



UNIVERSITY *of* CALIFORNIA

# Agriculture & Natural Resources

COOPERATIVE EXTENSION • YOLO COUNTY

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## UC Pest Management Guidelines

### POWDERY MILDEW

Home & Landscape

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Powdery mildew is a common disease on many types of plants. Different powdery mildew fungi cause disease on different plants. Powdery mildews generally do not require moist conditions to establish and grow, and normally do well under warm conditions; thus they are more prevalent than many other diseases under California's dry summer conditions.

#### **IDENTIFICATION AND DAMAGE**

The disease can be recognized easily on most plants by the white powdery mycelial and spore growth that forms on shoots, both sides of leaves, and sometimes flowers and fruit. An exception is the powdery mildew that affects tomatoes, eggplants, peppers, artichokes, and some ornamentals, which produces yellow patches on leaves, but often no powdery growth. On most vegetables, powdery mildew appears first as yellow spots on the upper leaf surface of older leaves; these spots develop the characteristic powdery growth, and symptoms spread to the undersides of leaves and stems. Affected leaves may turn completely yellow, die, fall off, and exposed fruit beneath may become sunburned. On some plants, powdery mildew may cause the leaves to twist, buckle, or otherwise distort. Severely infected plants may have reduced yields or shortened production times.

The disease can be serious on woody species such as grapes, fruit trees, roses, crape myrtle, and sycamore where it attacks new growth including buds, shoots, and flowers as well as leaves. New growth is dwarfed, distorted, and covered with a white, powdery growth. On apples and grapes, young fruit develop web-like russeted scars and sometimes a rough corky skin.

#### **LIFE CYCLE**

All powdery mildew fungi require living plant tissue to grow. On perennial hosts such as grapes, raspberries, roses, and fruit trees, powdery mildew survives from one season to the next in infected buds or as fruiting bodies that reside on the bark of cordons, branches, and stems. On strawberries the disease can survive on leaves that remain on the plants through winter. Year-round availability of crop or weed hosts is important for the survival of the powdery mildew fungi that infect cole crops, tomatoes, peppers, and eggplants. Special resting spores are produced that allow overwinter survival of the species that cause the disease in lettuce and peas and certain other crops.

Powdery mildew spores are carried by wind to new hosts. Although humidity requirements for germination vary, all powdery mildew species can germinate and infect in the absence of water. In fact, spores of some powdery mildew fungi are killed and germination and mycelial growth are inhibited by water on plant surfaces. Moderate temperatures and shady conditions are generally the most favorable for powdery mildew development. Spores and mycelium are sensitive to extreme heat and direct sunlight.

#### **MANAGEMENT**

In most cases, planting resistant vegetable varieties or avoiding the most susceptible varieties and following good cultural practices will adequately control powdery mildew. However, fruit and ornamentals require protection with fungicide sprays where conditions are most favorable for mildew. Fungicide applications are most often needed on susceptible varieties of apples, grapes, cucurbits, roses, and crape myrtle.



*University of California and United States Department of Agriculture Cooperating*

### Cultural Practices

Plant in unshaded areas as much as possible. Provide enough water and avoid excess fertilizer. Overhead sprinkling may actually reduce powdery mildew because spores are washed off the plant, and some are killed when leaves are wet. As new shoots begin to develop on perennial plants, watch closely for the appearance of powdery mildew. Where infection is limited, prune out and bury or discard diseased tissue as soon as it appears. Keep grapes carefully pruned and trained to allow exposure of fruit to sunlight and good airflow through the canopy. If powdery mildew has been present during the season on woody species, prune out infected tissue during the dormant season.

On apples, look carefully for infected shoots and buds and remove them. Infected buds are flattened or shriveled in appearance compared to normal buds. The buds and infected shoots have a thin layer of fuzzy white fungus on their surface that usually is easy to see. Where practical, remove and dispose of overwintering leaves on strawberry plants that are infected. If blackberries or raspberries develop powdery mildew, remove the canes down to the roots during the dormant season. Infected canes of berries and grapes have distinctive weblike russetting. Remove infected prunings from the garden area and destroy them.

### Fungicide Application

In some situations, especially in the production of apples, grapes, susceptible cucurbits, and roses, fungicides may be needed. Sulfur and synthetic fungicides are available. Garden Fungicide, a formulation of sulfur that is combined with surfactants is available from Safer®. This product is especially useful for garden use. However, sulfur can be damaging to some squash and melon varieties. To prevent plant injury to any plant, do not apply sulfur when temperature is near or over 90°F. Proper timing of fungicide applications is critical to successful control; this is especially true with sulfur treatments that primarily prevent rather than eradicate infections. Fungicides must be applied to highly susceptible plants at the earliest signs of the disease; once mildew growth is extensive, it is generally too late for effective control with fungicides. Fungicides can also be used on other tree fruits and vegetable diseases but should rarely be needed for powdery mildew control.

Apples. Sprays are not necessary in many backyard situations. However, if you have had serious powdery mildew damage in past years, apply liquid lime sulfur or flowable sulfur at two-week intervals, once or twice, beginning when buds just start to open (green tip stage), until small, green fruit are present.

Grapes. Powdery mildew is a perennial problem in grapes. Begin applying sulfur when all buds have pushed. Thereafter, repeat at 10-day intervals until the sugar content of grapes is 12 to 15 percent, which is when they begin to soften and approach ripeness and are no longer susceptible to infection.

*Originally compiled from: Flint, M. L. 1990. Pests of the Garden and Small Farm: A Grower's Guide to Using Less Pesticide, Univ. Calif., Agric. Nat. Resources Publication 3332, Oakland.*

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