

## Managing Late Blight in the Organic Tomato Crop

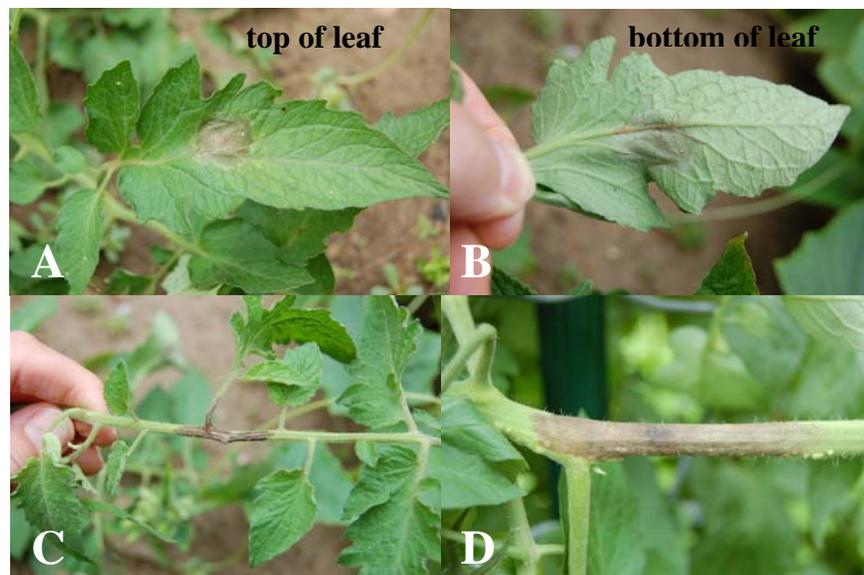
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*Some of the information in this fact sheet was provided by Dr. Ruth Genger, University of Wisconsin Plant Pathology, Dr. Dennis Halterman, University of Wisconsin Plant Pathology, Mr. Adrian Barta, Wisconsin Department of Agriculture, and Dr. Margaret Tuttle McGrath, Cornell University Plant Pathology.*

**Disease Description & Status of Disease in WI:** Late blight is a potentially destructive disease of tomatoes (and potatoes) caused by the fungal-like organism, *Phytophthora infestans*. This pathogen is referred to as a ‘water mold’ since it thrives under wet conditions. All tomato plant parts can become infected by late blight, with leaf lesions beginning as pale green or olive green areas that quickly enlarge to become brown-black, water-soaked, and oily in appearance (Figure 1). Lesions on leaves can also produce pathogen sporulation which looks like white-gray fuzzy growth (Figure 2). Stems can also exhibit dark brown to black lesions with sporulation (Figure 1). Fruit symptoms begin small, but quickly develop into golden to chocolate brown firm lesions or spots (Figure 2). The time from first infection to lesion development and sporulation can be as fast as 7 days, depending upon the weather. In Wisconsin, late blight has not been identified on tomatoes or potatoes since 2002. As of today, August 18, 2009, we have confirmed reports of tomato late blight in 8 counties: Lafayette, Green, Rock, Walworth, Dane, Sauk, Columbia, and Portage. Most reports have come in from home gardeners with fewer than 12 plants in a backyard garden. However, in the past week, we have been getting reports of late blight from growers with larger acreages of tomatoes in the state. To date, we have not found late blight on potatoes in Wisconsin. However, a laboratory test with the late blight pathogen collected from a tomato plant in Dane County on late July 2009 indicated that it can infect potato foliage. We also know that this strain of *Phytophthora infestans* is type US#14 which is known to be aggressive on potato, of the mating type A2, and resistant to the conventional fungicide metalaxyl.



**Figure 1.** Symptoms of late blight on tomato leaves and stems.



**Figure 2.** Symptoms of tomato late blight on tomato leaves and fruit. A. Late blight lesion on tomato leaf. Note brown, water-soaked lesion with white pathogen sporulation (Photo credit: Joe Bollman, UW Extension Columbia Co.). B. Brown, firm, late blight lesions on 'Roma' tomato fruits (Photo credit: Dorothy Krause, Marlborough Park Community Gardens, Dane Co.). C. Close up of brown, firm, late blight lesion on green tomato fruit.



**Figure 3.** Confirmed reports of tomato late blight in Wisconsin. Counties colored red represent counties with confirmed reports of tomato late blight as of August 18, 2009.

**Management:** Once late blight has moved into an area, it is critical that tomato plants be protected from infection. Although there are several fungicides that are approved for organic use to control tomato late blight, only coppers are most effective if applied before initial infection and applied repeatedly. Copper products must be present on new foliage in order to have a protective, disease-slowng effect, so repeat sprays are necessary. Little disease control can be had when copper applications are made only after disease onset. A recent study compared copper and non-copper containing organic-approved fungicides (such as Sonata, Serenade, and Oxidate) for late blight control on potato. Results from replicated trials showed that the best organic-approved fungicide for potato late blight control was copper (Dorn, et al. 2007. Control of late blight in organic potato production: evaluation of copper-free preparations under field, growth chamber, and laboratory conditions. Eur. Journal of Plant Pathology 119:217-240). OMRI-approved copper products are listed below.

Copper product (OMRI approved)	Manufacturer
Britz Copper Sulfur 15-25 Dust	Britz Fertilizers, Inc.
Champ WG	NuFarm Americas, Inc.
COC WP	Albaugh, Inc.
Concern® Copper Soap Fungicide	Woodstream Corp.
CSC Copper Sulfur Dust Fungicide	Martin Operating Partnership, L.P.
Cueva Fungicide Concentrate	W Neudorff GmbH KG
Cueva Fungicide Ready-To-Use	W Neudorff GmbH KG
Lilly Miller® Cueva™ Copper Soap Fungicide Ready-To-Use	Lilly Miller Brands
Nordox® 75 WG	Nordox AS
Nu Cop® 50 WP	Albaugh, Inc.
PHT Copper Sulfur Dust	J.R. Simplot Company
Ready-To-Use Worry Free® Brand Copper Soap Fungicide	Lilly Miller Brands
Basic Copper 53	Albaugh, Inc.
Copper Sulfate Crystals	Chem One, Ltd.
Quimag Quimicos Aguila Copper Sulfate Crystal	Fabrica de Sulfato El Aguila, S.A. de C.V.

## Frequently asked questions

### *Where did this late blight come from?*

Based on symptoms, timing of appearance of symptoms, and spread of this disease in WI, it is likely that inoculum (source of spores for late blight infection) entered the state on air that had moved into WI from other nearby states with reports of late blight on tomato and potato. The late blight pathogen produces a lot of spores on infected plants and spores can move in air up to 40 miles.

### *Where can I find more information on tomato late blight symptoms and management?*

<http://www.extension.org/article/18351>

<http://www.extension.org/article/18361>

<http://www.attra.org/attra-pub/lateblight.html>

<http://www.plantpath.wisc.edu/wivegdis/>

### *How do I destroy and/or dispose of my late blight-infected tomato plants?*

There are several methods of destroying infected plants: 1) pull up plants, bag, and put out for general trash disposal. This method is OK for a few plants; 2) infected plants can be buried but be sure to avoid creating a warm, sheltered environment which would keep the plant tissue and pathogen alive for extended periods of time beneath the surface of the soil (such as a deep compost pile). The goal is to kill the plants: once the plants are dead, the pathogen cannot survive. Do not bury a large pile of plants in one hole, rather, make a shallow trench away from production areas and lay plants and debris in, then cover; 3) plants can be flame-killed with a propane or other torch; and 4) infected plants can be pulled and placed in a small pile covered over with a dark colored plastic tarp and left in the sun. This will create heat in the pile from the sun beating on the plastic tarp and plants will die within a few days.

### *Are tomato fruits from late blight infected tomato plants safe to eat?*

Healthy-appearing fruit from late-blight-infected tomato plants are safe for human consumption. If they have been infected, but aren't yet showing symptoms, they won't keep in storage. There are some concerns about canning infected fruit because bacteria can enter late-blight infected fruit and impact quality. Further information can be found at:

<http://foodsafety.psu.edu/LateBlight.htm>

### *How fast will late blight infected tomato plants die?*

This depends upon how many points of infection the plant received, the cultivar (some cultivars are more susceptible than others), the history of use of protectant fungicides (such as copper), and on the weather. Hot, dry, sunny weather typically holds back late blight; whereas cool, rainy, overcast weather will cause late blight to progress rapidly killing the plant in 7 to 10 days.

### *I have tomato late blight in my garden – will I get it next year if I plant tomatoes again?*

The tomato late blight pathogen, *Phytophthora infestans*, cannot survive outside of infected plant tissue and the current strain of the pathogen cannot produce overwintering spores (oospores) on its own. For this reason, it is critical to kill infected plant material. Infected potato tubers can serve as a source of inoculum in a following year, however, to date, late blight has not been identified on potatoes in WI.