College of Agriculture, Food and Environment
Cooperative Extension Service

Plant Pathology Fact Sheet **PPFS-GEN-02**

Powdery Mildew

Emily Pfeufer, Nicole Gauthier, and Carl A Bradley
Plant Pathology Extension Specialists

Importance

Powdery mildew can affect numerous plants, including fruit, vegetable, and agronomic crops, as well as woody and herbaceous ornamentals. This common and widespread disease can occur in commercial and residential plantings. Refer to Table 1 for a list of plants most commonly affected by powdery mildew in Kentucky.

Susceptible plants that are infected early in the season can be seriously damaged, while plant species affected later in the season may not be significantly harmed. Powdery mildew may adversely affect flowering, fruit development, plant vigor, and yields, although this disease rarely kills plants outright. Plants that become stressed by powdery mildew infections may succumb to other abiotic or infectious agents.

Symptoms & Signs

Powdery mildew is easily identified by the presence of white, tan, or gray powdery fungal growth (mycelium and spores) that is present primarily on surfaces of infected plant parts. Immature plant parts are often most susceptible. Affected leaves (Figures 1 to 3),

Figure 1. Powdery mildew on pumpkin foliage. (Photo: Nicole Ward Gauthier)

Figure 2. Powdery mildew affects a large number of ornamentals, both herbaceous and woody. Foliage of this infected phlox planting has the appearance of being dusted with powder (Photo: Sheryl Pirone). **Figure 3.** Small grains, such as wheat, are common hosts of powdery mildew in Kentucky (Photo: Kenneth Seebold, UK). **Figure 4.** Infected grapes become covered with fungal mycelia and spores of the powdery mildew pathogen (Photo: Julie Beale, UK). **Figure 5.** Leaves may curl along margins, as shown in this photo of powdery mildew-infected apple foliage (Photo: John Strang, UK). **Figure 6.** Discolored, irregular necrotic (dead) spots have developed on this grape leaf (Photo: Nicole Ward Gauthier, UK).

stems, buds, flowers, and fruit (Figure 4) appear as if they have been dusted with powder. Later in the growing season, tiny, round, black fungal fruiting structures of the overwintering stage (chasmothecia, formerly known as cleistothecia) may appear to "pepper" mildewed tissue.

Powdery mildew may occur as isolated spots or cover entire plant surfaces. When young expanding leaves are infected, they may become distorted and stunted. Leaves may curl at the margins (Figure 5). Discolored, irregular spots and blotches may develop on foliage (Figure 6);

severely infected leaves drop prematurely. Fruit may be misshapen, fail to color properly, become russetted (Figure 6), or split open. Infected fruit often have a shortened shelf-life when outer cuticles are injured. Fruit of many vegetables do not become infected, but powdery mildews can still reduce yield and/or quality. For example, pumpkins and winter squash have a shorter storage-life when stems and handles are weakened by powdery mildew.

Figure 7. Early infections of apple fruit result in net-like russetting as fruit matures. (Photo: John Strang, UK)

Cause & Disease Development

Many different closely-related fungi cause powdery mildew diseases; the most common genera include the following: *Erysiphe, Golovinomyces, Phyllactinia,* and *Podosphaera*. These fungi are obligate parasites, meaning they can only infect and actively grow on living tissue. Most powdery mildew species have a limited host range, so infection of one host does not necessarily mean that other species nearby are in danger of infection.

Powdery mildew fungi overwinter as fruiting structures (chasmothecia/cleistothecia) in buds, bark crevices, and on fallen plant debris. Spores (ascospores) are released from overwintering structures in spring and are splashed by rain or carried by wind currents to susceptible tissues, where they germinate and cause primary infections. Other airborne spores (conidia) are produced on colonized tissue and result in repeating infections throughout the growing season. Late in autumn, overwintering structures form on infected plant surfaces.

Powdery mildew fungi are favored by temperatures of 68° to 77°F, but they may be active from 55° to 90°F. Diseases caused by these fungi are most common in shady areas, low areas that trap damp air, and sites with crowded plants and poor air circulation. Unlike many other fungal pathogens that require moisture on plant surfaces for spore germination and infection, powdery mildew fungi can infect in arid conditions (40% humidity). Free moisture, especially rainfall, is actually detrimental to survival of conidia. This means that powdery mildew can become problematic even when it is too dry for other diseases to develop.

Disease Management

Management options are often determined by the production system (e.g., commercial field, residential landscape, greenhouse/high tunnel, etc.), as well as by the specific crop. Follow as many of the management options listed below as possible, whenever they are applicable.

Cultural Practices

- *Cultivar selection*—Plant cultivars vary in their susceptibility to powdery mildew. Resistant/tolerant cultivars of apple, crabapple, grape, lilac, phlox, some cucurbits, pepper, rose, wheat, and many other crops are available. Whenever possible, select cultivars with known resistance or tolerance to this disease.

- *Planting site*—Do not plant susceptible crops in low areas or sites that are shaded; these are often high humidity areas. Rotate annual crops to reduce pressure from overwintering powdery mildew fungi.

- *Fertility*—Avoid excessive applications of nitrogen fertilizer, which stimulate succulent growth that is most susceptible to infection.

- *Sanitation*—Remove and destroy infected plant tissues and debris that may serve as

overwintering sources of these fungi. Crop residues can also be incorporated into the soil to reduce sources of overwintering fungi.

- *Air circulation*—Keep plants well-spaced and properly thinned to promote air movement, light penetration, and rapid leaf drying.

Fungicides

- Fungicides may be warranted for early season management of powdery mildew on susceptible crops, especially in commercial plantings or where highly valuable plants are grown. Fungicides are most effective when applied as preventatives, before primary infections can occur. Some crops, such as grape, remain susceptible all season and require consistent and prolonged sprays.

- Fungicide use in residential plantings is generally not recommended, especially when disease occurs late in the season. Late season infections cause minimal damage, even when plants appear severely affected.

- Consult an appropriate spray guide or contact your county Extension office for information on recommended fungicides.

Additional Resources

- Extension Plant Pathology publications (plant disease fact sheets and spray guides) http://plantpathology.ca.uky.edu/extension/publications
- Post-harvest Disease Losses in Fruit & Vegetable Crops (PPFS-GEN-24) https://plantpathology.ca.uky.edu/files/ppfs-gen-24.pdf

Table 1. Partial listing of plants commonly affected by powdery mildew in Kentucky.

Common name	Botanical name (genus)
Agronomic crops	
Barley	*Hordeum*
Hemp (greenhouse)	*Cannabis*
Wheat	*Triticum*
Fruit	
Apple	*Malus*
Cherry	*Prunus*
Grape	*Vitis*
Ornamentals	
Begonia	*Begonia*
Crabapple	*Malus*
Dogwood	*Cornus*
Lilac	*Syringa*
Phlox	*Phlox*
Pin oak	*Quercus*
Rose	*Rosa*
Sycamore	*Plantanus*
Tuliptree	*Liriodendron*
Turfgrass	Various genera
Zinnia	*Zinnia*
Vegetables	
Cantaloupe	*Cucumis*
Pumpkin	*Cucurbita*
Squash	*Cucurbita*

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