

## Late Blight of Potato

Dr. Khalil I. Al-Mughrabi



Late blight, caused by *Phytophthora infestans*, devastates potato foliage and tubers. The pathogen can survive between growing seasons as mycelium in potato tubers and plant tissues, and on alternative hosts of *Solanaceae* family. *P. infestans* may also overwinter as oospores in soil. Infected tubers used for seed or discarded onto cull piles or infected volunteer potatoes are sources of infection for the new growing season. In addition to potatoes, tomatoes, eggplant, peppers, petunias and other Solanaceous plants sold at garden centers or planted in home gardens are also potential sources of late blight. Though late blight most commonly occurs in cool, wet climates, it can also occur anywhere when irrigation or wet conditions combine with cool temperatures to favor disease development. The late blight pathogen does not require stressed plants to initiate the disease. Under favorable weather and crop conditions, a potato field can be defoliated in two to three weeks, and sometimes in a matter of days, due to late blight.

### Disease Management

Good late blight management practices include disease prevention, sanitation, cultural practices, field monitoring, an effective fungicide spray program and postharvest protection.

#### Sanitation, Cultural Practices and Field Monitoring

1. Plant disease-free seed. Inspect seed potatoes within 24 hours of delivery. Cut a sample of tubers and look for the reddish-brown dry rot characteristic of late blight tuber rot.
2. Test your seed lots for late blight before planting. When purchasing seed, it is recommended to have them tested for the absence of blighted seed by an authorized provincial service in your region.
3. Grade seed potatoes after being cut to remove any late blight infected tubers. Infected tubers can be a potential source of early infections in the field.
4. Frequently disinfect seed cutting equipment.
5. Immediately after cutting, treat seed with a recommended seed piece fungicide.

6. Bury cull piles before crop emergence. Infected tubers in cull and rock dump piles are a major source of infection for the new crop. Buried tubers may germinate and grow. Rogue or treat volunteer plants with an herbicide. Slivers and pieces of potato remaining from cutting operations should also be buried.
7. Volunteer potato plants can be a source of infection. Any volunteer potato plants in a field should be removed by rouging or using herbicides. For non-seed fields where late blight is found, consider applying a sprout inhibitor to control volunteers in the following year.
8. Controlling late blight susceptible Solanaceae weeds such as hairy nightshade, in potato as well as in non-potato crops is an important measure of controlling late blight incidence in potato.
9. Immediately report any suspected incidence of late blight to your extension specialist or to the nearest agricultural center. If late blight is identified, rogues and other workers should wear pants and boots which can be disinfected (e.g., Bleach solution diluted 1:9 with water; or other disinfectants) between different fields. Equipment should also be washed and disinfected before entering adjoining fields.
10. Construction of a deep hill may help restrict spores from washing down through the soil and infecting the developing tubers.
11. Weather conditions favorable for late blight development can be determined using late blight forecasting models that use relative humidity, rainfall, and temperature data. The weather data is converted into units called "severity values" for the purpose of predicting late blight outbreaks. Consult your extension specialist for information on late blight forecasts for your area.
12. Monitor your crop. Scout fields with special attention to low spots and along treed edges where moisture persists after rains or dews. Have a good look at stems and leaves for late blight symptoms. Stem infections will be diminished during dry periods but will be re-activated in humid weather.
13. When late blight is first identified, top kill or rogue an area twice the size of the infected area. All rogued infected plants should be put in plastic bags and then taken out of the field.
14. Rolling or rotobating a crop before top killing would expose the soil and lower canopy to drying. Also rolling seals cracks in the soil and may reduce tuber infections.
15. Top kill at least 2 weeks prior to harvest to allow time for infected tubers to rot and to promote tuber maturity and thicker skins at harvest. Vines should be completely dead at harvest.
16. Late blight causing spores survive longer in wet soils. Harvest when the soil surface is dry or windrow the potatoes and allow the surface of tubers to dry before harvest.
17. Dig potential problem areas such as sprayer rows and low areas last and store these potatoes where they can be easily moved out in case of a problem.
18. Wet or bruised tubers are more likely to get infected with late blight. Skinned or cut and bruised areas are direct entry points for late blight and other diseases. However, wound is not always a requirement to cause an infection on wet tubers.
19. Grade out any obviously diseased potatoes before they are put into storage.
20. If late blight is seen on the foliage, there will also likely be tuber infections. Immediately following harvest, these tubers should be ventilated with a high volume of air at low humidity until the surface of the potatoes is dry. This may lead to higher shrinkage than normal, but losses due to storage rots will be reduced.
21. Potato lots with 5% or more late blight infections (by weight) should be stored in the front of the storage or in separate bins, so they can be easily removed in a high-risk situation.
22. Postharvest treatment with fungicides containing phosphorous acid will protect healthy tubers from pink rot or late blight infections occurring at harvest. Ensure even coverage with the fungicide. Follow label rate and recommendations.

## Fungicide Spray Program

A preventive spray program is always recommended. Effective control by fungicides requires good coverage of the foliage, proper rates, and timing of applications. Generally, fungicides are most effective in the early stages of infections before symptoms appear. However, no fungicide can cure an established infection. Fungicides against late blight are essentially protectants and not particularly persistent. They must be used to protect plants as prophylactic sprays in routine programmes, in an overall strategy designed to prevent the disease from infecting the crop.

**Contact** fungicides retain on the surface of the plant where they are applied and only protect the plant where the spray is deposited or been subsequently re-distributed by moisture. Contact fungicides are not taken into the plant and therefore are vulnerable to erosion by wind, rain, and degradation by sunlight. They do not protect new plant growth formed after the spray has been applied. These fungicides have no effect against already established late blight infections.

**Translaminar** fungicides are absorbed by the leaves and show limited redistribution from upper sprayed surface to lower unsprayed surface. They are generally more rainfast than contact fungicides, but do not move within the plant to protect the new growth.

**Systemic** fungicides are absorbed into plant tissue and may offer some after-infection activity. Very few fungicides are *truly systemic* (i.e., move freely throughout the plant); however, some are *upwardly systemic* (i.e., move only upward in the plant through xylem tissue), and some are *locally systemic* (i.e., move into treated leaves and redistribute to some degree within the treated area of the plant).

**In a preventive program, the first 3 fungicidal sprays are the most important sprays of the entire season**

1. In high-risk situations such as in favorable weather conditions posing high late blight risk, begin spraying at 80% emergence using a fungicide at the labeled rate.
2. Let the spray booms fill and run for a minute at the edge of the field before starting to spray the crop.
3. Start spraying in the opposite direction each time to provide better overall coverage. This is especially true for a variety such as Shepody that has cupped leaves and it is difficult to get even coverage over the whole leaf.
4. For ground application, the spray volume should be at least 233 L/ha (52 gal/ha or 21 gal/acre) applied at 690 kPa (100 psi). Select nozzles that produce a droplet spectrum between medium and fine.
5. If fungicides are intended to be applied by air, fields should be planted in such a way to allow unobstructed aerial access to the entire field. Most fungicides are registered at a minimum water volume of 5 gal/acre by air – consult product label. Avoid planting potatoes under or closer to overhead lines and immediately next to shelterbelts. Poor fungicide coverage in just a small area of the field poses a high risk for late blight to infect.
6. When determining the fungicide spray intervals, consider the rate of plant growth, weather conditions, and late blight status in your area. Consider shortening the spray interval during active growth of the plants and if 20-25 mm or more of rain occurs in 24 hours.
7. Fungicide application should continue after top killing until the plants are completely dead.
8. If a late blight infected area is to be top killed, first spray the healthy area of the field with a fungicide with sporocidal action and similarly spray the infected area afterward. Following fungicide application, top kill the infected area.
9. Samples suspected of late blight should be forwarded for analysis since strain characteristics such as sensitivity to pesticides, aggressiveness, and host preference can impact control strategies.