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Potato Late Blight

Identification and Management

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Late blight is a disease that typically causes severe symptoms on flowering plants of the family *Solanaceae*. The pathogen that causes late blight, *Phytophthora infestans*, infects a variety of *Solanum* spp., including eggplant, pepper, nightshades, and petunia. However, it is most infamously known for its destruction of potato, *S. tuberosum*, and tomato, *S. lycopersicum*.

Symptoms

Symptoms of late blight can occur on all parts of a potato plant. Leaf symptoms include circular, necrotic or brown lesions surrounded by collapsed pale or chlorotic (pale green to yellow) tissue. Enlarged, water-soaked or wet and oily-appearing leaf lesions often give rise to sporulation, identifiable by white or gray fuzzy growth. Dark green, brown, or black water-soaked lesions on the stem may also contain sporulation. Symptomatic tubers typically have sunken and firm brown lesions that may extend several centimeters into the tuber. The variability in lesion appearance is often the result of differences in moisture.

Typical late blight lesion on the top of a potato leaf (above). It shows a circular to irregularly shaped brown, papery lesion typical at 7–10 days old in relatively dry weather.

The underside of the leaf (right), which is protected from direct sunlight, shows white, fuzzy, prolific pathogen sporulation in association with the brown lesion.

Disease spread and conditions

Phytophthora infestans is the oomycete, or water mold pathogen, responsible for potato late blight. Water molds are known for their multiple "spore" types, each of which plays a unique role in making disease. The pathogen spreads by movement of its sporangia (the primary "spore" type for longer-distance movement) by air or by splashing within a field or garden.

When moisture is high and there is pooling water on soil surfaces or wetness on leaves, the sporangia can give rise to zoospores, the "spore" type responsible for shorter-distance movement. Zoospores can swim for approximately 2–10 hours and create new infections within fields and gardens.

In Wisconsin and throughout the continental United States, the *P. infestans* pathogen fortunately does not make the sexual, or soilborne, spore known as the *oospore*. This does happen in other countries and creates a long-term challenge to vegetable production.

Moist and moderate temperatures (90–100% humidity and 54–75˚F) promote the production of sporangia (primary "spores"). Sporangia typically infect at 64–75˚F, whereas zoospores are produced and can be infective at 46–64˚F.

Disease cycle

The disease cycle of *P. infestans* is generally asexual here in the United States. The sporangia land on leaf, stem, and other plant tissues and either infect directly or produce zoospores, which then infect the plant under cooler, wetter conditions. Under optimal disease-promoting conditions, infection can occur in as little as 2 hours. After 4–5 days of sufficient moisture and moderate temperatures, sporulation can take place at the site of infection, creating white, fuzzy growth and new sporangia for further dispersal.

Rapid repetition of the asexual cycle causes large-scale late blight epidemics. Because the oospore of this pathogen is not present in the United States, overwintering of the pathogen occurs largely by persistence of infected potato tubers or other plant parts (tomato fruits or stems). The pathogen cannot survive on its own in the environment without survival on some kind of living plant host tissue.

Management

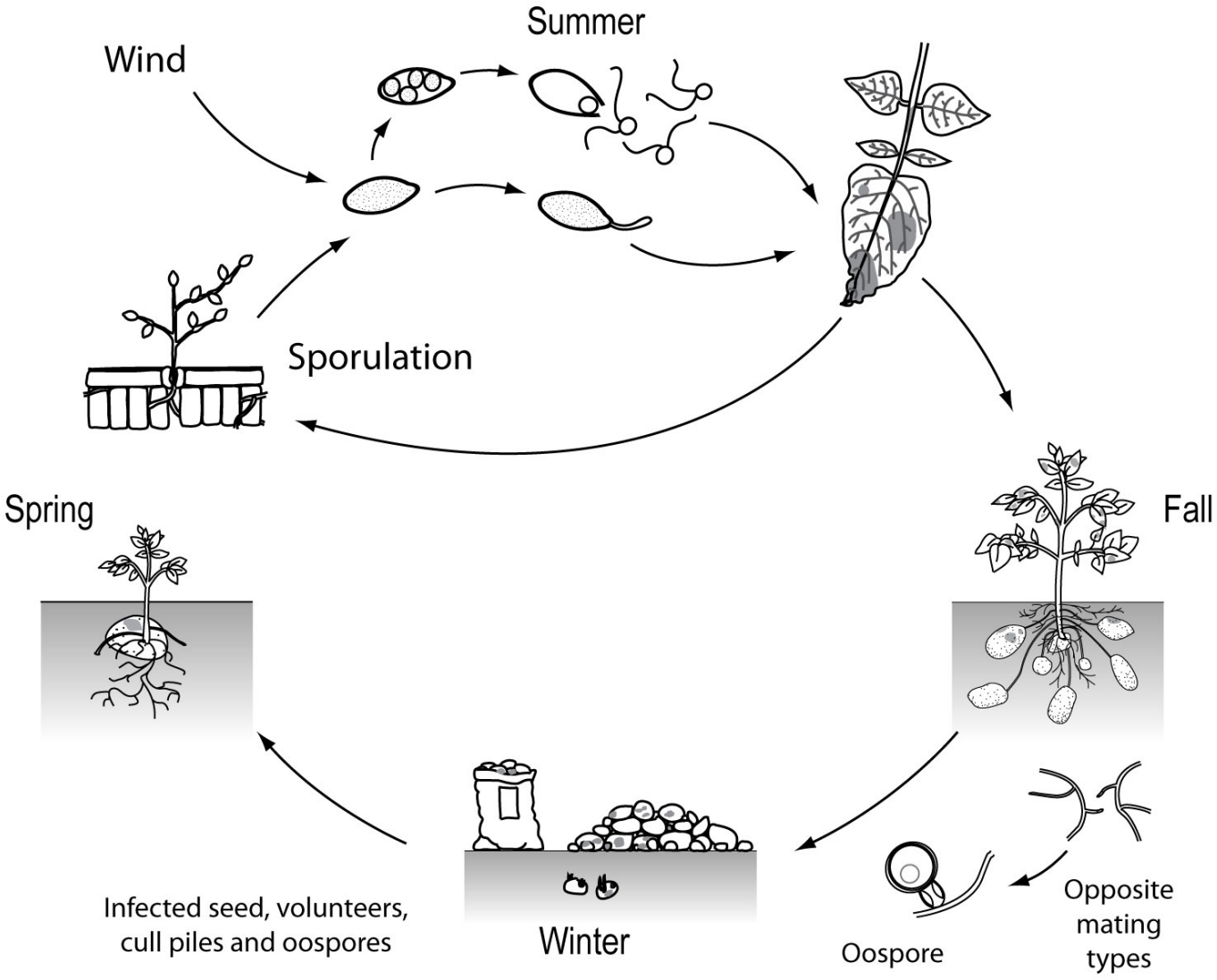
Late blight management strategies aim to limit the presence of initial inoculum (the first wave of sporangia or spores) and prevent the development of secondary inoculum (subsequent waves of spores produced on plants). There are many practices that can help control late blight:

- Plant only healthy seed potato tubers.
- Destroy cull, or waste, potato tubers.
- Destroy volunteers, the unwanted potato or tomato plants that may have grown from the previous year's planting.
- Destroy unmanaged infected plants.
- Space rows to increase airflow and reduce moisture.
- Plant resistant cultivars.
- Apply fungicides to prevent infection.

External potato tuber symptoms of late blight on red- and white-skinned varieties. Note the dark brown, bruised appearance.

Internal potato tuber symptoms of late blight. Note that areas are rust to dark brown in color and remain firm and grainy in texture. When symptoms progress, secondary soft-rotting pathogens often invade.

Potato Late Blight Disease Cycle



Many fungicides are available for commercial conventional and organic production. For Wisconsin-specific fungicide information, refer to *Commercial Vegetable Production in Wisconsin* (A3422), a guide available through the UW-Extension Learning Store website (**learningstore.uwex.edu**). Or, for home garden fungicide recommendations, see *Home Vegetable Garden Fungicides* (XHT1211), a fact sheet available through the UW-Extension Plant Disease Diagnostic Clinic website (**labs.russell.wisc.edu/pddc/**).

For more information

USAblight
www.usablight.org
This national late blight reporting and information website also provides useful statewide disease occurrence, management information, and alerts.

University of Wisconsin Vegetable Pathology website
www.plantpath.wisc.edu/wivegdis/

Commercial Vegetable Production in Wisconsin (A3422)
learningstore.uwex.edu

Your local Extension office
In Wisconsin:
yourcountyextensionoffice.org
Outside of Wisconsin:
www.csrees.usda.gov/Extension

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