

Fungicide Recommendations for Controlling Hemp Powdery Mildew in the Greenhouse

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Key Points

1. Powdery mildew is a foliar disease of hemp and is often worse in greenhouses or high tunnels compared to field production.
2. Symptoms are first noticed as small, circular, white powdery lesions on leaf surfaces and are easily seen with the naked eye.
3. Early detection through scouting is important for effective disease management.
4. Fungicides can be highly effective and work best when applied preventatively before the disease becomes established.

Powdery mildew symptoms

Hemp (*Cannabis sativa*) powdery mildew is a foliar disease caused by the fungus *Golovinomyces ambrosiae*. Symptoms include white powdery mold made up of fungal mycelium and spores (conidia) on the upper leaf surface, and occasionally on stems, of infected plants (Figure 1). Symptoms are often first noticed as small, discrete, circular white powdery lesions with poorly defined margins on the leaf surface (Figure 1A and 1B). The white powdery growth is easily seen with the naked eye. As the disease progresses, lesions coalesce (grow together), and leaves may become distorted. Entire leaf surfaces may be covered with white powdery growth (Figure 1C). Later, infected leaves become brown and necrotic and may fall off prematurely (Figure 1D). Additional information on hemp powdery mildew signs and symptoms can be found in the UT Extension publication "[Hemp Disease and Pest Management \(W916\)](#)". More information on managing powdery mildew and leaf spots of field-grown hemp can be found in the UT Extension publication "[Hemp Fungicide Efficacy Field Trial for Leaf Spot and Powdery Mildew \(W995\)](#)". Links for these resources are provided below under the additional resources section.

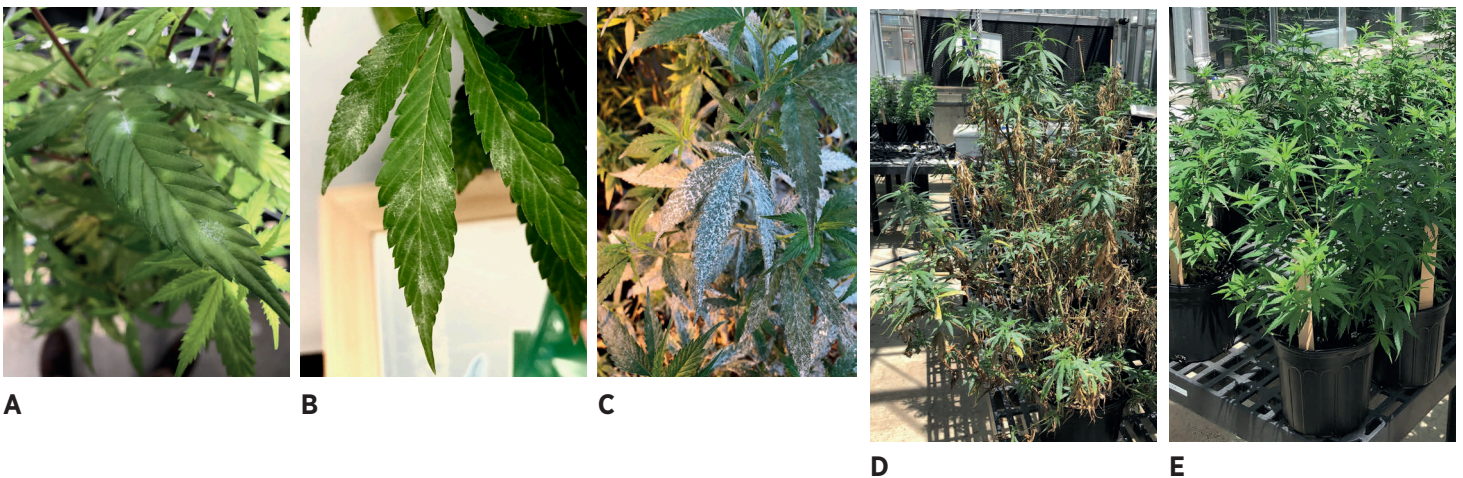


Figure 1. Hemp powdery mildew begins as small, discrete, circular white powdery lesions with poorly defined margins on the leaf surface (A and B). As the disease progresses, lesions coalesce and may cover entire leaf surfaces (C). Infected leaves later become brown and necrotic and may fall off prematurely (D). Healthy hemp plants shown for comparison (E).

Disease cycle and spread

Conditions common in greenhouses and high tunnels, such as moderate temperatures (70 to 80 degrees F) and high relative humidity, provide a favorable environment for powdery mildew development. Unlike many foliar fungal diseases, powdery mildew can thrive in the absence of leaf wetness. High relative humidity favors infection and spore survival, but the disease can progress even when relative humidity is below 50 percent. Under favorable conditions, the pathogen produces spores which easily spread through air movement to cause new infections. Approximately 3 to 7 days after initial infection, secondary infections can arise from the movement of airborne spores.

Hemp powdery mildew fungicide efficacy trial methods

Greenhouse experiments were conducted at the University of Tennessee in Knoxville, Tennessee, from 2020 to 2022. Trials were arranged in a randomized complete block design with four replicates. Each experimental unit consisted of one hemp plant in a one-gallon pot. The hemp cultivar ‘Sweetened’, which is highly susceptible to hemp powdery mildew, was used in the experiments. Fungicides were applied at the highest labeled rate three times at 7-day intervals during the experiment. The first application was made one day before powdery mildew inoculation as a protectant treatment. All plants were then sprayed with a suspension of powdery mildew spores (inoculated) to induce uniform disease. Two additional treatments were applied at 7-day intervals from the first protectant treatment. Applications were made to achieve thorough coverage using hand-held pump sprayers. Non-treated control plants were sprayed with water. The plants were assessed for powdery mildew incidence and severity weekly at 7, 14 and 21 days after the first treatment application.

Hemp powdery mildew fungicide recommendations

All fungicides tested significantly reduced powdery mildew compared to the non-treated controls (Table 1). All fungicides tested are OMRI-listed and acceptable for use in organic hemp production. Five products had excellent efficacy (Defguard, Exile, Milstop, Regalia and Sil-Matrix), and reduced powdery mildew by more than 90 percent (Table 1). Stargus had good efficacy and reduced powdery mildew by 79 percent (Table 2). For best results, these products should be applied before the onset of disease. Products tested and recommended here do not represent a complete list of products available for managing hemp powdery mildew. Fungicide products, state registrations and labels change often. It is the responsibility of the user to ensure that any pesticide is applied in a manner consistent with the product label. The Tennessee Department of Agriculture maintains a list of pesticide products registered for use on hemp in Tennessee, which can be found at the following URL <https://www.tn.gov/agriculture/farms/hemp-industry/hemp/getting-started.html> . In the FAQ list on the website, click “Can I use pesticides on hemp?” to see the updated pesticide list.

Table 1. Efficacy of fungicides for managing hemp powdery mildew in the greenhouse.

Treatment*	Active Ingredient	Disease reduction compared to non-treated control	Product efficacy
Defguard	<i>Bacillus amyloliquefaciens</i> strain D747	90%	Excellent
Exile	Potassium salts of fatty acids	93%	Excellent
Milstop	Potassium bicarbonate	98%	Excellent
Regalia	extract of <i>Reynoutria sachalinensis</i>	92%	Excellent
Sil-Matrix	Potassium silicate	90%	Excellent
Stargus	<i>Bacillus amyloliquefaciens</i> strain F727	79%	Good

*All products tested are OMRI listed and acceptable for use in organic production.

Additional resources

Hemp Fungicide Efficacy Field Trial for Leaf Spot and Powdery Mildew. W995. The University of Tennessee Extension. tiny.utk.edu/W995

Hemp Disease and Pest Management. W916. The University of Tennessee Extension. tiny.utk.edu/W916

Tennessee Department of Agriculture, Pesticide Products Registered for Use on Hemp in Tennessee. In the FAQ list on the website, click “Can I use pesticides on hemp?” to see the updated pesticide list. <https://www.tn.gov/agriculture/farms/hemp-industry/hemp/getting-started.html>

Precautionary statement

Read and follow label directions carefully before you buy, mix, apply, store or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label.

Disclaimer

This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator’s responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication.

Use of trade or brand names in this publication is for clarity and information; it does not imply approval of the product to the exclusion of others that may be of similar, suitable composition, nor does it guarantee or warrant the standard of the product. The author(s), the University of Tennessee Institute of Agriculture and the University of Tennessee Extension assume no liability resulting from the use of these recommendations.



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