

Managing *Phytophthora* on Pepper

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Historically, Michigan producers grow over 75,000 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. The pathogen may overwinter in the soil and persist for >10 years. *Phytophthora* is favored by rain and warm temperatures and spreads readily via water. It has also been found in irrigation ponds and surface water sources.

Infection by *Phytophthora* in pepper may occur days before any visible symptoms of disease appear. Initially, the pathogen may enter the roots or crowns with symptoms first appearing as water-soaked lesions that rapidly progress to cause stem girdling, plant wilting, and death. When infected, the fruits and leaves may also have water-soaked lesions, and occasionally a white “powdered sugar” layer of spores appear.

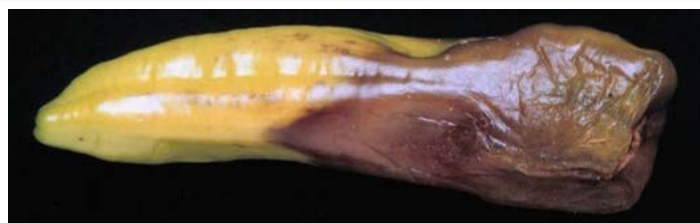
Integrated management strategies are required to control *Phytophthora* in pepper. Fields should be scouted regularly for disease symptoms.

Recognizing *Phytophthora* on PEPPER

- Plant wilting and death
- Water-soaked or brown lesions on the stems and leaves
- “Powdered sugar” layer of spores on fruits

Cultivar selection plays an important role in disease management. Bell pepper varieties that are tolerant to *Phytophthora* include Aristotle, Declaration, Intruder, Paladin, and Revolution. MSU research demonstrated that *Phytophthora* isolates may vary in their ability to cause disease. This has great implications for growers because cultivars with demonstrated resistance in certain regions may not be resistant in their field.

Peppers should not be planted in rotation with other susceptible crops like cucumber, melon, squash, pumpkin, zucchini, tomato, eggplant, or snap bean. Raised beds covered in black plastic mulch used in combination with drip irrigation can be used to reduce disease incidence. Overhead irrigation should be used sparingly and avoided if possible during fruiting.



Phytophthora fruit rot on a banana pepper.



Foliar blight, fruit rot, and stem lesion symptoms.

Foliar applications of fungicides directed at the base of the pepper plant have offered only limited protection from crown rot. Apply foliar sprays using ample water volumes to achieve good coverage. Be sure to apply the fungicide before and after a period of rainfall expected to exceed ½ inch. Some products have been labeled for drip or drench applications.

Rotate products among FRAC groups to reduce the risk of *Phytophthora* developing resistance to a particular fungicide. MSU research demonstrates that even frequent applications of foliar fungicides to a susceptible cultivar may not adequately protect against crown and root rot.

Fumigants registered for use on pepper to control *Phytophthora* include Telone C35, Sectagon-K54, Sectagon 42, Vapam HL, and K-Pam.

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 pest control on crops, but only when they are used in a safe, effective and prudent manner according to the label.

Management Strategies

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- Plant into well-drained, tilled fields
- Use black plastic mulch in combination with raised beds and drip irrigation
- Avoid using surface water for irrigation
- Irrigate sparingly from a well
- Plant resistant/tolerant cultivars
- Rotate crops
- Scout fields regularly for *Phytophthora*
- Remove any diseased plants and adjacent healthy plants
- Apply fungicides preventively and at short intervals when needed
- Powerwash equipment after it has been in infested fields
- Do not dump diseased culls in production fields



“Powdered sugar” *Phytophthora* spores on a bell pepper fruit.

Preferred *Phytophthora* Fungicides for PEPPER

Product	A.I.	FRAC*	Comment
Elumin	ethaboxam	22	Rotate between applications. Apply as a soil or foliar spray or via drip.
Forum 4.18SC	dimethomorph	40	Use in a fungicide tank mix. Rotate to a fungicide with a different FRAC after 2 sequential applications.
Orondis Gold 200 SC	oxathiapiprolin	49	Rotate to a fungicide with a different FRAC after 2 sequential applications. Apply in transplant water, at-plant in-furrow or via drip.
Orondis Ultra	oxathiapiprolin /mandipropamid	49/40	Tank mix with a copper fungicide and apply as a foliar spray. Rotate to a fungicide with a different FRAC after 2 sequential applications. Use either soil or foliar applications of oxathiapiprolin products, but not both for disease control.
Presidio 4SC	fluopicolide	43	Use in a fungicide tank mix. Apply as a soil or foliar spray or via drip.
Revus 2.08SC	mandipropamid	40	Tank mix with a copper fungicide and apply as a foliar spray. Rotate to a fungicide with a different FRAC after 2 sequential applications. Include adjuvant.
**Ridomil Gold SL, Ultra Flourish	mefenoxam	4	Apply as preplant or at-plant soil spray or via drip.
**Ridomil Gold Copper	mefenoxam/copper hydroxide	4/M01	Apply as a foliar spray. See label for application restrictions of mefenoxam/metalaxyl products.

Phytophthora ‘B’ Team for PEPPER

Ranman 400SC	cyazofamid	21	Alternate with a fungicide with a different FRAC. Apply to base of transplants or in transplant water or via sprinkler irrigation. See label about surfactant.
Zampro 4.4SC	ametoctradin/dimethomorph	45/40	Rotate to a fungicide with a different FRAC after 2 sequential applications. Apply as an at-plant drench or via drip.

*The FRAC code is an alphanumeric code assigned by the Fungicide Resistance Action Committee and is based on the mode of action of the active ingredient.

**Fungicide resistance has been detected in *Phytophthora* where mefenoxam has been used frequently.