

# Powdery Mildew on Ornamentals and Vegetables

Includes: *Erysiphe cichoracearum*, (wide host range: zinnia, begonia, cucurbits, lettuce, vinca, snapdragon –overwinters on infected plants); *Sphaerotheca fuliginea* (on cucumbers, squash); *Sphaerotheca pannosa* var. *rosae* (on rose); *Oidium begoniae* (on begonia), *Microsphaera azaleae* (on rhododendron and azalea in the USA); as well as other species.

## Host/Site

Fungal organisms causing powdery mildew disease affect many food, flower, and landscape plants. Annuals like zinnia, perennials such as dahlia, delphinium, lupine, and monarda, food crops like squash, and shrubs such as deciduous azalea illustrate the wide host range of these organisms.

When present in the maritime Pacific Northwest on rhododendron and evergreen azaleas (shrubs that retain their foliage year-round), the mildew is generally a species of *Microsphaera*. Learning to identify this complex of symptoms on rhododendrons and azaleas helps with landscape management of this common problem.

## Identification/appearance of symptoms

**On most landscape plants:** Characteristic, obvious, and distinct symptoms accompany powdery mildew. Leaves, stems, and flowers erupt in a fuzzy, whitish coating that does resemble white powder heavily sprinkled over the surfaces. Advanced cases may cause plants to defoliate. The disease definitely reduces the plant's ability to photosynthesize and maintain healthy growth.

**Rhododendron symptoms:** These differ from those commonly observed and described above. Leaves appear spotted, with brownish-purple or yellow spots on the undersides. Some cultivars show purplish, ring-shaped spots on the upper leaf surface. Veins may be purple or brownish. Symptoms vary from one plant to another. Some show few observable symptoms on the upper leaves, but may have many diffuse colored spots underneath. (R. 'Unique' is an example.) Early symptoms of this powdery mildew can seem subtle; late infections may show heavy powdery growth under the leaves, though this is uncommon. Plants may co-exist with the infection, or may defoliate if severely infected.



Powdery mildew on rhododendron Virginia Richards

## Life cycle

Generally, powdery mildew spores survive over winter on plant parts. Rhododendron powdery mildew spores may also overwinter this way. Spores are spread by wind or are carried by insects, animals, and people. Since the powdery mildew disease fungi are so common in the maritime Northwest, it's difficult to manage a garden that will not potentially be affected by these diseases.

Some rhododendron growers in temperate zones world-wide are investigating whether very cold winter temperatures reduce infections. This theory is still under exploration.

## Natural enemies

Not available in forms useful for garden management, but biological control is being researched.

## Monitoring

Powdery mildews flourish during periods of nighttime humidity followed by warm, sunny weather, when the leaf surface may experience periods of high relative humidity. These weather conditions prevail more commonly in late summer and fall in the maritime Northwest. Begin checking plants for symptoms in mid-summer.

**On rhododendron:** New growth will often fully expand before symptoms appear. Symptoms may not be noticeable very early in the season.

## Action Threshold

Because diseases may spread rapidly once established, keep monitoring plants. When practical, remove affected leaves to prevent the spread of fungal spores to healthy leaves.

(continued/over)



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Pruning to improve air circulation can help but will not eliminate infection. Some growers have experienced improvement on heavily-affected plants by severe pruning and good cultural management, which includes avoiding over-fertilization.

### **Cultural controls**

**Fertilize moderately.** Over-use of nitrogen fertilizers stimulates powdery mildew problems on annuals and vegetables.

**Keep the garden clean;** prune out severely affected leaves if this won't reduce the foliage canopy too much (healthy plants can lose about twenty five percent of their leaves).

**Rhododendron powdery mildew** persists on affected leaves until the damaged leaf either defoliates early, or drops naturally as the branch grows. Some observations have been done on rhododendrons resistant to the disease, but these are still anecdotal reports from growers and should be used only as guidelines for personal choices. Continue observing which plants survive under powdery mildew pressure.

#### **Choose disease-resistant cultivars where possible.**

Many annual and perennial flowers, including zinnias and monardas, have been bred to resist powdery mildew, as have some vegetables.

#### **Very susceptible to rhododendron powdery mildew (*Microsphaera* sp.):** *R. cinnabarinum*, *R.* 'Elizabeth,'

*R.* 'Virginia Richards,' *R.* 'Unique', Loderi group, many deciduous azaleas.

**Less susceptible:** Plants with indumentum, such as the *R. yakushimanum* group; *R. macrophyllum*, *R.* 'Nova Zembla,' *R.* 'Palestrina,' *R.* 'Vulcan.'

### **Chemical controls**

If fungicides are used, apply in early stages of infection; do not attempt to treat a severely debilitated plant.

**Sulfur:** Various products containing sulfur are registered for use on edibles and ornamentals. Check the label: the plant must be listed by name on the label.

**Alkali bicarbonate:** Research at Cornell University on sodium bicarbonate (baking soda), as well as the practical experience of many rose-growers, led to many home formulations for fungal disease management. EPA-registered products based on potassium bicarbonate are now available (e.g. Remedy™, Kaligreen).

**Conventional fungicides:** Many are quite hazardous, being corrosive to eyes in concentrate form. Use products such as benomyl, triforine, and copper carefully, following labels exactly.

**Controls for rhododendron powdery mildew:** When treatment is considered necessary, apply fungicides just as current-year leaves expand to full size if the disease is present on the previous year's leaves. If the disease hasn't been noted in the previous year, apply fungicides at the first sign of symptoms on the current year leaves. Sulfur and triforine are registered for treatment.

### **References**

Pschiedt and Ocamb, editors. *Pacific Northwest Disease Control Handbook*, 1998

Badsen and Helfer, 1995. "World Survey of Rhododendron Powdery Mildews," *Journal of the American Rhododendron*, 49 (3): 147-156.

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