

August 2019 Idaho outbreak of potato late blight – further information and recommendations

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Introduction

Late blight disease has been found in six fields in southwest Minidoka County near the town of Paul. The disease was first observed on Monday 19th August. Late blight sporulation was observed on diseased tissue and the material was confirmed to be *Phytophthora infestans* through both species-specific real-time PCR and LAMP. A sample from one affected field was genotyped by Sandesh Dangi (University of Idaho, Aberdeen) and determined to be the US23 genotype.

Although, weather conditions do not appear favorable for pathogen spread, extensive infection was observed in some of the fields. The Idaho Spore Trapping Network detected spores of *Phytophthora infestans* in the area over the last two weeks. Spores were detected at Acequia on the 9th of August and again on the 12th and 14th. Spores were also detected at the Rupert spore trap on the 16th (the level of spore detected were 5 times higher than that detected at Acequia). However, no further detections of *P. infestans* were found in both Burkard and Sporenado spore traps throughout the rest of the network. This could suggest that infection is likely focused around Paul. Although, present weather conditions do not appear conducive for the disease, periods of high humidity such as those caused by thunderstorms could increase the risk of spread. Since spores have been detected at two traps within about 15 miles of the affected area (Figure 1), growers in that area should be actively scouting and have an appropriate spray program to protect themselves from late blight. A spore trap has now also been deployed directly within the affected area to further monitor spore levels.

Growers in Madison county area should also remain on alert and actively scout for the disease. A positive detection was observed in the trap at Rexburg on the 31st of July. However, the trap was only actually sampling 4 from the last 14 days due to a malfunction. Although, a number of leaf samples from the area have been screened by the Idaho Falls and Parma labs with no *P. infestans* detected so far.

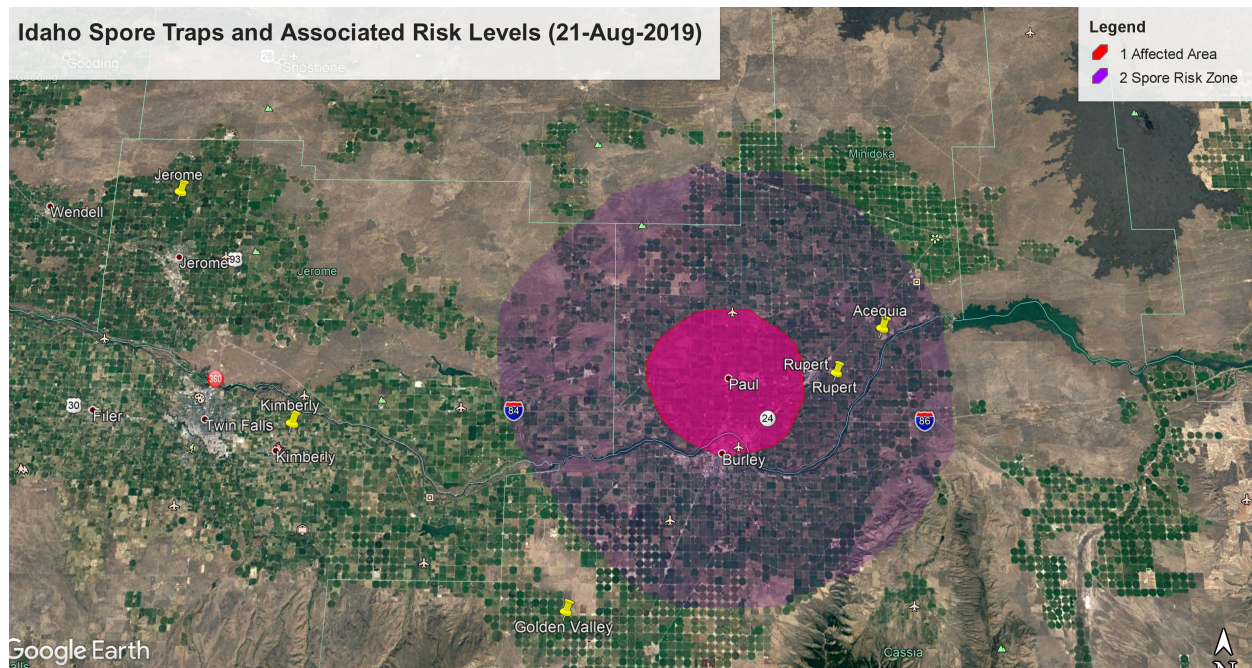


Figure 1. Red zone indicates the approximate affected area. The purple zone indicates the likely area where *Phytophthora infestans* spores are present based on the interpolation between the negative Golden Valley trap and positive trap detections at Rupert and Acequia.

Disease Biology

Sporulation in this pathogen is favored by wet weather with moderate temperatures (60 to 80°F), high humidity and frequent rainfall. Under such conditions, the disease can spread extremely rapidly and has the potential to completely defoliate fields within three weeks of the first visible infections if no control measures are taken. In addition to attacking foliage, *P. infestans* can infect tubers at any stage of development before or after harvest and rot of tubers often occurs in storage following tuber infections.

Tubers may become infected if spores produced on the foliage are washed down into the soil by rain or irrigation water. Water-borne spores appear to follow stems and stolons in a water film into the soil, reach tubers, and cause infection. Tubers near the soil surface are thus more likely to be infected.

Sporangia of *Phytophthora infestans* may be spread from infected plants in one field to healthy plants in surrounding fields by wind, splashed rain, mechanical transport and animals thereby continuing the disease cycle. Many reproductive cycles are possible within a season, this accounts for the rapid increase in disease once it becomes established in a field.

Symptoms

The first symptoms of late blight in the field are small, light to dark green, circular to irregularly shaped water-soaked lesions. These lesions usually first appear on the lower

leaves where the microclimate is more humid. However, they may occur on upper leaves if weather conditions are favorable and the pathogen has been carried into the field by air currents. Lesions often begin to develop on the compound leaf near the point of attachment to the petiole (which is often cupped) or edges, where dew is retained longest. During cool, moist weather, lesions expand rapidly into large, dark brown or black spots, often appearing greasy. Lesions are not limited by leaf veins, and if formed at leaf tips or edges, they can cause young expanding leaves to be misshapen. As new infections occur, and existing lesions coalesce, entire leaves may become blighted and killed within a few days. On stems, lesions are often initiated at the point of attachment to the stem and leaves become detached shortly after infection. The lesions continue to develop along the length of the stem and even in hot dry weather can remain active.

In the early morning or during cool damp weather, a white velvety growth may be seen on the underside of infected leaves. This white velvety growth distinguishes late blight from several other foliar diseases of potato. A pale green to yellow border is sometimes present around lesions.

Late blight infection of tubers is characterized by irregularly shaped, slightly depressed brown to purplish areas on the skin. These symptoms may be less obvious on russet and red-skinned cultivars. A tan to reddish-brown, dry, granular rot is found under the skin in the discolored area, extending into the tuber usually less than half an inch. The extent of rotting in a tuber depends on the susceptibility of the cultivar, temperature, and length of time after the initial infection. The margin of diseased tissue is not distinct and is marked by brown finger-like extensions into the healthy tissue of the tuber. In time, the entire tuber becomes blighted and discolored. Late blight rot of tubers is often accompanied by soft rot.

Tuber symptoms



Foliar symptoms



Diagnosis

Samples with suspicious lesions can be submitted to the following individuals who are equipped with test kits for *Phytophthora* diagnosis:-

Margaret Moll, Idaho Falls Research and Extension Center, 208-529-8376,
mmoll@uidaho.edu

Kaia Duellman, Idaho Falls Research and Extension Center, 208-529-8376,
kduellman@uidaho.edu

Katie Fairchild, Aberdeen Research and Extension Center, 208-397-4181,
katief@uidaho.edu

Jason Thomas, University of Idaho Extension Minidoka County, 208-436-7184,
jasont@uidaho.edu

Jeff Miller, Miller Research, 208-431-4420, jeff@millerresearch.com

Lynn Woodell, Kimberly Research and Extension Center, 208-423-6626,
lwoodell@uidaho.edu

Brad Stokes, University of Idaho Extension Elmore County, 208-587-2136,
bstokes@uidaho.edu

James Woodhall, Parma Research and Extension Center, 208-970-9667,
jwoodhall@uidaho.edu

Phytophthora test kits can also be purchased directly from the following organizations in Idaho:

Parma Research and Extension Center, 208-970-9667, jwoodhall@uidaho.edu

Potadaho Seed Services, 208-440-3793, potadaho@gmail.com

In addition, the diagnostic lab at Parma Research and Extension Center offers a rapid screen for the main foliar pathogens of potato using real-time PCR. This tests for *Phytophthora infestans*, *Alternaria solani*, *Alternaria alternata* and *Botrytis cinerea*.

Any material that has been confirmed to be *P. infestans* can be sent to Sandesh Dangi at Aberdeen Research and Extension center for genotyping and strain determination. 208-397-4181, sdangi@uidaho.edu.

Recommendations

Effective management of late blight requires the implementation of an integrated disease management approach. This includes strict sanitation practices (e.g. management of cull piles), good irrigation management, cultural practices and the proper timing and application of effective fungicides. All these practices together can reduce the chances of a late blight outbreak. Cultural practices are the first line of defense against late blight. Field scouting should be a vital component of a grower's IPM program. Scouting allows growers to make informed disease and pest management decisions. When scouting for late blight pay particular attention to areas where moisture can accumulate such as low-lying ground and the center of the pivot. Scout any volunteers and cull piles should they also be present in the area.

Control of late blight with fungicides is most effective when applied to foliage before infection occurs or when the disease is in its very earliest stages of development and no symptoms are visible. In the irrigated fields of southern Idaho, late blight can be very difficult to manage once infections become established as the humid microclimate within the canopy favors further disease development after irrigation.

There are a wide range of fungicides labeled for use against potato late blight. Each fungicide is different and will have specific conditions for use listed on the label with additional details regarding application rates, re-entry intervals and total product amounts that can be applied in a season. Some may even include information on how to minimize the risk of fungicide resistance developing. Fungicides that are effective for the control of late blight tend to have one of three modes of action: germination inhibition (they prevent germination of spores and thus plant infection), inhibiting mycelial growth (they block pathogen colonization of the plant cells), anti-sporulation activity (they prevent the pathogen from sporulating and thus limit spread of the disease).

Recommended programs for late blight control are not straightforward. The product(s) of choice will depend on whether the crop is at low risk, high risk or already has some disease and from where the disease has developed. The appropriate placement of translaminar and other systemic products in a fungicide spray program should be determined by the mode of action of the product in relation to the host and disease development. However, all products are best used within a preventative protectant program. For example, Orondis Opti, Previcur Flex, Forum, Revus, Curzate, Reason, and Gem (all plus protectant fungicide [EBDC or chlorothalonil]), or Gavel or Tanos may be applied while the canopy is expanding but before senescence. Forum is most effective during canopy expansion and as a post-senescence product, it can be applied up to late crop senescence. Ridomil has been shown to have curative properties and may halt a late blight epidemic if it is applied early enough in an outbreak. Please note that results from fungicide resistance screening of *P. infestans* isolates (US23) collected late in the 2015 growing season in Aberdeen indicated that the US23 strain in Idaho had then developed resistance to mefenoxam, although isolates collected earlier that year in Minidoka county were Ridomil sensitive.

Late in the season it is advisable to avoid excessive irrigation as tubers become infected with late blight when spores wash down through the soil from infected leaves. Late season fertilizer applications should also be limited. Although they will maintain green vines and promote tuber bulking, green and vigorous vines can also be difficult to kill with desiccants and immature tubers are more prone to skinning and therefore infection at harvest. Green vines may also harbor inoculum that can infect tubers during harvest. At the end of the season, petiole nitrate levels should drop down to levels that encourage vine senescence. Vines should also be killed at least two weeks before harvest, especially in blight infected fields. This interval minimizes the chance of tubers getting contaminated with late blight inoculum during harvest and allows previously infected tubers to decompose in the field. If blight is present in the field or in the vicinity of the field at harvest, it may also be beneficial to spray foliage after vine killing with labeled fungicides to kill living late blight spores on the foliage.

Finally, tubers should be dry when placed in storage with the storage air temperature and humidity managed carefully so that the tubers remain dry. Condensation of moisture on tubers, resulting from air circulating through the tubers that is warmer than the temperature of the tubers, will cause any late blight present to form spores and spread within the pile. Potatoes should be held at the lowest temperature possible consistent with their ultimate use (table stock or chipping). Most fungi do not grow much at temperatures of 38°F or lower, but some development will occur at higher temperatures.

Further information

<http://www.idahopotatodiseases.org/lateblight.html>

<https://millerresearch.com/research-library/late-blight/>

<http://pnwpestalert.net/alerts/crops/>

Acknowledgments

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