

Cherry Powdery Mildew in Utah

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Quick Facts

- Powdery mildew on sweet and tart cherry is caused by the fungal pathogen *Podosphaera cerasi*.
- The pathogen infects young leaves and, occasionally, fruit.
- Warm, dry days followed by cool, humid nights favor disease development.
- Infections reduce tree vigor and can affect fruit yield and quality.
- Orchards with dense tree plantings favor spread.
- Chemical control is the primary means of management.

Powdery mildew is commonly found in commercial tart and sweet cherry orchards in Utah and throughout the western U.S. It does not need free water (rain) to spread, allowing it to thrive in dry climates and humid tree canopies. The disease is identified by the white, powdery fungal growth that develops on foliage (Fig. 1) and sometimes fruit. Although it can occur in backyard trees, the fungus causes the most damage in commercial orchards where trees are planted close together, creating conditions that favor spread.

Hosts

To date, hosts of *P. cerasi* include the following (Moparathi et al., 2019), with damage in Utah primarily seen in sweet and tart cherry orchards:

- Tart cherry (*Prunus cerasus*)
- Sweet cherry (*P. avium*)
- Bird cherry/fire cherry/pin cherry (*P. pensylvanica*)
- Common plum (*P. domestica*)
- Nanking cherry (*P. tomentosa*)
- Western sand cherry (*P. besseyi*)
- Sand cherry (*P. pumila*)
- Pacific plum (*P. subcordata*)
- Canada plum (*P. nigra*)

Disease Biology

The fungus overwinters in the form of tough fruiting bodies called chasmothecia both on infected leaves on the orchard floor and, to a lesser extent, in bark crevices (Grove & Boal, 1991). In the spring, during an irrigation or precipitation event that produces at least 0.1 inch of water within one hour, the chasmothecia rupture and release primary windblown inoculum, known as ascospores (Fig. 2) (Grove, 1991). Optimal spread of primary infections occurs at 77 °F, where even less water is needed for the release of ascospores (Grove, 1991).

At temperatures of 60 °F or above, the ascospores germinate on the undersides of healthy young leaves, forming inconspicuous colonies of powdery-white mycelium (Fig. 3). The general timing of these initial infections in northern Utah is mid-May, but damage may not be visible to the naked eye until late May.

Mycelium on the leaves immediately forms conidiophores (specialized hyphae) that produce asexual spores called conidia. Conidia are wind-dispersed, causing multiple secondary infections. Each secondary infection will form mycelium and spores within seven days (Moparathi, 2016). This cycle continues for several months, as long as the tree is producing

new foliage, sometimes leading to widespread disease within an orchard. Mature leaves are not susceptible to infection due to their fully developed cuticle and epicuticular waxes (Moparthy et al., 2023). Notably, free water from rain prevents primary or secondary spores from germinating by washing them from the leaves and fruits (Blanco et al., 2004).

In northern Utah, nearly all terminal shoots of tart cherries may be infected by mid-July, with mycelium growth visible on all leaf surfaces. Hotter conditions (over 85 °F) slow the spread and growth of the fungus. Our observations in Utah have shown that by mid to late August, leaf senescence combined with cooler evening temperatures in the 50s triggers the formation of chasmothecia, which start as yellow-colored and later turn dark (Fig. 4). Most chasmothecia remain on the foliage, but some become airborne and embedded in bark crevices (Grove & Boal, 1991).

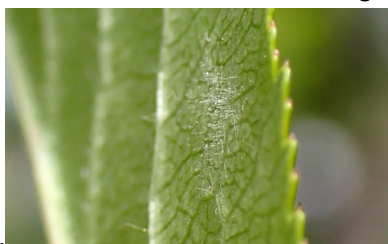
In Washington, Grove and Boal (1991) report that infections rarely occur on fruit unless there is a cool rain event near harvest time, whereas in Utah, infections are often seen on ripening cherry fruits. In general, unripe fruit is not susceptible to powdery mildew (Probst et al., 2021).



Fig. 1. Tart cherry leaf with powdery mildew (*Podosphaera*



cerasi). **Fig. 2.** A chasmothecium erupting to release



ascospores. **Fig. 3.** Early infections are difficult to see. Hold the leaf slanted to the



sunlight to see the “stubble-like” new mycelium growth. **Fig. 4.** Chasmothecia (small black

**Fig. 5.** Lighter (chlorotic)

dots) forming within mycelium toward the end of the season.

**Fig. 6.**

area on the leaf surface where the mycelium occurs on the underside of the leaf. Edge curling of sweet cherry leaf due to powdery mildew.

Symptoms and Signs

New infections occur only on succulent young leaves and start as small, white, powdery areas on the underside of young leaves that may require a hand lens to detect (Fig. 3). In some cases, the surface of the leaf above the infection is lighter in color (Fig. 5). These infections gradually expand into larger patches of mycelium (signs) on both sides of the leaf. When viewing mycelium, it may appear to occur only on the leaf surface (above or below), but the fungus has specialized structures that penetrate the leaf and siphon nutrients, causing the symptoms listed below.

Early Symptoms

**Fig. 7.** Puckered, distorted, and brittle

sweet cherry leaves



with necrotic areas
mildew on tart cherry fruits and stems.

Fig. 8. Powdery

- Leaf surfaces have small circular lesions, lighter green than the remaining leaf (Fig. 5).
- Infected portions of the leaf may curl slightly (Fig. 6).

Advanced Symptoms

- Leaf growth is puckered and distorted and leaves are brittle (Fig. 7).
- Infected leaves yield bronzed or necrotic (dead) areas.
- Reduced vigor or inhibited growth occur from reduced ability to photosynthesize.
- Leaves drop prematurely, reducing cold hardiness.
- Infected sweet cherry fruits may have russeted areas or a dull, whitish coating that affects cosmetic quality.
- Tart cherry fruits become infected only under high mildew pressure (Fig. 8) and may not shake from the tree during harvest.

Management

Monitoring

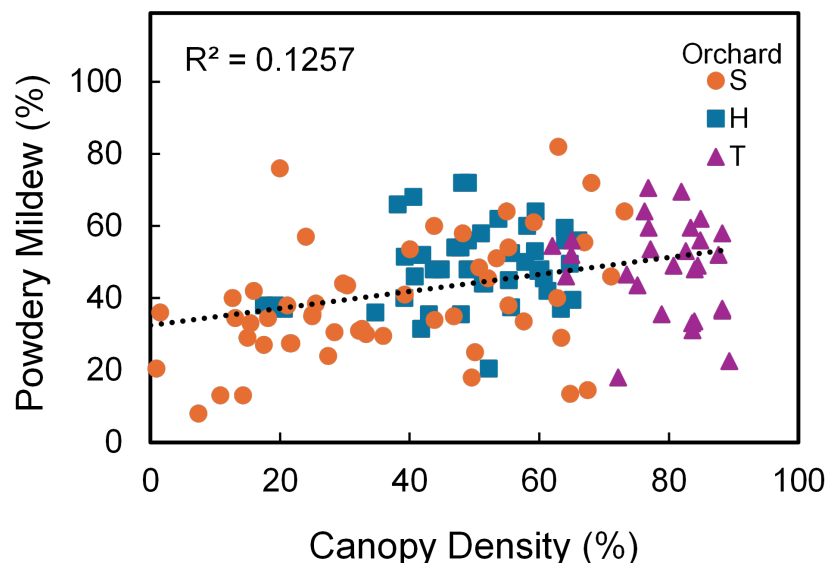


Fig. 9. The relationship between

powdery mildew

and canopy density across three fields.

Notes. Powdery mildew infection rates are for June 20, 2023. Canopy density was measured by ceptometry, and values are percent of light intercepted. Densities below 40% were associated with lower PM levels.

Christina Lilligren, USU

Cherry powdery mildew can be difficult to manage if not caught early, so careful monitoring is important. Starting in early to mid-May (soon after shuck split), examine a selection of leaves from suckers and spurs in the lowest portion of the crown. Early infections can be difficult to see, as the top surface of the leaf will not show any symptoms. Remove the leaves from the tree and view each one with the sun over the back of your shoulder to highlight the whiteness of the early-forming mycelium; a 10x magnifying lens may be needed. Once mycelium is easily visible on the top or bottom leaf surfaces, powdery mildew is likely widespread.

In late summer, inspect foliage for the formation of chasmothecia, which indicates the fungus is entering into a resting stage and fungicides are ineffective. Chasmothecia can be observed with a 10x hand lens, are the size and shape of spider mite eggs, and are yellow, orange, or black (Fig. 4).

A 2022 and 2023 Utah State University (USU) study in Utah tart cherry orchards investigated the use of a multispectral camera mounted on an unmanned aerial vehicle (UAV), or drone, as a tool for early detection of powdery mildew. Unfortunately, when seasonal imaging was compared to extensive on-ground data collection, remote detection did not correlate with the on-ground data collected (Lilligren, 2025).

Host Resistance

Almost all tart cherries grown in Utah are Montmorency, which is highly susceptible to powdery mildew. Resistance in tart cherries is not currently available, but researchers have been evaluating resistance in sweet cherry cultivars for decades (Moparthi et al., 2023). Bing, Ranier, Lapins, Sweetheart, and Van are all highly susceptible sweet cherries. Chelan, PMR-1, Hedelfingen, Regina, and Venus sweet cherries all have some resistance.

Rootstock types do not have a direct influence on powdery mildew infection; however, they indirectly impact tree vigor (Calabro et al., 2009). Utah tart cherries are mostly grown on Mahaleb rootstock for its tolerance to cold temperatures and drought conditions, and it is less vigorous than Mazzard. In sweet cherries, Calabro and others (2009) found that powdery mildew was more severe in trees growing on Mazzard rootstock, likely due to the more vigorous canopies.

Cultural Strategies

Several studies have shown that powdery mildew generally thrives in dense canopies (due to higher humidity and poor air circulation), but this was only recently documented in tart cherry. In the same USU study referenced above, researchers also compared powdery mildew incidence to tree canopy density (detected via ceptomety). A weak correlation was observed between powdery mildew incidence and canopy density, where trees with extremely low canopy density tended to exhibit lower powdery mildew incidence. However, no difference in powdery mildew was seen in trees with a density greater than 40% (Fig. 9; Lilligren, 2025).

Where feasible, thin the crown of dense canopies by pruning out unnecessary limbs. This will improve air circulation, reduce canopy humidity, and improve spray coverage. Another important aspect of pruning is to remove tree height beyond what the sprayer can reach. Cherry trees that are too tall for the sprayer results in excessive mildew permanently left in the orchard.

Finally, infection will be high where there is vigorous growth. Therefore, do not overfertilize. During spring, remove suckers because the succulent foliage is highly susceptible to powdery mildew.

Chemical Control

In most cases, powdery mildew is managed primarily with fungicides, and the most important factor for chemical control is to apply early in the season. By the time white mycelium is visible on the *upper* leaf surface, it is too late for effective control. Only young foliage is susceptible, so sprays should target new foliage rather than the entire canopy.

For **organic control**, several biofungicides are labeled for cherry powdery mildew; however, trials in Washington found that when applied alone, they were less effective than synthetic fungicides but could be used in a rotation (Moparthi & Bradshaw, 2020). Horticultural oils (petroleum- and plant-based) are also effective in reducing powdery mildew, and some Utah growers spray 1% oil weekly in spring, resulting in good mildew suppression. The oil disrupts the cell walls of conidia, making them nonviable. Finally, sulfur, the oldest organic fungicide available, is also highly effective. Both oil and sulfur should only be used in cooler temperatures (spray at night or on days under 85 °F) to avoid foliar damage.

An effective rotation in **conventional systems** could start with sulfur for the first sprays in spring at 7-day intervals, followed by Group 3 or Group 11 fungicides later in the season.

It is important to note that because *P. cerasi* has a rapid reproduction rate, it can easily become resistant if a fungicide is used repeatedly. Swamy and Grove (2019) documented resistance in sweet cherry powdery mildew to azoxystrobin (FRAC code 11) and myclobutanil (FRAC code 3) in Washington orchards.

Avoid developing resistance by following the “3-2 rule.” The 3 means a chemical class (FRAC code number) may be used 3 times total per season on the same crop, while the 2 means that the chemical class should not be applied more than twice in a row.

The [Intermountain Tree Fruit Production Guide](#) provides an updated list of registered organic and conventional fungicides, their chemical class (for rotation), and their efficacy. In general, available modes of action groups are displayed in Table 1.

Table. 1.*Registered Organic and Conventional Fungicides and Their Modes of Action and Efficacy*

Type and chemical class (Group)	Chance of resistance	Product examples	Efficacy
Multi-site contact activity fungicides Group M	Low	• Topsin (thiophanate-methyl) potassium bicarbonate (organic; Kaligreen). • Sulfur (organic; flowables, wettable powders, micronized powders, dusts). Sulfur products are phytotoxic when applied at high temperatures or within 10 days of oil (except in dormant sprays).	Good
Demethylation inhibitor fungicides Group 3	High	• Myclobutanil (Rally). • Triflumizole (Procure). • Propiconazole (PropiMax). • Metconazole (Quash).	Moderate to good
Strobilurin fungicides Group 11	High	• Azoxystrobin (Abound). • Pyraclostrobin (Cabrio).	Excellent
Other Groups (7 and 13)	Moderate to high	• Penthiopyrad (Fontelis) – Group 7. • Quinoxifen (Quintec) – Group 13.	Excellent good to Excellent
Group “U” fungicides (“unknown”)	Moderate	• Metrafenone (Vivando) – Group U8. • Flutianil (Gatten) – Group U13.	Excellent
Biofungicides are organic and represent several groups	Moderate	• Serenade and Sonata contain <i>Bacillus</i> sp. and work by inhibiting germination. • They should be applied every 5 days. They can also be used in a rotation with conventional fungicides to prevent resistance.	Moderate to good
Oils are also organic	Low	• Plant-based oils (Sporan, Trilogy). • Petroleum-based oils (Stylet-Oil). • They can be combined with other materials (except sulfur or Captan) to enhance efficacy or used alone at	Only effective if applied before infection and every week.

Type and chemical class (Group)	Chance of resistance	Product examples	Efficacy
		1% every 5 to 7 days.	

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Related Research