Potato Progress

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New Twists in the Challenge of Managing Late Blight

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Potato late blight is historically an important plant disease of world wide significance. Not only is the disease devastating and the cause of wide spread suffering encountered in innumerable epidemics, the most famous being the Irish Potato famine in 1845-52, but the disease was also the impetus for the research that lead to the development of modern plant pathology, research that played a major role in disproving the false theory of spontaneous generation, and research that lead to the development of our current germ theory. After 166 years of research, we are still learning more about the fungus-like pathogen, *Phytophthora infestans* and the disease it causes. The potential of economically managing late blight and other diseases increases as we learn more.

Two recent findings are critical to understanding late blight and have added new twists in managing the disease. The first is that the pathogen can latently survive in infected tubers during long-term cold storage (2). In other words, infected tubers can be stored and not show symptoms until sometime following being removed from storage. Spores of *P. infestans* can then be produced on infected plant tissue and initiate epidemics in the spring. Storage temperatures used for seed-tuber storage are ideal for the persistence of latently infected seed tubers. Both latently infected seed tubers and infected tubers that are removed from commercial storages in various stages of rot after late winter and inappropriately placed in cull piles or other improper disposal situations are potential source of initial inoculum (the spores that start an epidemic) after planting. The second finding is that *P. infestans* can be quickly transmitted from infected seed pieces in the field to emerged shoots in the spring and/or early summer when rainy conditions occur (1). Spores (primary inoculum) are then formed on above-ground stems and the epidemic is initiated.

Late blight was present in many potato seed growing regions, primarily in the northern states and Canadian provinces in 2010. This seed is a potential source of initial inoculum and of a late blight epidemic in the Columbia Basin in 2011. The planting of infected seed in the 1990s helped fuel the major epidemics in the region during those years. Limited Section 18 registration in some seed producing states with mandipropamid (Revus), which has activity against *P. infestans*, is expected to reduce secondary infections from infected seed tubers. Seed treatments of cymoxanil (Curzate) and mancozeb will reduce secondary infections during cutting and handling. Late blight on seed being planted in the Columbia Basin in 2011 has been confirmed.

Successful management of potato late blight requires the timely integration of key disease control tactics. These include strict sanitation practices, proper irrigation management, selected cultural practices that help protect the crop, and timely and correctly applied appropriate fungicides.

Potato fields should be monitored thoroughly and often for late blight this season. Management of temperature, relative humidity, air movement, and holding time of tubers are needed to manage tuber late blight in storage. Following is a list of practices that will help manage late blight in the field in the Columbia Basin.

Sanitation

Sanitation practices are aimed at reducing potential sources of infections and include.

1. Plant late blight free seed
2. Eliminate culls and tuber refuse
3. Eliminate volunteer potato plants
4. Treat seed with a fungicide containing mancozeb or cymoxanil (Curzate)
5. Plant seed tubers within 24 hours of cutting
6. Do not plant the area of the first tower nearest the pivot

Epidemics of late blight characteristically arise from a very low level of infected seed tubers or just a few infected volunteer plants. Certified seed lots should be selected from seed areas where late blight did not occur or from farms where the disease was successfully managed. Seed health certificates and visits to the seed farm during the growing season can be helpful in selecting satisfactory seed lots. Volunteers in fields that had late blight the previous year are especially likely to be infected and pose a threat the current year. Care is particularly needed to remove volunteer potatoes in these situations. Spores of the late blight organism can form on infected seed tubers and spread to and infect other seed pieces during cutting and handling. Research at WSU has documented that sporulation can occur on infected seed within 24 hours, because of favorable temperature and humidity within a pile of cut seed tubers. Spread to other seed pieces occurs as air currents disperse spores and as seed pieces are mixed during handling. Fungicide seed treatments that contain mancozeb or Curzate reduce this spread. Planting seed tubers within 24 hours of cutting will also help reduce seed tuber infections. The use of fungicides on potato seed will not negate the importance of using certified seed tubers free of late blight. Remember certified seed does not mean the seed is free of late blight. Soil temperatures should be 55 F and increasing at planting.

Cultural and irrigation practices

Judicious cultural and irrigation practices reduce the rate at which late blight increases and potentially reduce the number of fungicide applications needed for late blight management. Effective practices include:

1. Potatoes should not be grown within the first 80 ft of the pivot center. This is usually the wettest area of the circle and most conducive environment for late blight infection on foliage and tubers, and is often where late blight is initially seen infecting plants in the field. Late blight often begins in fields near the pivot center, and recent research demonstrated that large proportions of infected tubers originate in this area. Rot in storage can move throughout the storage from concentrated sources of infected tubers. Lost production area is about 0.4 acre or 0.3% of a 125-acre field (this is with a 25 ft radius subtracted for pivot turn around road). Yield and tuber quality are often lower in this area. Benefits can be a reduction in number of fungicide applications, better late blight control, and fewer infected tubers going into storage.

2. Irrigate sparingly until just before tuber initiation. This reduces the risk of early season late blight, infection by *Verticillium dahliae* (cause of early die disease), and infection of seed pieces by soft rot bacteria.

3. Avoid pivot overlaps, over-watering and watering during rainy periods or prolonging leaf wetness periods when dew is occurring. Try to irrigate when leaf wetness periods will be less than eight hours. Watering during late afternoon and evening will extend the leaf wetness period. Reduce irrigation at the end of the growing season.

4. Plant seed pieces relatively deep and form an adequate hill.

5. Use good fertilization practices. Massive vine growth creates a microclimate favorable for late blight.

6. Harvest during dry weather. Pulp temperatures should be less than 68 F.

7. Monitor fields for late blight, especially near the center of pivots, along wheel tracks, and low areas in fields. This is especially important in 2011. Contact Dennis Johnson or Phil Hamm if late blight is suspected or found. **Late blight is best managed on a regional basis because spores are quickly and widely disseminated during wet weather. It is important for growers to know the general location of any infected fields.**

Fungicide applications

Timely fungicide applications at effective rates are an important component of managing late blight. Important factors in managing late blight with fungicides include:

1. Consult the late blight information line (**800-984-7400 in WA** and **800-705-3377 in OR**) for timing of initial fungicide applications and intervals between applications. Forecasts for the Columbia Basin use the Columbia Basin Late Blight Forecasting Model, current disease reports and weather forecasts. The model is based on the number of days with rain in April and May. Information is also available at **http://classes.plantpath.wsu.edu/dajohn.**

2. Begin fungicide applications at least seven days prior to late blight exposure. Usually this requires the first application just prior to row closure and continuing on a 7-day interval for at least three weeks.

3. Continue applications at recommended intervals to protect new and old foliage until harvest.

4. Use short application intervals when disease pressure is high. <u>There are not fungicides available with a knock out punch!</u>

5. Ridomil, copper, and tin fungicides are not effective for late blight in commercial fields in the Columbia Basin. Super Tin is effective when mixed with metiram (Polyram) or mancozeb.

6. Foliar applications of phosphorous acid (Phostrol) will reduce late blight tuber rot at harvest and in storage. Two to three applications (8 - 10 pt/acre) at two-week intervals beginning at tuber

initiation effectively reduced late blight tuber rot at Othello in 2001 -2003. Pink rot was also reduced with phosphorous acid applied to foliage.

7. An effective and cost saving program for applying late blight fungicides begins by applying the first fungicide application by air and then rotating with chemigation thereafter. This method has the greatest advantage when disease incidence and pressure require a 7-day application frequency.

8. All fields need protection, even those scheduled for early harvest. Follow product label information when applying fungicides.

Literature Cited

Johnson, D.A. 2010. Transmission of *Phytophthora infestans* from infected potato seed tubers to emerged shoots. Plant Dis. 94:18-23.

Johnson, D.A., and Cummings, T.F. 2009. Latent infection of potato seed tubers by *Phytophthora infestans* during long-term cold storage. Plant Dis. 93:940-946.

Aphid, Beet Leafhopper, and Tuberworm Survey, 2011

The WSPC has for several years funded regional insect population surveys in the Columbia Basin, and 2011 will be the third year that this program is headed by Carrie Wohleb of WSU Extension. A selection of potato fields throughout most of the Columbia Basin production area in Washington is visited weekely, and trap catches of beet leafhopper on yellow cards and tuberworm in Delta traps are recorded. Also, each field is sampled for aphids and other primary insect species. These data are presented in regular e-mail updates and on the Web. To sign up for the e-mail updates, contact Carrie Wohleb at cwohleb@wsu.edu. To access the data online, visit:

http://www.potatoes.com/IPM-Home.cfm
or
http://potatoes.wsu.edu/survey/PotatoInsectSurvey.html.

This year the insect population data display has been improved to include color coding of sites according to pest numbers found that week. Historical data for 2011 will also be available for each site. We expect to have new 2011 data available about the first week of May.

2011 WA Commercial Potato Seed Lot Pick up &Trial Information

Info also available each year at: **www.potatoes.wsu.edu**

Commercial potato seed samples are requested for the 2011 Washington Seed Lot Trial. **Two to three hundred whole (single drop) seed is an acceptable sample size, or 50 lbs of 4 oz single drop seed.**

Requested: 50 lbs of 2-4 oz whole seed, no seed treatments (Seed over 6 oz is not acceptable)

A representative sample is needed. Sampling the first (or last) 300 seed from the truck is not likely to provide a representative sample of the lot. Sample tags may be obtained by calling the Potato Commission at 509-765-8845.

Your assistance with collection and drop off of seed samples is needed. Seed samples may be taken to the WSU Othello Research Unit (509-488-3191); located on Booker Road ¼ mile south from State Highway 26 and about five miles east of Othello. For sample pick up and any questions regarding the seed lot trials please call:

South Basin: Tim Waters (509-545-3511), Mark Pavek (509-335-6861), or Zach Holden (509-335-3452).

North Basin: Carrie Huffman Wohleb (509-754-2011), Mark Pavek (509-335-6861), or Zach Holden (509-335-3452).

In the North Basin, one seed "drop-off" has been established. It is located at Qualls Ag Labs (Mick Qualls, 509-787-4210 ext 16) on the corner of Dodson Road and Road 4; come to front office between 8 am and 5 pm. Please call the numbers below to arrange additional pick up sites. Samples will be picked up at 2:00 pm the day before each planting date (below) to be included. Growers planting in early March should drop their samples off at the Othello Research Center or store the samples and call the numbers below for pick up. For all alternative pick up locations or questions please call Mark Pavek at 509-335-6861 or Zach Holden at 509-335-3452.

PICK UP DATES ARE ONE DAY PRIOR TO THE PLANTING DATES BELOW

The remaining seed lot planting dates for 2011 are:

2nd	April 5
3rd	April 19
4th (Late)	May 3

2011 Potato Field Day - Thursday June 23

This year's virus reading of the seed lots will take place on June 7 and 21.

Predators: Lacewings

See also: http://www.potatoes.com/research.cfm

Photo: Stephen Luk

Snakeflies are close relatives of lacewings, and also predators.

There are two broad categories of lacewings commonly found in crops, the brown lacewings and green lacewings.

Photo: Jim Moore

Photo: Thom Schaefer

Photo: Marshall Dyer

Green lacewing larva (left) and the stalked egg (right).

Photo: John Maxwell

Brown lacewing larva.

Lacewing biology

1. Lacewings (and snakeflies) are generalist predators in many crops, gardens, and natural settings. The larvae feed on softbodied prey by sucking body fluids through the long curved jaws. Adults chew up their small insect prey.
2. Lacewings occur throughout potato producing areas, but are only sometimes abundant in crops.
3. Like other predators, they are sensitive to many insecticides -- care must be taken to preserve them.

Washington State Potato Commission (Phone: 509-765-8845)