Diagnosing Late Blight and Late Blight Look-Alikes in Potatoes

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Accurate diagnosis of plant diseases is essential for economic disease management in agriculture. This is particularly true for potato late blight, caused by *Phytophthora infestans,* because the disease can rapidly increase and quickly cause considerable damage. Prompt and specific control practices are needed to prevent spread. Late blight has distinct plant symptoms when environmental conditions favor rapid disease development; however, symptoms can be confused with those of other diseases when the environment does not favor disease development. Diseases and plant damage caused by environmental factors that have been confused with late blight include blackleg and aerial stem rot (*Erwinia* spp. or *Pectobacterium* spp.), gray mold (*Botrytis cinerea*), early blight (*Alternaria solani*), white mold (*Sclerotinia sclerotiorum*), leaflet tip scorch, stem sun scorch, and frost damage.

When making a diagnosis, observe affected plants over a relatively wide area of the field and look for plants showing a range of disease symptoms. Consider pattern of symptoms on plants and in the field, and rapidity of symptom occurrence. Late blight affects potato leaflets, petioles, and stems. There is usually a progression of symptoms and they will generally be more severe or occur earlier in areas of the field receiving abundant irrigation water or where water collects (center of field, low areas, and wheel tracts). Late blight spreads rapidly, but severe symptoms do not occur "over night." Look for sporulation, which will appear as a white downy mildew growth on the lower surface of affected leaflets and on stems. If none is present, place affected tissues in a humid (RH 100%) container (plastic bag or box containing a moistened paper towel) and incubate at 50 to 68 F for 12 to 48 hr to produce spores.

Frequently it is necessary to take or send samples to an expert for diagnosis. If leaf and stem samples are to be taken or mailed, place them in a plastic bag or container and then seal, but do not add water or a moist paper towel, or expose to heat or the sun. Get the sample to the destination quickly, preferably within 24 hours.

Publications are available containing disease descriptions and photographs of potato diseases and disorders, which are helpful in diagnosing disease problems. A recommended publication is the "*Compendium of Potato Diseases*" from The American Phytopathological Society and it can be ordered by calling 800-328-7560.

Late Blight

Late blight symptoms develop on stems, petioles, leaves, and tubers. Lesions on leaflets are round or semi-circles in shape, brown to purple-black in color, and are often surrounded by a pale, light green to yellow halo. Active late blight infections commonly have a white downy mildew (mycelium and spores) growing mostly on the underside of infected leaflets that can particularly be seen in the morning hours when dew is present or when humidity has been high. If the humidity becomes low, the progress of the disease is checked, and the pale halo becomes less pronounced, and the white downy mildew disappears. Actively growing lesions have a water-soaked appearance and can be gray-green in color, whereas older lesions are usually dried up, brown and brittle. Late blight lesions on leaflets, unlike those of early blight, will grow through leaf veins, hence, the general round or half-circle shape in contrast to the angular-shaped lesions of early blight. Lesions on all plant tissues are not delimited in size and under favorable conditions enlarge rapidly. Stem infections appear as purplish-black lesions, and will produce the white mildew of mycelium and spores. Stem lesions become brittle and stems may easily break.

Early Blight

Early blight first appears on older leaves as oval or angular shaped spots that are dark brown to black in color. A narrow chlorotic zone may appear around the spots and the disease is characterized by close concentric rings within each spot. These spots resemble a target. The sports may coalesce and kill large areas of leaf tissue. Lower senescent leaves are infected first and, with conditions favorable for disease development, the disease may move onto leaves on the upper portion of the plant.

Shape of lesions, presence of concentric rings in lesions, and lack of white downy mildew (mycelium and spores) under mild, humid conditions distinguishes early blight from late blight.

White Mold

Sclerotinia stem rot first appears as water-soaked spots usually at the point where stems attach to branches or on branches or stems in contact with the soil. A white cottony growth of fungus mycelium develops on the lesions, and the infected tissue becomes soft and watery. The fungus may spread rapidly to nearby stems and leaves. Lesions may then expand and girdle the stem, which causes the foliage to wilt. During dry conditions, lesions become dry and will turn beige, tan or bleached white in color and papery in appearance. Hard, irregularly shaped resting bodies of the fungus, called sclerotia, form in and on decaying plant tissues. Sclerotia are generally ¼ to ½ inch in diameter, initially white to cream in color but become black with age, and are frequently found in hollowed-out centers of infected stems. Sclerotia will eventually fall to the ground and enable the fungus to survive until the next growing season.

Sclerotinia stem rot can be distinguished from late blight by the presence of sclerotia and the mycelium is more coarse and dense and appears more like cotton.

Gray Mold

Gray mold appears on damaged and mature leaves and stems low in the crop canopy. Lesions on leaflets are initially tan, often wedge-shaped, and bordered by major veins. Lesions on stems are tan to brown. Under humid conditions, infected flower, leaf, and stem tissues develop a gray to brown fuzzy growth, which consists of spores and spore bearing mycelium.

A distinguishing characteristic from late blight is the gray to brown color, fuzzy appearance of the sporulation.

Blackleg and Aerial stem rot

Symptoms progress from a decaying seed piece and range from small, water-soaked lesions at the base of the stem to extensive lesions extending from the base of the stem into the upper canopy. Affected tissue is soft and water-soaked under humid conditions and becomes shriveled under dry conditions. Color of lesions ranges from black to light brown. The stem pith is often decayed beyond the boundary of the external lesion, and the vascular tissue is commonly discolored well in advance of the lesion.

Aerial stem rot is a soft rot of petioles and mostly aboveground stems not originating from decaying seed pieces. Symptoms first appear as a water-soaked green decay that turns light brown or, infrequently, black.

Distinguishing characteristics from late blight are inky black, water soaked lesions and the absence of white downy mildew.

Leaflet tip burn and Stem sun scorch

The margins and tips of leaflets may become necrotic and turn back to brown on leaves at the top of the canopy when the weather has been warm to hot and windy. This is likely caused by rapid transpiration of water from the leaf tip. Late blight lesions would not be expected only on the tips and margins of leaflets on top of the crop canopy. Pattern of lesions in the canopy and lack of a halo at the margin of lesions and lack of white mildew help distinguish tip burn from late blight.

Potato stems exposed to direct sunlight may scorch and darken. Aged sun scorched stems may appear as "old" late blight stem lesions. Check out angle of exposure in relation to rows and plant foliage, pattern of affected stems in the field, and lack of a gradation of stem lesion age to distinguish from late blight. Furthermore, look for late blight symptoms on leaves and tubers to completely eliminate the possibility of late blight.