

## Late Blight of Potato and Tomato

### *Phytophthora infestans*

EPMS-001

#### Quick Facts

- *Phytophthora infestans* is the fungus-like organism that causes Late Blight.
- Late blight infects both potato and tomato.
- No completely resistant plants are available for Late Blight.
- Many *P. infestans* isolates are resistant to metalaxyl.
- *P. infestans* infects leaves, stems, tubers and fruits.
- *P. infestans* spores are transmitted via seed pieces, wind currents, rain and irrigation.

exotic pest capable of severely impacting potato and tomato production throughout Utah. Many states affected by widespread incidence of Late Blight have applied for and received Section 18 approval by the EPA for chemicals that are efficacious against *P. infestans*. Since Utah has been free of Late Blight prior to the onset of metalaxyl resistance, we are unable to obtain a Section 18 and, therefore, are left with fungicide alternatives that are less efficacious against Late Blight. In addition to a direct crop loss resulting from a Late Blight epidemic, Utah potato growers would be unable to market seed pieces as being Late Blight free.



Photograph Courtesy: Sherman V. Thomson  
**Figure 1.** Foliar lesions (left 3 leaves) and stem lesion (right) caused by *P. infestans*.



Photograph Courtesy: Sherman V. Thomson  
**Figure 2.** Foliar lesion with sporangia along the margin. Sporangia and Oogonia may appear as a white mold at lesion margins during periods of high humidity.

Late blight, caused by the fungus-like microorganism *Phytophthora infestans*. It became infamous 150 years ago as the cause of the Irish Potato Famine. Since this event, the agricultural community has spent billions of dollars on controlling late blight. Throughout the 1990s the Columbia Basin of Washington and Oregon as well as Idaho experienced widespread outbreaks of the disease. These outbreaks were exacerbated by the arrival of other *P. infestans* mating types and resistance buildup to Ridomil (metalaxyl). Fortunately, Utah has not discovered late blight in any of its potato or tomato fields since the early 1990's. Due to this fortune, late blight is considered an

## Symptoms:

Stems and leaves become affected first with water-soaked spots that quickly enlarge and turn brown to black (Figure 1). During periods of high humidity, lesions may have a white mold develop at its edges on the underside of the leaf (Figure 2). The white mold will quickly produce and disperse zoospores resulting in a rapid decline of an infected field.

Tuber infections appear as discolored brown to purple skin lesions followed by a brown tuber rot (Figure 3). Tuber rot mainly occurs during storage.



Figure 3. Tuber lesions, external purplish appearance of a lesion on red skinned potato (right). Internal brown rot commonly found with late blight infected tubers (left).

## Causal Agent:

Many publications and references about *Phytophthora infestans* indicate that it is a fungus; however, it was recently reclassified as a “red algae” in the kingdom chromista due to various factors including the occurrence of a free-living motile stage known as a zoospore. *P. infestans* is characterized by a thick, white hyphal mat with a cottony appearance. This fungus is capable of reproducing both asexually and sexually. Asexual reproductive structures are referred to as sporangia, which contain the zoospores (infective propagule of the fungus). Sexual structures are referred to as oogonia (female) and antheridia (male) and the fertilized structure resulting from exchange

of genetic material is known as an oospore. The oospores are resistant structures and may aid in overwintering and survival under adverse conditions. Zoospores are able to infect other areas by “swimming” in a thin film of water on plant surfaces to susceptible tissue. *P. infestans* has two mating types, A1 and A2, that are now present within the US. When A1 and A2 mating types combine during sexual reproduction, resistance to repeated use of a single chemical can build up rapidly.

## Control Recommendations:

Late Blight control relies on both cultural and chemical strategies. However, since the *P. infestans* is considered a water mold, cultural controls relating to irrigation and moisture management are very important in preventing the disease. Although there are no potato varieties that are highly resistant to Late Blight, table 1 compares the susceptibility of some commonly grown potato varieties.

Table 1. Comparative susceptibility to Late Blight for commonly grown potato varieties.

Russet Burbank	Susceptible
White Rose	Susceptible
Norchip	Very Susceptible
Hilite	Very Susceptible
Russet Norkota	Very Susceptible
Superior	Very Susceptible
Shepody	Very Susceptible
Red LaSoda	Very Susceptible

Information obtained from Pacific Northwest Plant Disease Management Handbook.

## Cultural Controls:

- Remove cull piles from field and storage locations before planting new seed pieces.
- Use only certified disease-free seed pieces.
- Hill plants to keep excess moisture away from tubers.
- Control volunteers.
- Irrigate while weather is dry to reduce extended periods of leaf wetness.
- Dig tubers from infected fields 2 weeks after vine kill.

- Harvest tubers when soil is slightly moist or dry to reduce tuber infections.
- Ventilate stored tubers and avoid free moisture on tubers.

**Chemical Controls:**

Chemical	Rate	Application Timing	Restrictions	Miscellaneous
Acrobat 50WP	Refer to Label	Refer to Label	12-hr REI	Do not mix with metalaxyl or mefenoxam. Do not exceed 32oz/A per season.
Bravo Ultrex	0.7-1.4 lb/A	7-10 day intervals	12-hr REI	7 day PHI
Terranil 6L	0.75-1.5pt/A	7-10 day intervals	48-hr REI	7 day PHI; Do not exceed 16 pts per season.
Bordeaux 8-8-100	100gal/A	7 day intervals	NA	Use freshly prepared mix
C-O-C-S WDG	1.5-4lb/A	7-10 day intervals	24-hr REI	
Kocide DF	1-4 lb/A	7-10 day intervals	24-hr REI	
Champ Formula 2F	0.66-2.66 pt/A	3-5 day intervals	24-hr REI	Start applications when plants are 6" high
Curzate 60DF	3.2 oz/A	Mix with protectant fungicide	12-hr REI	14 day PHI; Do not exceed 7 applications per crop.
Maneb 75 DF	2 lb/A	Refer to label	24-hr REI	14 day PHI; Do not exceed 14.9 lb/A per season.
Pro-Tex	0.75-1.5 qt/A	7 day intervals	48-hr REI	14 day PHI; Do not exceed 6 qts/A per season; Restricted Use Pesticide.
Manzate 200DF	2 lb/A	Refer to label	24-hr REI	14 day PHI; Do not exceed 10.5 lb/A per season.
Dithane DF Rainshield NT	2 lb/A	Refer to label	24-hr REI	14 day PHI; Do not exceed 15 lb/A per season.
Previcure Flex	1.2 pt/A	7-10 day intervals	12-hr REI	14 day PHI; Tank mix with chlorothalonil, maneb, or mancozeb. Do not exceed 6 pts per season.
Polyram 80DF	2 lb/A	Refer to label	24-hr REI	
Quadris Flowable	6.2-15.4 fl oz/A	7-14 day intervals	4-hr REI	14 day PHI; Do not exceed 6 applications or 2.88 qts/A per season. Employ resistance management strategies.
Super Tin 80WP	1.87-3.75 oz/A	Refer to label	48-hr REI	21 day PHI; Do not exceed 15 oz/A per season. Use in combination with chlorothalonil, maneb, mancozeb or Polyram 80DF. Do not graze treated area. Restricted Use Pesticide.
Tatoo C	2.3 pt/A	7-14 day intervals	48-hr REI	14 day PHI; Do not exceed 11.5 pts per season.

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## Questions for Late Blight sample and surveys

### Grower Information

Name:

Address:

Farm Location:

### Crop Information:

Origin of seed pieces:

Plant and Variety:

Source of irrigation water

Irrigation type and frequency:

Soil type:

Have fungicides been applied specifically for Late Blight control: yes/no

If yes, which fungicide was applied:

Has the incidence of disease changed: yes/no

### Miscellaneous:

Pesticides applied:

Fertilizers applied:

Neighboring farms with host plants: yes/no

Are neighboring farms experiencing the same disease: yes/no

Which insect(s) were problematic within the field during this season:

Have control measures been necessary for the insect(s): yes/no