round, usually no more than one-eighth of an inch to one-fourth of an inch in diameter. The lesion has smooth edges instead of fringed (fuzzy) edges like black spot. The center of the larger spots will be a light gray, while the outside will be light brown to a very dark brown or dark purple.

This leaf spot can be severe at times and may defoliate the rose. You can often find both black spot and cercospora leaf spot on the same plant, but black spot is usually much more frequent. This leaf spot has been severe at times on Knock Out type roses north of Tupelo.

The same watering guidelines, sanitation practices, and fungicide sprays that control black spot should control cercospora leaf spot.



Figure 2. *Cercospora* leaf spot growing in conducive temperature and high-moisture conditions. The lesions have an outer ring of purple and more tan-colored centers.



Figure 3. Note the pattern of early *Cercospora* leaf lesions on this leaf. The lesions have formed where water tends to collect on the underside of the leaf. Proper watering will help manage some leaf spot problems.



Figure 4. Powdery mildew on an old rose cultivar. Note the delicate, white powdery growth.

Powdery Mildew of Roses

Powdery mildew is found on some rose types in Mississippi during the spring and fall months. Look for white to gray-white patches of powdery fungus growth on young leaves, shoots, buds, and flowers. The white may rub off between your fingers. In heavy infections, new leaves may become distorted and dwarfed, and may turn reddish or purple under the powdery areas. This problem is not common in Mississippi and is encountered most frequently among older varieties of roses (old garden roses, climbing roses, and so forth).

Fortunately, the same practices used to control black spot and *Cercospora* leaf spot are effective for powdery mildew: plant spacing and pruning that encourage good air circulation, watering in ways to keep leaf surfaces dry as much as possible, good sanitation, and using protectant fungicides.

Table 1. Topical (contact) fungicides.

These fungicides stay on the outside of the plant, much like a raincoat. You must thoroughly coat the plant with the fungicide to keep the shower of spores from entering an uncoated area. Most topical fungicides kill fungi multiple ways (the “M” in the FRAC code column). Whenever possible, use a topical fungicide, such as mancozeb, in conjunction with a penetrant fungicide (Table 2).

Residential Use Fungicides		
Common chemical name (active ingredient)	Resistance (FRAC) code¹	Trade name
captan	M4	Bonide Captan; Hi-Yield Captan 50W Fungicide; SouthernAg Captan Fungicide
chlorothalonil	M5	Bonide Fungonil Concentrate; Ortho Max Garden Disease Control; Fertilome Broad Spectrum Landscape and Garden Fungicide; High Yield Vegetable, Flower, Fruit, and Ornamental Fungicide; SouthernAg Liquid Ornamental and Vegetable Fungicide (contains Daconil)
copper	M1	Bonide Liquid Copper Concentrate; SouthernAg Liquid Copper Fungicide
mancozeb	M3	Bonide Mancozeb Flowable with Zinc; Green Light Broad Spectrum Mancozeb Fungicide Disease Control Spray; SouthernAg Dithane M-45

Large Use (Rosarian)/Professional Use Fungicides		
Common chemical name (active ingredient)	Resistance (FRAC) code¹	Trade name
captan	M4	Captan 50 Wettable Powder; Captec 4L
chlorothalonil	M5	Daconil Ultrex; Daconil Weather Stik; Echo 720 Turf and Ornamental; Ensign 720; Ensign 72.5%; Initiate 720; Prokoz Mainsail; Spectro 90 WDG
copper	M1	C-O-C-S WDG; Champ Dry Prill; Champ Formula 2 Flowable
mancozeb	M3	Dithane 75 DF; Fore 80 WP Rainshield; Penncozeb 75 DF; Prokoz Clevis

¹The information given here is for educational purposes only. References to commercial products, trade names, or suppliers are made with the understanding that no endorsement is implied and that no discrimination against other products or suppliers is intended. You must follow all label directions. A restricted-use license is required to purchase some of the large use/rosarian/professional use fungicides.

Table 2. Penetrant type fungicides.

These fungicides enter, to some degree, into the plant and protect it from the fungi using a single mode of action.

Residential Use Fungicides		
Common chemical name (active ingredient)	Resistance (FRAC) code¹	Trade name
myclobutanil	3	Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate
propiconazole	3	Bonide Infuse Concentrate; Fertilome Liquid Systemic Fungicide; Ortho Lawn Disease Control; Control Solutions; Honor Guard PPZ
tebuconazole	3	Bayer Advanced Garden Disease Control for Roses, Flowers, & Shrubs Concentrate; Bayer Advanced All-In-One Rose and Flower Care
triticonazole	3	Ortho Rose and Flower Disease Control
triforine	3	Ortho RosePride Disease Control
Large Use (Rosarian)/Professional Use Fungicides		
thiophanate-methyl	1	3336 F; Nu-Farm T-Methyl SPC 4.5 F
thiophanate-methyl + chlorothalonil	1 M5	Spectro 90 WDG
thiophanate-methyl + iprodione	1 2	26/36 Fungicide
propiconazole	3	Amtide Propiconazole 41.8% EC; Banner Maxx; Banner Maxx II; Fitness; Procon-Z; Procoz; Fathom 14.3 MEC; Propensity 1.3 ME; Propiconazole E-Pro; Quali-Pro Propiconazole 14.3
triadimefon	3	Bayleton 50 Turf and Ornamental 50 WSP; Bayleton Flo
tebuconazole	3	Torque
azoxystrobin	11	Heritage
pyraclostrobin	11	Insignia
trifloxystrobin	11	Compass Fungicide; Compass O 50 WDG

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