

# Managing Phytophthora Blight of Peppers and Cucurbits

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Zachariah Hansen, Assistant Professor and Extension Specialist

Timothy Siegenthaler, Graduate Assistant

Andrew Swafford, Student Assistant

Department of Entomology and Plant Pathology

## Disease Overview

Phytophthora blight is a general term for crown rot, root rot and fruit rot of vegetables caused by the oomycete (water mold) *Phytophthora capsici*. It is a serious disease of peppers and cucurbits, but it can also affect other vegetables including tomato, eggplant and beans. The disease is best managed through prevention because once it becomes established in a field it is nearly impossible to remove. The pathogen produces long-lived spores, called oospores, that can survive in the soil for 10 years or more. When conditions are warm and wet, the disease progresses rapidly through the production of another spore type called sporangia. When conditions are favorable for disease, millions of sporangia are produced, each releasing up to 40 swimming zoospores which are responsible for starting new infections. These spores move through splashing water and can easily spread down rows through flowing water or contaminate irrigation sources during rain events.

## Diagnosing Phytophthora blight

### Peppers

Symptoms on peppers include sudden wilting and dark lesions near the soil line (Fig. 1). Root rot may also be observed. Fruit are commonly affected and display a tan, water-soaked soft rot with a thin layer of white powdery mold visible to the naked eye (Fig. 2). Affected plants will often die shortly after symptoms appear. Symptoms of Phytophthora blight on pepper may be confused with southern blight, which also presents rapid wilting and a dark lesion as the soil line. Southern blight is distinguished by a dense, white fungal mat on the stem at the soil line – and often on the surrounding soil – containing small, hard, tan, round objects called sclerotia (Fig. 3). Both diseases may occur at the same time, and it is important to distinguish them, as southern blight is managed differently.



**Figure 1.** Bell pepper showing wilt associated with *Phytophthora* crown rot.



**Figure 2.** Bell pepper showing typical symptoms of *Phytophthora* fruit rot.



**Figure 3.** Pepper stem showing typical symptoms of southern blight, which may be confused with *Phytophthora* blight. Note the dense, white fungal mat and small, tan, circular sclerotia that would be absent in *Phytophthora* blight.

## Cucurbits

Symptoms on cucurbits can show up on all plant parts including roots, stems, leaves and fruit (Figs. 4-7). Crown rot is first observed as rapid plant wilting (Fig. 4). Healthy roots are bright white in color, whereas infected roots often turn brown, which is considered the root-rot phase. Brown, water-soaked lesions may be observed at the soil line. Leaf lesions appear as dark, water-soaked lesions and are usually the result of soil splashing (Fig. 6). Fruit lesions appear as soft, circular, water-soaked spots that can expand to cover the majority of the fruit surface. Lesions often develop where the fruit contacts the soil, but fruit may also become infected anywhere through water-splashed spores or systemically through the stem. As the disease progresses, white powdery mold may be observed on fruit lesions and is easily visible to the naked eye (Fig. 7).



**Figure 4.** Squash plants wilting due to early stage *Phytophthora* crown rot.



**Figure 5.** Squash plants collapsed due to advanced *Phytophthora* crown rot.



**Figure 6.** Squash leaf showing a typical *Phytophthora* blight lesion.



**Figure 7.** *Phytophthora* fruit rot on pumpkin. Note the characteristic white powdery mold.

## Management

### Prevention

Avoid introducing the disease into production fields. Common routes of introduction include movement of soil on shared farm equipment or on workers' boots, dispersal of spores in flood waters or surface irrigation, and movement of infected plant tissue. Thoroughly clean soil off farm equipment and workers' boots before moving between fields. A pressure washer is recommended for farm equipment to ensure all soil is removed. Livestock and wildlife are also capable of moving the organism. Avoid low-lying areas that are prone to flooding. Be aware of potential sources of contamination in surface irrigation water, bearing in mind that contamination may occur upstream at another location. Place cull piles away from noninfested fields and surface irrigation sources. If "pick-your-own" pumpkins are brought onto a farm, avoid placing in or near any vegetable production fields and inspect the pumpkins for symptoms of Phytophthora blight.

### Crop rotation

Rotate away from susceptible hosts for at least three to five years. Nonhost crops include corn, wheat, soybean, grasses, broccoli, cabbage, cauliflower, kale, kohlrabi, mustard, basil, chives, celery, dill and parsley.

### Cultural control

For non-vining crops such as pepper and summer squash, plant into raised beds. For vining crops, raised beds may increase incidence of fruit rot in low-lying areas between rows. Plant into well-drained soil and use plastic or organic mulch, such as straw, to limit fruit contact with soil and reduce soil splashing. Avoid overhead irrigation to reduce soil and water splashing. Manage weeds, as certain weeds are susceptible to Phytophthora blight and may act as a disease reservoir. Some weed hosts include nightshade, velvetleaf, Carolina geranium, purslane and jimsonweed.

### Irrigation water

*P. capsici* is commonly dispersed through surface irrigation water. Irrigating from streams and ponds can introduce the pathogen into clean fields or worsen problems in diseased fields. Use well water,

rather than surface water, wherever possible. If surface water must be used, consider treating with an oxidizing agent, such as chlorine\*\*, or a UV filter to disinfect prior to use.

## Cultivar selection

### Peppers

Several pepper varieties with moderate resistance to Phytophthora blight are available. These varieties should be incorporated into an integrated pest management (IPM) program that includes all other recommendations described in this fact sheet.

Moderately resistant bell pepper varieties:

- Archimedes
- Aristotle
- Declaration
- Paladin
- Revolution
- Vanguard

Moderately resistant lamuyo pepper variety:

- Fabuloso

### Cucurbits

All cucurbits are susceptible to Phytophthora blight.

### Chemical control

Fungicides are best used preventatively to control Phytophthora blight. Under high disease pressure some losses can still be expected in susceptible pepper and cucurbit crops even with an aggressive chemical management program. For this reason, all other aspects of disease management described in this fact sheet should be used as part of an IPM program. Additionally, *P. capsici* is known to readily develop resistance to fungicides, particularly those with the active ingredient mefenoxam, so fungicide rotation is crucial to preserve fungicide efficacy. Always use fungicides in accordance with their labeling. Several fungicides must be used as part of a tank mix so check label for tank mix requirements. Refer to the latest version of the Southeastern US Vegetable Crop Handbook for up-to-date fungicide recommendations, available at: [growingproduce.com/southeasternvegetablecrophandbook](http://growingproduce.com/southeasternvegetablecrophandbook). Additional information on pesticide safety available at the University of Tennessee Pesticide Safety Education Program website: [ag.tennessee.edu/psep](http://ag.tennessee.edu/psep).

## Fungicides recommended for managing Phytophthora blight of peppers and cucurbits

Product	Active ingredient(s)	For pepper, cucurbit, or both	Efficacy	Application method	Max. consecutive applications	Max. applications per season
Orondis Gold 200	oxathiapiprolin	both	good	in furrow, transplant water, drip	2	4
Orondis Opti A	oxathiapiprolin	both	good	foliar	2	6
Orondis Ultra*	oxathiapiprolin + mandipropamid	both	good	foliar	2	4
Revus*	mandipropamid	both	good/fair	foliar	2	4
Zampro	ametoctradin + dimethomorph	both	good/fair	drench, drip, foliar	2	3
Presidio*	fluopicolide	both	good/fair	drip, foliar	1	2
Ridomil Gold + copper	mefenoxam + copper	pepper	good/fair	varies by crop	4	4
Ridomil Gold SL, Ultra Flourish	mefenoxam	both	fair	preplant incorporated, soil spray, drip	1	2
Ranman	cyazofamid	both	fair	transplant water, foliar	3	6
Reason	fenamidone	pepper	fair	foliar	1	3

**\*Check tank mix requirements on product label**

**Precautionary statement:** To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. 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.

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