

Late Blight of Potato and Tomato

Symptoms

Late blight (LB) is a very destructive disease of tomatoes and potatoes. The first symptoms are evident in leaves and stems as dark water-soaked spots. On leaves, lesions start at the tip or edge of the laminae. Lesions expand rapidly, and under humid conditions the pathogen sporulates (white growth) on the lower side of the leaf, at the edge of the lesion, producing innumerable sporangia that are spread by wind and water (Fig. 1).



Figure 1. LB lesion on tomato leaf, top side (left) and lower side of the leaf, with abundant sporulation at the edge of the lesion (right). Photo: Diana Schultz.

On the tuber the disease is evident on the skin as slightly sunken reddish brown areas that continue through the flesh of the tuber as a dry rot. In tomato fruits the LB pathogen produces dark brown lesions that start on the top or sides of the fruit, and may extend to the entire fruit. These lesions sporulate under humid conditions (Fig 2).



Figure 2. Tomato fruit with LB and abundant sporulation. Photo: Diana Schultz.

Tuber and fruit lesions can progress post-harvest under favorable conditions. LB fruit and tuber lesions are an open door to infection by other pathogens, frequently bacteria, resulting in complete loss to soft rot.

Causal Agent

LB of potatoes and tomatoes is caused by the oomycete *Phytophthora infestans*, a fungal like organism. *P. infestans* produces sporangia. In cool, wet conditions the sporangia form zoospores, whereas under warmer conditions, the sporangia germinate directly as spores do. Oospores, the sexual spores, are formed when two types of mycelia (mating types A1 and A2) come in contact. Oospores are usually not found in the field.

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Figure 3. Foliar symptoms of LB on potato. Photo: D. Schultz-R. French

Besides potatoes and tomatoes, *P. infestans* affects a few related plants including hairy nightshade, bittersweet and Petunia.

Inoculum Source and conditions

Phytophthora infestans survives in infected tubers (used as seed, in cull piles, or left on the ground) or in live plant tissue (volunteer plants, weeds, transplants). The pathogen can survive in soil or plant refuse only as oospores. Under favorable conditions (high humidity and temperatures of 60°-80°F) sporangia are produced on the infected tissue, and then dispersed by rain splash and wind. In presence of free standing water (dew, rainfall, fog, irrigation), and depending on temperature, sporangia either germinate indirectly (cool weather) or directly (warmer conditions). Germ tubes enter the plant tissue and form mycelia. Symptoms become visible three to four days after infection. Rain, fog or heavy dew, together with extended cloud coverage, and cool nights (50-

60°F) and days (around 70°F), are ideal conditions for disease development. Under these conditions, entire stems, even the whole plant can be killed in a matter of days. Under favorable conditions, exposed tomato fruits and potato tubers are infected by spores washed from the foliage by rain or irrigation, or at harvest. Under dry conditions, lesions dry, and the infection and sporulation stall.

Control

- Eliminate inoculum sources by destroying cull piles (chopping, burying, burning or feeding to livestock) and by removing volunteer hosts and weeds.
- Plant only certified seed potatoes and healthy tomato transplants.
- Rotate to non-host for two to three years.
- Select fields with good water drainage and good air circulation. Hilling is recommended for potato, to control weeds and to protect tubers from LB infection.
- Properly time overhead irrigation to reduce the time that leaves remain wet.
- Scout fields regularly concentrating in areas that may favor disease development (areas with poor aeration, near water or low-lying) or that are difficult to spray (areas near utility poles, trees or corners of the field).
- Apply protectant fungicides (contact fungicides) and follow forecasting predictions if available for your area. Once the disease has been detected in the field, alternating systemic and contact fungicides is the best practice to control LB and at the same time avoid generating resistance.
- Harvest potatoes after the vines are completely dry (naturally or by desiccant herbicide application).
- Store potatoes and tomato fruits in well-ventilated areas under cool conditions to minimize post-harvest loss.

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