

Controlling Powdery Mildew on Ornamentals

Powdery mildew occurs in Alabama on a wide variety of flowers, woody shrubs, and trees. A group of closely related, generally host-specific fungi are known to cause this disease. The appearance of this disease on one plant species does not mean that powdery mildew is a threat to other plants in the area. Powdery mildew often detracts from the beauty of many ornamentals but rarely has a significant impact on plant health.

Woody trees and shrubs susceptible to powdery mildew include azalea (Kurume types), horse chestnut, crape myrtle, crabapple, flowering dogwood, euonymus (*E. japonica*), hydrangea, lilac, oak, peach, pecan, photinia (Chinese), rose, and sycamore. African violet, Rieger begonia, chrysanthemum, cineraria, dahlia, delphinium, kalanchoe, phlox, snapdragon, and zinnia are among the more mildew-susceptible flowering plants.

Symptoms

Small, discrete, white- to buff-colored patches consisting of numerous thread-like strands called hyphae appear on tender shoots, buds, and, in some cases, on fruit. Often, these patches are first seen on the upper leaf surface or shoot tip. Eventually, the surface of entire leaves, shoots, or

Powdery mildew on zinnia. Note the discrete particles of cottony fungal growth on the petals.



buds may be covered by the cottony, thread-like growth of powdery mildew fungi.

Tiny, dark-brown to black, pepper-seed-sized spheres, which are fruiting bodies of powdery mildew fungi, may be embedded in the patches on the foliage of plants grown outdoors. These structures, called *cleistothecia*, are rarely seen on greenhouse-grown plants.

Powdery mildew fungi usually attack young leaves, shoots, flowers, buds, and fruit. However, mature foliage on some plants may also be colonized. Discolored blotches on the host plant's leaves are sometimes associated with the patches of powdery mildew fungal growth. Distortion, yellowing of foliage, leaf rolling, early leaf drop, and

Crape myrtle shoot desiccated by powdery mildew.



slowed plant growth are symptoms often seen on seriously damaged plants. On crape myrtle, diseased shoot tips may wither and die

Damage to developing flower buds may greatly reduce floral quality. Repeated severe mildew infections, especially on some flowers, small shrubs, and tree seedlings, may cause a slow decline in plant health. Powdery mildew fungi have little if any effect on the health of established trees.

Fungus Life Cycle

On many woody shrubs and trees, powdery mildew fungi overwinter as dormant hyphae in buds. On other plants, these fungi survive periods of unfavorable weather as dark-brown to black fruiting bodies (cleistothecia) embedded in the powdery patches on leaves and shoots.

On greenhouse crops and some evergreen shrubs, powdery mildew fungi persist as hyphal threads on plant foliage. When conditions favor fungal growth, spores arising from infected buds or fruiting bodies are spread by air currents to nearby plants.

Severe powdery mildew on a climbing rose.



Spore germination and the infection of host tissues occur quickly on dry plant surfaces at mild temperatures and at a relative humidity of at least 95 percent. The characteristic cottony patches are usually seen within a few days after infection.

Outdoors, powdery mildew is usually most severe in late spring and early fall when the days are warm, nights are cool, and the rainfall is light. The heaviest powdery mildew outbreaks often occur in humid, shaded sites. This disease may be a year-round problem on some greenhouse-grown crops.

Control

Practices used to control powdery mildew diseases in the landscape, greenhouse, and nursery settings are similar. Cultural practices can often slow or, in some cases, prevent disease development. Powdery-mildew-resistant varieties are the best and least troublesome method of disease control.

Always ask if the plants you are buying, especially those most sensitive to powdery mildew, have good disease resistance. Resistant varieties of some popular shrubs are listed in Table 1.

Variiegated euonymus (*E. japonica*) varieties are more resistant to powdery mildew than green, non-variegated varieties. Hino Crimson, Hinodegiri, and Coral Bells are among the most sensitive Kurume azaleas to powdery mildew. This disease is rarely seen on Indica- and Satsuki-type azaleas. Powdery mildew-resistant Rieger begonia and kalanchoe varieties have also been identified. Indica x faureii hybrid crape myrtle cultivars are highly resistant to powdery mildew.

Table 1. Partial List Of Powdery-Mildew-Resistant Varieties Of Several Woody Shrubs.

CRAPE MYRTLE

Acoma	Natchez
Apalachee	Sarah's Favorite
Basham's Party Pink	Tonto
Caddo	Tuscarora
Muskogee	Tuskegee

CRABAPPLE

Centurian	Red Jade
Coralburst	Sargent
Donald	Tina
Molten Lava	White Angel

ROSE

Hybrid Tea	Grandiflora
Miss American Beauty	Charisma
Mister Lincoln	Europeana
Pink Lady	Queen Elizabeth
Pristine	Sarabande
Tiffany	Saratoga

When establishing new landscape beds, mildew-susceptible plants should be widely spaced in open, sunny areas. Plant heavily shaded areas with disease-resistant cultivars.

In the fall, destroy or discard fungus-infested debris of annual flowers, deciduous shrubs, and trees. This will reduce the risk of carrying over the fungus to the next growing season.

Pruning overhanging trees and shrubs to improve air circulation and sunlight penetration will help slow the spread of disease. Maintaining a slow, even growth rate with light, frequent nitrogen applications will help suppress disease development. Avoid fall nitrogen fertilizer applications which stimulate new mildew-sensitive growth.

In greenhouse settings, venting and heating at night is necessary to hold the relative humidity below levels needed for spore germination and fungal growth. Also, use fans to improve air circu-

lation. If cultural practices alone do not maintain sufficient disease control, fungicides may be needed to protect susceptible plants from powdery mildew. Generally, good disease control can be obtained when fungicide applications are begun as soon as powdery mildew first appears on the foliage.

For outside plantings, begin fungicide applications on powdery-mildew-sensitive plants at or shortly before budbreak. Follow a one- to three-week spray schedule, depending on the fungicide chosen and the weather conditions, until conditions no longer favor the spread of disease. Recommended fungicides are listed in Table 2. Refer to the product label or Extension publication ANR-500B, "Alabama Pest Management Handbook," for specific plants recommended for each fungicide.

The addition of a spreader-sticker or liquid dish detergent is recommended for tank-mixes of wettable powder fungicides to ensure thorough coverage of the foliage. In greenhouse settings, use sulfur in addition to fungicide applications to control powdery mildew.

Sulfur fumes may be generated by vaporizing sulfur on steam pipes or special hot plates. You may also apply wettable powder and flowable sulfur formulations directly to the foliage with standard spray equipment. Be careful when using sulfur because of its phytotoxicity to some floral and woody ornamental crops.

Powdery mildew on crape myrtle.



P. glandulosa (dwarf flowering almond) is very susceptible to powdery mildew.



Powdery mildew on zinnia leaves.



Table 2. Fungicides Recommended for Powdery Mildew Control

Host And Disease	Fungicide And Formulation	Rates (Unless Stated Otherwise)		Comments
		Per Gal.	Per 100 Gal.	
Woody Trees, Shrubs, and Perennial Ground Covers				
Powdery Mildew				
	azoxystrobin HERITAGE 50DG	--	1-4 oz.	Apply at first sign of disease and repeat at 14- to 28-day intervals.
	chlorothalonil + fenarimol TWSOME 4.4F	0.67 T.	2 pt.	Apply at first sign of disease and repeat every 10 to 14 days. Use higher rate and shorter interval when disease pressure is heavy and conditions favor spread of disease.
	fenarimol RUBIGAN AS	--	6-10 fl. oz.	See comments for chlorothalonil + fenarimol, above.
	myclobutanil EAGLE WSP	--	6 oz. (2 pkg.)	Apply at first sign of disease and repeat at 10- to 14-day intervals. Add a non-ionic surfactant to the tank mixture of Eagle and Systhane. Systhane has been cleared only for greenhouse and nursery use.
	SYSTHANE WSP	--	4 oz. (2 pkg.)	
	AMMUNOX	2 T.	1.0 fl. oz.	
	propiconazole BANNER MAXX	--	5-8 fl. oz.	Apply as needed at first sign of disease.
	thiophanate-methyl 3336 4.5F	0.5-1 T.	10-20 fl. oz.	Apply at first sign of disease (June) and continue sprays at 7- to 14-day intervals. Resistant varieties are available.
	3336 50W	--	12-24 oz.	
	thiophanate-methyl + mancozeb DUOSAN 79W	2.5 t.	1.5 lb.	Apply at first sign of disease (June) and continue sprays at 7- to 14-day intervals. Resistant varieties are available.
	ZYBAN 79W	2.5 t.	1.5 lb.	
	triadimefon BAYLETON T/O	0.2 t.	4 oz.	Bayleton is cleared for landscape use only.
	STRIKE 25W	--	4 oz.	
	triflumizole TERRAGUARD	0.67-1.33 t.	4-8 oz.	Apply at weekly intervals as needed. Use higher rates under heavy disease pressure.
	triforine FUNGINEX ROSE DISEASE CONTROL 6.5E	1 T.	--	Apply at first sign of disease and continue sprays at 7- to 14-day intervals.

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Use pesticides **only** according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

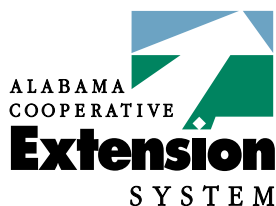
The pesticide rates in this publication are recommended **only** if they are registered with the Environmental Protection Agency and the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply any pesticide, check with your county Extension agent for the latest information.

Trade names are used **only** to give specific information. The Alabama Cooperative Extension System does not endorse or guarantee any product and does not recommend one product instead of another that might be similar.

For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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