

# TOMATO POWDERY MILDEW MANAGEMENT

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This disease is common in high tunnels and greenhouses, but also occurs outdoors. It has been occurring sporadically but more frequently. Recent increase in high tunnel production at least partly accounts for increased importance of powdery mildew in the Northeast. Symptoms are the typical powdery white spots characteristic of this type of disease. They usually appear first on lower leaves inside the plant canopy. Left unmanaged, powdery mildew can quickly kill affected leaves. See images at: <http://blogs.cornell.edu/livegpath/gallery/tomato/powdery-mildew-on-tomatoes/>. There is additional information at this page.

When purchasing seedlings, ask producer about powdery mildew management program being used and inspect plants thoroughly when received. Rejecting affected plants is worth considering because of the cost of needing to start a weekly fungicide program so early in crop production.

Select resistant varieties when possible (there are not many). Manage weeds: some likely are alternate hosts. This includes during the period between crops in a high tunnel or greenhouse. Look for symptoms weekly. It is especially important to check the underside of leaves that are buried in the canopy as these are often the first affected. Use of a broad-spectrum fungicide like chlorothalonil or copper will control powdery mildew on the upper surface of leaves increasing the need to look at the underside of leaves.

Apply fungicides regularly starting at first detection of symptoms or preventively based on past occurrence. Fruit production is a physiological stress that can increase plant susceptibility and thus can be the time symptoms are first found. Almost all fungicides act on pathogens to prevent infection. A few have very limited curative activity. This is why it is critical to successful management of any plant disease to start applying fungicides early in disease development. Thorough coverage of foliage, especially the underside of leaves, is also critical. Trellis field-grown plants and use drop nozzles. Some modern conventional fungicides can move through leaves. Sulfur can provide some control on the underside of leaves due to its volatility enabling it to redistribute to the underside of leaves.

For field-grown crops being grown conventionally, choose fungicides with FRAC Code U6, U8, 3, 7, and/or 11 active ingredient(s). These have targeted activity for powdery mildew and are able to move to the lower surface of leaves. Alternate among products in different FRAC Groups to manage resistance and to ensure effective control and also to comply with label restrictions. Also apply them with a broad-spectrum fungicide like sulfur or chlorothalonil. Products only effective for powdery mildew:

Torino (FRAC U6): maximum of 3 applications at minimum 14-day interval.

Vivando (U8): maximum of 2 consecutive and 3 total applications.

Rally, Rhyme and other DMIs (3): maximum of 4 total applications.

Products with 2 active ingredients that also have activity for other diseases include:

Quadris Top (3 + 11): maximum of 2 consecutive and 5 total applications.

Topguard (3 + 11): maximum of 4 total applications.

Inspire Super (3 + 9): maximum of 2 consecutive and 4 total applications.

Aprovia Top (FRAC 3 + 7): maximum of 2 consecutive (7-day) and 4 total applications.

Luna Tranquility (7 + 9): maximum of 2 consecutive and 4 total applications.

Priaxor (7 + 11): maximum of 2 consecutive and 3 total applications.

Miravis Prime (7 + 12): maximum of 2 total applications.

Switch (9 + 12): maximum of 2 consecutive (follow by 2 applications of another fungicide) and 4 total applications.

Revus Top (3 + 40) is a good choice when late blight is also present; maximum of 2 consecutive and 4 total applications.

There are fewer options for conventional tomatoes grown in greenhouses (or high tunnels) because this use is prohibited for many fungicides (explicitly stated on the label). Fungicides listed above that can be used are Inspire Super\*, Luna Tranquility, Switch (not on cherry, grape, or other small fruit types), Torino\*, and Vivando\* (\*no statement on label prohibiting which other product labels have). Additionally, Trionic (FRAC 3) is only for use in commercial greenhouse crops and on transplants. Apply Luna Tranquility only in well-ventilated plastic or glass structures; ventilate for at least 2 hours afterwards.

For organically produced tomatoes there are several labeled products that typically do not have restrictions on their use in greenhouses. Cease is a parallel product to Serenade that is only labeled for use in greenhouses. Sulfur and oil are among the most effective organic products. They cannot be used together or in close succession because of potential for phytotoxicity to occur likely from oil enabling sulfur to move in to leaves. Oil leaves little residue compared to most other products thus it is a good choice to use during the harvest period. A suggested program for field and greenhouse (or high tunnel) tomatoes is a micronized sulfur like Microthiol Disperss until first fruit are nearing maturity, followed by a non-oil product for 2 weeks to avoid sulfur toxicity, and then a mineral or botanical oil during harvest period so visible residue will be minimal on harvested fruit. Fungicides approved for organic production that are labeled for tomato powdery mildew include Cease, Double Nickel, JMS Stylet-oil, Kaligreen, Mildew Cure, MilStop, M-Pede, OxiDate 2, Prevont, Regalia, Serenade, Serifel, Sonata, Taegro 2, Thyme Guard, Timorex Gold, Trilogy, TriTek, and several formulations of sulfur. Some of the active ingredients in these fungicides, such as potassium bicarbonate and mineral oil, are available for purchase for other uses. It is illegal to use them, or other substances not registered as fungicides in the U.S. (or deemed to be exempt by EPA), to manage diseases on plants being grown for commercial sale. This is mandated by the Federal Insecticide, Fungicide, and Rodenticide Act. FIFRA is a federal statute that governs the registration, distribution, sale, and use of pesticides in the U.S. and requires that before a pesticide may be sold or distributed in the USA, it must be registered (licensed) with the EPA.

*Please Note: The specific directions on fungicide labels must be adhered to -- they supersede these recommendations, if there is a conflict. Before purchase, make sure product is registered in your state. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.*

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