

## Plant Pathology Fact Sheet

# Late Blight of Tomato

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## IMPORTANCE

Late blight is an extremely important and damaging disease of tomatoes and potatoes, and can be found nearly anywhere these crops are produced. Total crop failures are common with this disease. The Irish Potato Famine, which caused the deaths of nearly one million people and the mass immigration of a similar number, was the direct result of devastating outbreaks of late blight that appeared over several years in Ireland and other parts of Europe during the 1840's.

In the United States, significant losses occur each year – mainly in northeastern and north-central states. However, serious outbreaks have been reported in the southeastern U.S. as well. Late blight was a minor problem found sporadically in late summer in Kentucky until 2009, when a major epidemic of late blight swept across much of the southern and northern U.S. Severe losses were reported in Central and Eastern Kentucky after the disease appeared in early July.

The following year, late blight was found at the end of May on tomato transplants being sold by a number of retail garden centers in central and northern Kentucky. Hot and dry



**FIGURE 1.** DARKENED, SOMEWHAT-CIRCULAR, AND WATER-SOAKED LESIONS ON LEAVES ARE TYPICALLY THE FIRST SYMPTOMS OF LATE BLIGHT.

weather prevailed in the summer of 2010, preventing losses on the scale seen in 2009. It is not certain that late blight will become an annual threat to tomatoes in the Commonwealth, but recent history and the potential for total crop loss suggest that growers should learn to recognize and manage this devastating disease.

## SYMPTOMS AND SIGNS

All above-ground parts of the tomato plant are susceptible to late blight. Symptoms often appear first in the upper portions of

affected plants. Initial lesions on foliage are small, somewhat circular, and water-soaked. As these lesions enlarge, their color changes from pale-green to darker green or black (FIGURE 1). Tufts of white fungal growth may be present in lesions on the undersides of leaves when humidity is high (FIGURE 2). As the disease progresses, foliage will blacken and die (FIGURE 3). Petioles and stems, when infected, develop water-soaked, darkened areas that enlarge over time (FIGURE 4). Plant tissue above the infected areas quickly collapses during disease-favorable conditions. Lesions on fruit begin as darkened, oily spots that expand and eventually cover the whole fruit (FIGURE 5). As with the foliage, fungal growth may be present in lesions when humidity is high. Fruits affected by late blight usually succumb to rots caused by secondary invaders, such as fungi and bacteria.

## CAUSE AND DISEASE DEVELOPMENT

Late blight is caused by *Phytophthora infestans*, a fungus-like organism belonging to a group of microorganisms called “oomycetes” or water molds. Other plant pathogens in this group are responsible for diseases like blue mold of tobacco, downy mildew of various crops, and certain root rots. The late blight pathogen needs living tissue to survive and therefore does not generally overwinter in Kentucky. An exception to this is carryover in potato tubers (living tissue) in fields where late blight occurred previously,



FIGURE 2



FIGURE 3



FIGURE 4



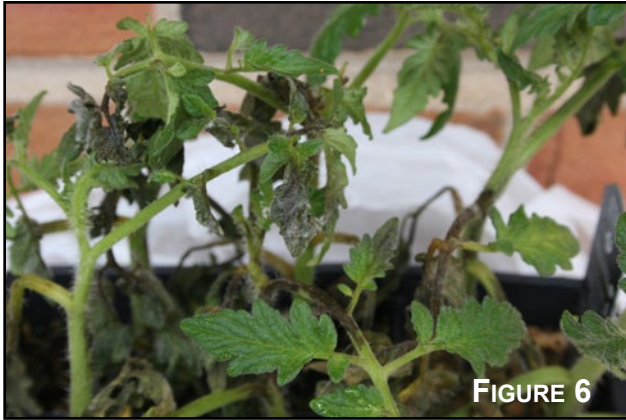
FIGURE 5

**FIGURE 2.** WHITE TUFTS OF SPORULATING PATHOGEN GROWTH FOUND ON THE UNDERSIDE OF A SYMPTOMATIC LEAF.

**FIGURE 3.** NECROSIS AND EXTENSIVE BLIGHTING OF FOLIAGE CAN OCCUR WITHIN A WEEK OF THE FIRST SYMPTOMS OF LATE BLIGHT.

**FIGURE 4.** SYMPTOMS OF LATE BLIGHT ON THE STEMS CAN LEAD TO THE RAPID DEATH OF THE PLANT.

**FIGURE 5.** FRUIT AFFECTED BY LATE BLIGHT DEVELOP LARGE, BROWN LESIONS AND FRUIT TAKES ON A LEATHERY APPEARANCE. EVIDENCE OF PATHOGEN GROWTH IS OFTEN PRESENT.



**FIGURE 6.** LATE BLIGHT ON TOMATO TRANSPLANTS OFTEN APPEARS AS WATER-SOAKED SPOTS ON LEAVES, STEMS, AND PETIOLES.

or on greenhouse-grown tomatoes. These sources can contribute to outbreaks of late blight in the spring, but this is an extremely rare occurrence in Kentucky. The primary sources of the pathogen are wind-borne spores and imported, diseased tomato transplants (FIGURE 6).

Late blight is most aggressive during periods of cool, wet weather. The ideal climate for infection and development is characterized by cool nights (50-59° F) and warm days (70-79° F) along with frequent periods of rain, fog, or heavy dew. Disease development is slowed or stopped at temperatures above 86° F, although the pathogen can remain dormant in infected tissue and re-emerge if temperatures fall back to the disease-favorable range. During favorable conditions, symptoms will appear around 5 days after infection occurs, and spore production will begin on infected tissue 1 to 2 days later. Large numbers of spores are produced and are then spread by wind, water splash, or mechanical contact. So long as the climate favors late blight, entire plantings can be destroyed within a week of the first appearance of symptoms. Movement of spores from infected fields or gardens can threaten tomatoes (and potatoes) being grown in neighboring areas. Wind-borne

spores have been reported to travel as many as 10 miles after being released in infected fields. Because the late blight pathogen reproduces at a rapid rate and generates tremendous numbers of wind-borne spores that spread quickly over large areas, even small levels of disease can turn into large-scale epidemics in a very short time.

## DISEASE MANAGEMENT

Successful management of late blight on tomato requires careful management practices and timely use of fungicides.

1. Although late blight will not carry over on tomato seed, survival on potato tubers is well-documented. Make sure that volunteer potatoes are destroyed quickly after they emerge by disking / harrowing or with herbicides, especially if late blight was seen on the previous year's crop.
2. Grow your own seedlings to avoid accidentally introducing late blight on diseased plants. If purchasing plants, inspect them carefully for symptoms of late blight on foliage and, in particular, on stems.
3. Plant varieties with reduced susceptibility to late blight. Recently introduced slicer varieties such as 'Defiant,' 'Legend,' 'Mountain Magic,' and 'JTO-99197' have all been shown to have reasonably good resistance to late blight. The heirloom varieties 'Tigerella' ('Mr. Stripey') and 'Brandywine' have reduced susceptibility to the disease compared to other heirloom types. Plum / cherry varieties reported to have some level of resistance to late blight include 'Plum Regal,' 'Matt's Wild Cherry,' and 'Sun Gold Cherry.'
4. After transplanting, control solanaceous weeds (nightshades, jimson weed, and groundcherries, for example) in and

around the field or garden. These can become infected and spread disease into nearby tomatoes.

5. Use fungicides during conditions that favor disease or when outbreaks of late blight are reported in your area. Consult University of Kentucky publications ID-36 or ID-128 (see Additional Resources) for a list of chemicals approved for use in home gardens and for commercial producers, both conventional and organic. Preventive fungicide use is the key to success when late blight threatens – the disease is very hard to stop with chemicals once symptoms are seen and disease-favorable conditions prevail.
6. Contact your local Cooperative Extension agent if you suspect late blight on your tomatoes. This will help ensure a correct diagnosis and will also allow the agent to alert others so that they may act quickly.
7. In the early stages of an outbreak, removing symptomatic plants or foliage can help slow the progress of late blight and allow time to protect those plants without symptoms. Plant material should be removed during calm and sunny weather to prevent the release of spores from infected tissue. Discarded foliage and plants can be bagged, buried, or burned. If disease is widespread, and late blight-favorable conditions prevail, it will be difficult to bring this disease under control. In these situations, destruction of the entire planting is advised to help prevent further spread of the disease.

## ADDITIONAL RESOURCES

The University of Kentucky publications listed below are available at County Extension offices, as well as on the Internet.

- Home Vegetable Gardening in Kentucky, ID-128 (2011)  
<http://www.ca.uky.edu/agc/pubs/id/id128/id128.pdf>
- IPM Scouting Guide for Common Pests of Solanaceous Crops in Kentucky, ID-172 (2008)  
<http://www.ca.uky.edu/agc/pubs/id/id172/id172.pdf>
- Management Tips for Disease Control in Commercial Vegetables in Kentucky, PPFS-VG-05 (1994)  
[http://www.ca.uky.edu/agcollege/plantpathology/ext\\_files/PPFShtml/PPFS-VG-5.pdf](http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-VG-5.pdf)
- Recognizing Late Blight on Tomato Seedlings, PPFS-VG-14 (2011)  
[http://www.ca.uky.edu/agcollege/plantpathology/ext\\_files/PPFShtml/PPFS-VG-14.pdf](http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-VG-14.pdf)
- Vegetable Production Guide for Commercial Growers, ID-36  
<http://www.ca.uky.edu/agc/pubs/id/id36/id36.htm>
- Tomato-Potato Smith Late Blight Risk map (Integrated Plant Protection Center at Oregon State University)  
[http://uspest.org/risk/tom\\_pot\\_map](http://uspest.org/risk/tom_pot_map)

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