

# Late Blight

## A Plant Disease That Impacts the Community

### PLANT DISEASE ALERT

Late blight is a community problem that threatens all potato and tomato growers. Everyone needs to do his or her part to prevent and control it.

Late blight is a potentially devastating plant disease that affects potatoes and tomatoes. Other related plants such as petunia and hairy nightshade also are affected. Don't let the name fool you. This plant menace can show up any time during the growing season on a susceptible plant when the right weather conditions and the pathogen are present. The pathogen that causes late blight is windborne and can devastate yields quickly in the garden and commercial fields if left unchecked. As a result, late blight is a community problem that affects everyone.

### Late blight outbreak history

Late blight is caused by several strains of *Phytophthora infestans*, a pathogen in the "water molds" group of organisms. It is the same disease that destroyed potato crops in Ireland, leading to the Irish potato famine in the 1840s. This disease has occurred sporadically in North America for decades. In 2009 and 2010, the disease was found at epidemic levels in the north-central U.S. and parts of Canada, devastating tomatoes and potatoes in gardens and commercial settings.

### Why did late blight reappear?

Several strains of the pathogen occur, and in the past, most strains in the central North American region infected only tomatoes or potatoes. New strains of the pathogen that are able to infect both potatoes and tomatoes have been identified during the recent epidemics. Evidence suggests that the source of some of the new strains was infected tomato seedlings from production facilities in the South that were distributed to big-box retail stores across North America. Widespread cool, wet weather during the 2009 and 2010 growing seasons was particularly conducive to disease development, and the disease progressed rapidly. Many gardeners and small producers were unprepared for the recent epidemics and did not recognize the disease until too late.

### Implications

The combination of several factors, including susceptible hosts (plants that can become in-

fectured with the late blight pathogen), new strains of the pathogen, inoculum buildup from recent epidemics and ideal weather suitable for disease development provide conditions for a "perfect storm" of annual late blight epidemics.

### Weather conditions that promote late blight development

The late blight pathogen requires cool to moderate temperatures and free moisture from dew, rain or overhead sprinklers. Temperatures between about 59 and 80 F allow the disease to progress rapidly, but the pathogen is active at a wide range of temperatures. Wind can carry the pathogen long distances.

### Late blight symptoms

All above-ground plant parts of tomatoes and potatoes are susceptible to late blight. On leaflets, late blight symptoms begin as small, water-soaked lesions that quickly expand to form large gray, pale green or dark brown blotches on leaves, petioles and stems (Figure 1). Under moist conditions, a thin layer of delicate whitish-gray or translucent moldlike growth will form on the undersides of leaves (Figure 1A). Sometimes, a narrow yellow margin forms around the lesion perimeter (Figure 1B). Stem lesions (Figure 1C) and leaf blotches will expand to encompass entire leaves, leaving them brown, shriveled and dead. At this point, foliar symptoms can resemble those associated with frost damage.

On tomato fruit, initial blemishes and blotches appear somewhat greasy and are diffusely brownish or greenish gray (Figure 2). Affected fruits usually retain their normal firmness initially. The blemishes can expand to cover the entire fruit and, through time, the fruit will deteriorate from secondary soft rot organisms. The delicate thin layer of mold growth of the pathogen often is associated with fruit blemishes.

The pathogen also can infect potato tubers. Affected tubers may have dry, reddish, granular lesions beneath the tuber skin (Figure 3). Early tuber symptoms often do not extend deeply into the tuber flesh, and they usually are more visible when a thin layer of the peel is removed. Affected portions can provide an entry point for secondary soft rot organisms that rot the tuber. Potato tubers infected with late blight often decay in storage due to secondary invaders.



Figure 1A. A late blight lesion on a potato leaflet, as seen from the underside of the leaf. Note the thin, delicate white growth of the pathogen on the underside of the leaf along the perimeter of the lesion.



Figure 1B. A late blight-infected potato leaf, as seen from the upper side of the leaf. A distinct yellowish or light green margin sometimes surrounds the blotch.



Figure 1C. A lesion on the stem of a potato plant. This lesion can expand quickly and kill the adjacent leaves.

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**Figure 2. Tomato fruit with a diffuse late blight lesion. Fruits initially are firm; through time, secondary soft rot organisms likely will move in and cause mushy decay.**



**Figure 3. Late blight-infected potato tuber. Initially, tuber infections are hard to see unless the skin is peeled away slightly to reveal the reddish-brown, granular underlying infected flesh. As in tomato fruit, the tubers may be firm initially, but through time, secondary soft rot pathogens likely will move in and decay the tuber.**

## Minimize the risk of late blight

No late blight-resistant potato varieties are available. Several varieties of tomatoes with late blight resistance are available through seed catalogs. However, as new strains of the late blight pathogen emerge, resistance levels in these tomato varieties may vary. As a result, growers should rely on other actions to minimize the late blight risk.

The following strategies do not guarantee disease prevention, but they may help minimize the risk of introducing late blight into the planting, slow the development of late blight and reduce the risk of producing infective parts of the pathogen that could threaten other small and large plantings.

- **Start with healthy tubers and plants.** Use certified potato seed tubers. Check them visually to make sure they are healthy before planting them. Start tomato and petunia plants from seed or select healthy seedlings from a local producer. Inspect tomato plants carefully, and do not purchase them if late blight symptoms are present.

- **Improve growing conditions.** Keep foliage as dry as possible. Avoid watering with overhead sprinklers because the resulting water splash maintains leaf wetness and can move the pathogen from infected to healthy plants. To allow foliage to dry more quickly, avoid planting densely to help improve airflow between plants. Stake tomatoes to increase air movement around leaves and fruit. Mulch with plastic or organic mulch such as straw or wood chips.

- **Remove and destroy affected plants and weeds.** In the spring before planting, destroy any potato tubers, tomatoes and volunteer weed hosts such as hairy nightshade that may have survived the winter. Vigilantly monitor for disease symptoms in the garden, starting early in the season. For small plantings, immediately remove and destroy plants and weeds (nightshade) with symptoms by sealing them in plastic bags and throwing them away. For larger

plantings, destroying symptomatic plants using other methods such as plowing or torching may be warranted. These actions are important not only to protect healthy plants in the garden but also to help minimize the chances that the pathogen will spread to neighboring gardens or commercial potato fields. At the end of the season, clean the planting area by completely removing and destroying all host plant parts. Composting lateblight-infested plant debris in the fall is not recommended.

- **Protect plants early with fungicides.** If late blight is known to be in the area, early action with protectant fungicide applications is critical to minimize the potential of the pathogen to completely destroy the garden harvest and spread to other areas. Applications should be made before the disease symptoms appear in the planting and at least once a week as long as the weather is cool and wet.

For gardeners, fungicides with the active ingredient chlorothalonil (such as Bravo or Ortho®Max Garden Disease Control) and copper-based compounds (such as Kocide and Bordeaux mixture) are effective against the late blight pathogen, and both types of active ingredients are available to gardeners. Chlorothalonil is more effective than the copper-based compounds, however.

Organic growers have limited options, but some of the copper-based fungicides meet organic standards set by the USDA National Organic Program. Organic growers are urged to check the Organic Materials Review Institute (OMRI) database ([www.omri.org](http://www.omri.org)) for accepted copper-based fungicides. Because copper is not highly effective for late blight control, ensuring that applications are made before disease symptoms appear is very important.

Not all fungicides are effective against the late blight pathogen. Only use a product that is registered for use against late blight on edible crops. **Read, understand and follow the fungicide label instructions before use.**

*This Plant Disease Alert is brought to you by the following:*

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