

Managing *Phytophthora* on Pumpkin/Watermelon

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MSU Research
Phytophthora capsici

Historically, Michigan producers grow over 80,000 acres of vegetables that are susceptible to *Phytophthora capsici*, including cucumber, zucchini, summer and winter squash, watermelon, cantaloupe, pumpkin, pepper, eggplant, tomato, and succulent bean. *Phytophthora capsici* may overwinter in the soil and persist for >10 years. The pathogen is favored by rain and warm temperatures and spreads readily via water. It has also been found in irrigation ponds and surface water sources.

Recognizing *Phytophthora* on Pumpkin

- Water-soaked lesions on fruits
- “Powdered sugar” layer of *Phytophthora* spores on fruits and stems

Symptoms of *Phytophthora* on young pumpkin seedlings are damping-off and plant death. The foliage of mature pumpkin plants appear to be relatively tolerant to *Phytophthora*, but rain may still splash soil with spores onto the fruit, causing infection. After a fruit becomes infected, it can take up to 2 days for the infected tissue to develop a dark sunken (water-soaked) appearance. Lesions get larger over time, and by 3 days, white spores resembling powdered sugar may form on the fruit surface, followed by complete fruit rot. Generally lesions are larger and increase in size more quickly at higher temperatures. It is possible to harvest healthy-appearing, but infected pumpkin fruits, which deteriorate days later in transit or storage.

The best way to prevent infection of a cucurbit crop is to avoid planting in a field that has a history of *Phytophthora*. There are several ways to manage spread if preventive measures are taken. Planting melons and pumpkins into raised beds with black plastic mulch increases drainage away from the plant reducing excess soil moisture, and decreases the number of fruit in direct contact with the soil. Increasing row spacing is also suggested to limit conditions favorable to *Phytophthora*. Reducing the plant population in the field can increase fungicide coverage on fruit.

Phytophthora can move through water, so it is ideal to plant into well-drained, tiled fields. Surface water should not be used to irrigate as *Phytophthora*



Phytophthora lesions and spores on squash.

can travel in water runoff to creeks, rivers, and ponds. If overhead irrigation must be used, reduced irrigation during fruiting has shown to limit infection while not significantly affecting yield. Early scouting is an additional element that should be used in disease management. If *Phytophthora* is found in the field, remove diseased plants and surrounding healthy-looking border plants.



Circular *Phytophthora* lesions on watermelon.

Management Strategies

- Plant into well-drained, tilled fields
- Use raised beds
- Avoid using surface water for irrigation
- Irrigate sparingly from a well
- Rotate crops
- Scout fields regularly for *Phytophthora*
- Remove diseased plants and adjacent healthy plants
- Apply fungicides at planting and when fruits are at young growth stage
- Powerwash equipment after it has been in infested fields
- Do not dump diseased culls in production fields



Wilted pumpkin plant caused by *Phytophthora*.

Mefenoxam, commonly known as Ridomil, was at one time very effective in disease management, but some *Phytophthora* have become insensitive to this fungicide. Since vines are somewhat tolerant to the disease, and fruit are especially susceptible, fungicide sprays should target the developing fruit.

Fumigants registered for use on pumpkin and melon to control *Phytophthora* include Telone C35, Sectagon-K54, Sectagon 42, and Vapam HL. See the [fumigation bulletin E-2579](#), “Commodity Fumigation Training Manual” for information.

In MSU trials, squash plots that received fungicides performed better than untreated plots. It is recommended that fungicides be applied early and often. Rotating fungicides is also necessary to prevent the pathogen from developing resistance.

Preferred Fungicides for Pumpkin/Melon

Product	A.I.	FRAC	Application
Ranman	cyazofamid	21	transplant water, foliar
Revus 2.08SC	mandipropamid	40	foliar
Tanos	famoxadone/cymoxanil	11,27	foliar
Gavel 75DF	mancozeb/zoxamide	M3,22	foliar
Presidio 4SC	fluopicolide	43	drip, foliar
Zampro	ametoctradin/dimeth	45/40	drench, drip, foliar

*Alternate products and tank-mix with protectants when required

Remember that the pesticide label is the legal document on pesticide use. Read the label and follow all instructions closely. The use of a pesticide in a manner not consistent with the label can lead to the injury of crops, humans, animals, and the environment, and can also lead to civil or criminal fines and/or condemnation of the crop. Pesticides are good management tools for the control of pests on crops, but only when they are used in a safe, effective and prudent manner according to the label.

Powdery Mildew on Pumpkin/Watermelon

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Pumpkin Powdery Mildew

Michigan and its neighboring states grow large acreage of crops susceptible to powdery mildew. Over 14,000 acres of pumpkin are grown within Michigan and Ohio. Smaller, but still significant, acreage of watermelon is grown. These crops in addition to squash and cucumber are affected by powdery mildew. In Michigan the powdery mildew is caused by *Sphaerotheca fuliginea*. Powdery mildew spores are airborne and are believed to come from either southern production fields or near-by cucumber greenhouses, which are affected by the same powdery mildew pathogen.

Recognizing powdery mildew on pumpkin and watermelon

- White powdery colonies on either side of leaf
- Often first seen in early plantings, in low lying field areas with little air-flow
- Dense vine growth favors the disease

The first symptoms of powdery mildew usually appear in mid to late summer. Once the spores land on a susceptible leaf, they infect the outer layer of cells, and then produce new spores which are further carried by air currents. Powdery Mildew is readily diagnosed in the field as white powdery colonies on the leaf's surface. The pathogen can also infect the underside of the leaf causing yellow spots to form on the leaf's upper surface. Typically in the field older leaves are more susceptible than new tissue.

Powdery mildew likes warm temperature and moisture, and often forms within dense foliage in the field. Once mildew colonies form on the leaf, temperature and moisture are less important to the pathogen's ability to spread. Rain can wash off powdery mildew spores when they have just landed on the leaf surface, but once infection begins the colonies will not wash off. The microclimate has a great effect on powdery mildew's ability to infect. Leaves within a canopy can be warmer and surrounded by more moisture than outer leaves. Low lying areas of a field where there is less air flow favor infection. Powdery mildew also likes shade, one of the reasons for its ability to develop quickly in dense canopies.



Powdery colonies on pumpkin leaf.

Management of powdery mildew can be difficult when a large amount of inoculum is in the vicinity. One method of management includes planting late crops, such as pumpkins or winter squash, upwind of an early cucurbit planting, such as summer squash. Some resistance exists in pumpkins, but no commercial watermelons have powdery mildew resistance. Watermelon leaves also tend to be more difficult to diagnose compared to pumpkin leaves due to their small size and lighter complexion. Scouting fields is an important early warning system. An IPM method consists of maintaining a threshold of 1 colony per 45 scouted leaves. After this point it is time to begin spraying.



Lower leaf surface with distinct colonies.

Management Strategies

- Avoid planting downwind of early squash fields
- Use resistant cultivars
- Mind plant spacing for increased air flow
- Scout fields, both upper and lower leaf surfaces
- Weekly fungicide applications when threshold of 1 colony per 45 leaves is reached



Shriveled handle caused by powdery mildew infection.

Powdery mildew is not just a foliar pathogen. It has the ability to infect the stems and handles of pumpkin, making for weak jack-o-lantern handles. The pathogen can also cause uneven ripening, low yield, and increases the chances of gummy stem blight (GSB). Proper spray coverage into the canopy is needed to protect the plant. Use of systemic as well as protectant fungicides is recommended because of the ability of powdery mildew to form on the underside of leaves. Coverage of the lower leaf surface is not adequate when using protectants alone. Due to the airborne nature of powdery mildew, a regular spray schedule is needed for adequate protection.



Dense planting covered with powdery mildew.

Preferred Fungicides for Pumpkin/Melon

Product	A.I.	FRAC
Pristine 38WG	boscalid	7,11
Quintec 2.08SC	quinoxifen	13
Torino 0.85SC	cyflufenamid	U6
Topsin M 70WP	thiophanate-methyl	1
Fontelis 1.67SC	penthiopyrad	7
Flint 50WG	trifloxystrobin	11

* Alternate products, apply in tank-mix with Bravo Weatherstik if required

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