A2404

# Powdery mildew of ornamentals

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Powdery mildew of ornamentals is a fungal disease encountered by many Wisconsin gardeners every year. Diverse fungi cause the disease and its signature symptom, a powdery growth, on a wide range of ornamental plants—annuals and perennials, herbaceous and woody. Typical hosts include birch, calendula, chrysanthemum, cosmos, dahlia, daisy (shasta), delphinium, lilac, oak, rose, phlox, and zinnia.

If diagnosed early, powdery mildew can be controlled. Thus, it is important to know how to diagnose powdery mildew, how to recognize the factors that increase its severity, and how to control it.

## Symptoms and effects

Damage from powdery mildew ranges from an unsightly, powdery covering on foliage to dry, brown infected leaves. In the more advanced stages, buds fail to open. But the disease's most common symptom is the white, light-gray, or slightly brownish growth of fungus over leaf surfaces. On roses and several other ornamentals, the fungus may also attack the stems, buds, and petals. Occasionally the fungus may be confined to just the buds and petals.

Early detection is an important aid to effective control. The first symptoms on roses are a slight curling and purpling of areas on the younger leaves, followed by the powdery fungal growth. Later, when infection becomes severe, the leaves of most infected ornamentals yellow, dry, and turn brown. Infected plant parts are covered with white fungal growth.

**Light patches of powdery mildew have grown on the petals and leaves of this African violet.**

**Powdery mildew on rose. The heavy white covering indicates the disease is in its advanced stages.**

## Cause

The name "powdery mildew" applies to at least eight genera of fungus, with several species in each. They grow primarily on leaf surfaces and send small, root-like structures into the leaf cells to extract nutrients. Their powdery appearance on the leaf comes from fungal threads and chains of small, colorless summer spores.

Powdery mildew fungi overwinter in tiny black bodies, known as cleistothecia or mycelia (fungal threads), which are located on leaf debris, stems, spurs or dormant buds. In spring, the fungal threads produce spores that initiate primary infections. The infections, in turn, produce summer spores. The wind carries these spores to new sites, where they start new infections. Spores produced on overwintering mycelia also can start spring infections.

In spring and fall the relative humidity fluctuates rapidly, which makes powdery mildew more common then. Free moisture on the leaves is not required for infection to take place.

Each species of powdery mildew fungi has a limited host range. Infection of one ornamental does not necessarily mean that neighboring ornamental species also will be attacked.

## Control

An effective control program must take into account the interaction of the host, environment, and fungus. As an alternative to exclusive pesticide use, we recommend the coordinated use of multiple tactics—an approach known as integrated pest management (IPM). This approach requires careful monitoring of plants to determine when controls are necessary, and then designing a control program based on appropriate cultural and/or chemical action.

### Cultural

Choosing the right plants for the location is a good way to minimize powdery mildew problems for the home gardener. Avoid growing mildew-prone crops, such as phlox or roses, where it is somewhat shady and air circulation is poor. Increase aeration where possible by pruning and thinning plant materials.

Some varieties differ in their susceptibility to powdery mildew. Even varieties of rose, zinnia, and other crops often advertised as "powdery mildew-resistant," sometimes show infection. This is because there are many fungal strains, and the development of powdery mildew-resistant ornamental plants has not been very successful.

Mildew is most severe on young, succulent growth that excessive nitrogen fertilizer promotes. You can sometimes reduce the potential for powdery mildew on susceptible plants by lowering nitrogen and increasing potassium fertilization.

Powdery mildew may be the most common foliage disease affecting several greenhouse-grown plants, because it is favored by the indoor environment. These plants include begonia, chrysanthemum, grape ivy, hydrangea, Kalanchoe, and roses. A high relative humidity (80–100%) occurs frequently in the greenhouse, especially at night, and it benefits spores and fungal infections. High nighttime humidity is often followed by lower relative humidity (50–80%) during the day. This benefits spore maturation and release for rose powdery mildew and probably other powdery mildew fungi as well. Air currents during periods of low humidity increase the number of spores in the air and aid in their distribution.

Greenhouse operators can sometimes manipulate the environment by ventilating and turning up the heat in late afternoon to drive out moisture before nightfall. However, because of fuel costs, this is not a common practice.

Lilac, zinnia, and several other ornamentals often become heavily infected in the fall when there are large temperature fluctuations. Perennials are seldom damaged by fall infection and require treatment only if their appearance is objectionable.

## Chemical

Many nursery, greenhouse, and landscape plants must be protected from powdery mildew during certain times in the growing season. Successful control often depends on selecting and applying a fungicide properly and at the right time. Most fungicides do not control powdery mildew, but more fungicides that do are becoming available. Some products registered for use on ornamentals are listed below.

It is especially important to know how to detect infections early. Treatments usually are easier and more effective if applied at an early infection stage. Routine, season-long preventative treatments are not recommended, as plants may be damaged or other adverse effects may occur. These include the destruction of beneficial, predatory mites that help keep plant-damaging mites in check.

Rotate chemicals from several different groups where treatments are frequently required. This reduces the chance that the mildews will develop a fungicide resistance. Benzimidazoles have failed in many locations because of the presence or emergence of fungal strains that are not sensitive to the chemical.

Also, check the labels to be sure the plants you want to treat are included; other uses are illegal and increase the chance of plant damage. Sulfur-containing products, for example, can burn foliage, especially during very warm periods.

You may find certain products do not work for you. Fungicide resistance may be a possibility, or it may be the coverage or timing of applications. Powdery mildew-infected surfaces are very waxy and difficult to wet. Most fungicide formulations contain sufficient spreader-stickers, but if the treated surface is not adequately wetted—that is, if the chemical forms droplets or runs off—add enough additional wetting agent to obtain adequate coverage. However, use a wetting agent only when needed to minimize plant injury and increase control.

Some products leave a substantial residue on the surface, which is not always desirable. Others, such as triforine, leave none. Such products can be especially useful when the garden or product is most attractive, as during bloom or before flower shows.

**Common names and trade names of chemicals that can be used against powdery mildew.**

| Common name | Trade name |
|---|---|
| dinocap | Karathane |
| dithiocarbamates | Duosan, Zyban |
| myclobutanil | Systhane |
| "sterol inhibitors" | |
| triadimefon | Bayleton |
| triforine | Funginex, Triforine |
| sulfur | Sulfur, wettable sulfur |
| thiophanate-methyl | Cleary 3336, Domain, Fungo |
| thiophanate-methyl + iprodione | Benefit |

References to products in this publication are for your convenience and are not an endorsement of one product over other similar products. You are responsible for using chemicals according to the manufacturer's current label directions. Follow directions exactly to protect the environment and people from chemical exposure.

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