Late Blight on Potatoes and Tomatoes

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Cause and Symptoms

Late blight is a fungal disease that can devastate a tomato or potato field within two or three weeks if it is not properly controlled. Few diseases spread as quickly as late blight. Thus, it is in your best interest to understand the life cycle of this disease, recognize its symptoms, and know all of the control measures available. Remember, late blight is historic as it was partially responsible for the Irish famine in the 1840's.

Late blight is caused by the fungus Phytophthora infestans which thrives when cool and wet weather occurs. Specifically, temperatures between 50 and 80°F. are conducive for disease development when combined with moisture conditions such as rain, fog, heavy dews, or relative humidities above 90 percent. Night temperatures in the mid-fifties with daytime temperatures from the mid-fifties to mid-seventies are ideal for this disease. In order for late blight to occur, the fungus must be present. The fungus grows by hyphae (microscopic threads) inside infected plant tissue.

Once the fungus is in a field via diseased tubers, transplants, etc., spores are produced that are disseminated by wind, rain, and irrigation. Temperatures at the upper range of spore (sporangium) production (upper 60° to 80°F.) stimulate direct germination of these spores.

Temperatures in the lower range (50 to 70°F.) stimulate the formation of many swarmspores (zoospores) from within the sporangia; this latter situation obviously increases the potential for disease spread.

Where does the fungus come from? For potatoes, seed pieces can harbor the fungus as can cull piles and unharvested, infected tubers from the previous year. Some studies show that this fungus can live over in the soil, but this has not been demonstrated in Florida. For tomatoes, infected transplants can serve as an original source of inoculum. It had been observed prior to 1998 that seldom did a widespread late blight epidemic occur on tomatoes in the Manatee-Ruskin area unless such was occurring in the Immokalee area and Dade County. Thus, growers in the Manatee-Ruskin area should be aware of the late blight situation further south. Similarly, growers in the Immokalee area should be aware of the late blight situation further south. The epidemics that occurred in the early 1990’s in Florida were initiated by inocula in seed tubers shipped from northern areas of the United States.

Because the fungus, P. infestans, causes late blight on both tomatoes and potatoes, one might assume that late blight on potatoes came from nearby tomatoes or vice versa. This may or may not occur depending on the strain(s) present in the area. Some strains infect only to-
matoes, others infect only potatoes, others in-
fect both tomatoes and potatoes and yet other
strains are weakly parasitic on both crops. Con-
found this with infection of strains dependent
upon genes for resistance in the plant and a con-
fusing situation is created. It is your job, as a
grower, to observe your fields for symptoms.
In the Hastings area a forecasting system,
'Blitecast', issues advisories on late blight for
potato growers.

Symptoms may be found on all plant
parts of tomatoes or potatoes except roots. If
potato seed pieces are infected, the seedling
may have dark brown lesions on the stem which
can girdle and kill the plant and produce spores
which can infect other plants. It is a good idea
to identify the cause of seedling disorders to
be absolutely sure late blight was not the cause.
Upperside leaf symptoms begin as pale green
to brown spots with or without a purplish tinge,
(Figures 1 and 2).

Often a pale green halo is observed
around the spots as they enlarge. On the un-
derside of the leaf, a white mildew ring is
present when leaves are wet (Figure 3). These
spots merge or expand, giving a blight appear-
ance to the plants (Figure 4). Stems turn brown
when infected and later turn black. In dry
weather, infected plant parts appear dry and
shriveled (Figure 5). Potato tubers become in-
fected by spores from leaves and stems. Ini-
tially, a shallow, reddish-brown dry rot occurs
on the skin and progresses unevenly into the
tuber (Figure 6). Tomato fruit, like potato tu-
bbers, will not be infected unless the foliage is
infected first. On tomato fruit, green to brown,
greasy irregular blotches occur, sometimes en-
compassing the entire fruit (Figure 7). Later a
shriveled condition with or without a white fun-
gus growth will appear (Figure 7).

**Control**

Several control measures plus observa-
tion are absolute necessities if late blight is to
be properly controlled. Tomato growers should
purchase disease-free transplants. This is not a
seed-borne disease on tomatoes. Observe your
fields thoroughly each day, especially when
cool and wet weather prevails.

Begin a fungicide spray program at the
first sign of disease, or before, if late blight is
present in your area in other fields. Ask your
county Extension agent about currently recom-

Potato growers should: 1) Purchase cer-
tified, disease-free seed pieces. 2) Prior to plant-
ing, seed should be stored in a dry location. 3)
When preparing seed pieces or while planting,
examine seed pieces for tuber disorders and
destroy suspect seed. Ask your county Exten-
sion agent about getting a diagnosis of seed
piece disorders. Remember, prevention is the
key to success. 4) Destroy cull piles. 5) Destroy
volunteer potato or tomato plants. 6) Plant re-
sistant varieties. Most red-skin varieties are
susceptible. 7) Begin a spray program with fun-
gicides recommended by your county Exten-
sion agent if late blight is in your area (other
fields included) or weather conditions (see
above) are suitable for late blight development.
Forecasting systems, like that in the Hasting's
area, can help in deciding when to spray. 8) Kill
infected foliage prior to harvest to minimize tuber infection. 9) Storage of potatoes, even for one day, should be under dry and ventilated conditions. 10) Discard infected tubers prior to storage or transit.

**Addendum**

The fungus *P. infestans* is capable of producing thick walled oospores which allow the fungus to survive in soil or old infected plant debris. However, the presence of two mating types, A1 and A2, must be present together at the same site for mating to occur. Up through 1992, only the A1 mating type existed in Florida. Beginning in 1993, both mating types have been identified in Florida.

With the potential for the late blight fungus to go through a sexual cycle in Florida, the possibility exists that different strains of the fungus will occur. The new strains may relate to increased virulence, survivability, or other characteristics. Further, the presence of oospores in the soil provides another source of inoculum for future epidemics. Prior to 1993, infected seed pieces were considered as the primary source of inoculum.

![Figure 1. Late blight lesions in tomato leaflet](image1)

![Figure 2. (Left) Late blight lesion in potato leaflet.](image2)

![Figure 3. (Right) Sporulation on underside of potato leaflet.](image3)
Figure 4. Advanced late blight symptoms on potato leaf.

Figure 5. Advanced late blight lesion in tomato stem.

Figure 6. Potato tubers with late blight. (Photo by H. Bissonnette)
Figure 7. Tomato fruit with late blight.