

Powdery Mildews in the Greenhouse

Introduction

Powdery mildew is one of the most common diseases in greenhouse production. Some greenhouse crops prone to infection include African violet, begonia, calibrachoa, dahlia, gerbera daisy, hydrangea, petunia, verbena, rose, kalanchoe and poinsettia. Many herbaceous perennials such as aster, centaurea, coreopsis, delphinium, monarda, phlox, rudbeckia, sedum and viola may become infected. Edible crops such as rosemary, sage, and mint are often infected with this disease. Although powdery mildews rarely kill a plant, they reduce the aesthetic value and marketability of the diseased plants.

Symptoms

Powdery mildew is often easily recognized by its white talcum-like growth. Powdery mildew colonies can vary for white and fluffy to colonies that are faint and hard to see.



Figures 1 & 2: Powdery mildew on dahlia. Photos by L. Pundt

- Symptoms may appear first on the upper leaf surface, but they can also develop on lower leaves.
- When symptoms develop on the more mature leaves, powdery mildew is harder to detect and seems to occur “overnight”, catching many growers unaware.
- As soon as favorable environmental conditions develop, powdery mildew develops into an epidemic as more leaves become infected.



Figure 3: Powdery Mildew on Baptisa. Photo by L. Pundt

Causal Organisms and Host Range

Powdery mildews generally look alike so it is a common misconception that they are all caused by the same fungus. However, different types of fungi such as *Golovinomyces* (formerly *Erysiphe*), *Leveillula*, *Microsphaera* and *Sphaerotheca* may occur in the greenhouse. All of these fungi are obligate parasites that need a living plant host to complete their life cycle. They usually survive in the greenhouse on crop or weed hosts.

Powdery mildews can attack healthy, vigorously growing plants. *Golovinomyces* (formerly *Erysiphe*) has a broad host range and attacks many members of the Aster family. Sometimes, mildews are relatively host specific. For example, *Sphaerotheca violae* only attacks *Viola*. If you are growing a diverse mix of herbaceous perennials in the greenhouse, it is helpful to know the type of powdery mildew so you can better determine the potential spread of the disease to your crops. This will make scouting easier. For a chart of the more common powdery mildews and the host plants they attack, see the Penn State factsheet, [Powdery Mildew Cross Listing](#).

Conditions Favoring Powdery Mildew

- Powdery mildew, unlike many foliar diseases, does not need free moisture on the leaf to thrive.

- Favorable environmental conditions include moderate temperatures of between 70° to 85° F and relatively low light levels. High relative humidity (greater than 95%) especially at night and low relative humidity during the day.
- Infections may be more common in the spring and fall when changes between the day and night temperatures encourage high relative humidity levels, especially during the night.

Spores (conidia) are produced in chains. Air currents and water splash in the greenhouse easily move these spores. The spores germinate and thread-like strands (hyphae) grow along the leaf tissue. Powdery mildews obtain plant nutrients by sending feeding organs (haustoria) into the epidermis. Once a spore lands on a plant, it may take as little as 3 days but more often five to 7 days for infection to develop. High humidity levels favor spore formation and low humidity levels favor spore dispersal.

Monitoring

- Begin scouting early, as often as you can, at least once a week, and more often, every two to three days, if possible.
- Look for the fluffy, talcum-like, powdery colonies especially on the upper surfaces of leaves. Stems and flowers may also be attacked.
- On susceptible varieties of sedum, brown scab-like lesions develop with little powdery growth. From a distance, it looks like a leaf spot disease or perhaps spray injury.



Figures 4 & 5: Powdery mildew on sedum. Photo by L. Pundt

- On petunia, watch for lower leaves that are chlorotic and later turn brown and die. Small dark spots may also be seen, but the typical white fungal growth is hard to see. Place the chlorotic leaves in a plastic bag

with a moist paper towel for about a day and then look for the white fungal growth.

- Use a 10x-hand lens to look for whitish threads radiating out from a central point or for chains of spores. Spray residue does not appear as fluffy and tends to have more of a droplet like outline. If powdery mildew develops on the lower surface, you may see a small, yellow spot on the upper surface on poinsettia and other crops.



Figures 6 &7: Powdery mildew on poinsettia. Photos by L. Pundt

- Powdery mildew may first be detected in locations with more changes between day and night temperatures.
- Hanging baskets or plants near the vents may first develop powdery mildew. Flag the affected area so you can easily revisit the plants after sprays have been applied.
- If only a low level of disease is detected, remove infected leaves or plants. Because the spores are so easily airborne, carry a plastic bag and carefully place the infected material into the bag.

Managing Powdery Mildews in the Greenhouse

Prevention

- Maintain proper plant spacing to reduce relative humidity levels within the plant canopy. (This will also help you gain better spray coverage).
- Keep relative humidity levels below 93% in the greenhouse.
- Heat and ventilate in the late afternoon and early morning to reduce high relative humidity at night. See the factsheet, [Reduce Greenhouse Humidity](#).
- Clean your greenhouse thoroughly between crops, removing all weeds that could be potential hosts.

- Most ornamental crops are not selected for pest resistance. However, some resistant cultivars are available. See [Disease Resistant Annuals and Perennials in the Landscape](#)
- Preventive applications of biological fungicides are often helpful. They can also be part of a rotation with chemical fungicides. See Biological Fungicides fact sheet on the IPM website.
- Applications of silicon fertilization have slowed the progression of powdery mildew on zinnia, phlox and sunflower but did not eliminate it.

Chemical Controls

- Powdery mildews only colonize the upper layer of cells, so chemical eradication is possible.
- You do not need to spray preventatively for powdery mildew, but you do need to spray as soon as the disease is detected.
- Rotate among fungicide classes to discourage development of resistance. Certain fungicides, especially systemic fungicides, are “at risk” to development of resistance if they are used continuously. The fungicide resistance action committee has developed a numbering system for fungicides with the same mode of action. Fungicides with a high risk should be used in rotation with other fungicides or mixed with fungicides with different modes of actions.

See the most recent edition of the *New England Greenhouse Floriculture Guide: A Management Guide for Insects, Diseases, Weeds and Growth Regulators* for more specific up-to-date recommendations on ornamental crops. It is available from the [Northeast Greenhouse Conference and Expo](#). For fungicides labeled for powdery mildew on herbs see [Some Selected Fungicides labeled for use on herb bedding plants](#) on the UConn Greenhouse IPM webpage under herbs. For fungicides labeled for powdery mildew on greenhouse tomatoes, see the [New England Vegetable Management Guide](#).

By Leanne Pundt, Extension Educator, University of Connecticut. 2011.
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