Potato

Late Blight

Howard F. Schwartz, David H. Gent, and Gary D. Franc

Identification and Life Cycle

Late blight, caused by the fungus-like organism Phytophthora infestans, is a potentially devastating disease of potato, and may be the most important disease of potato worldwide. The pathogen can infect several Solanaceous plants, including tomato, eggplant, petunia, and hairy nightshade. P. infestans can infect both potato foliage and tubers. Infection begins when sporangia or zoospores form germ tubes and infect foliage when temperatures are cool to moderate (46 to 75ºF) and free moisture is available. Lesions can develop in as little as three days after infection, producing additional sporangia that are responsible for secondary spread of the disease in a field. Tuber infections are thought to occur when sporangia are washed from leaves and contact buried tubers through cracks in the soil. Tuber infections may also occur during harvest and handling. In the High Plains, the pathogen requires a living host to survive. Therefore, cull potatoes, volunteers, and contaminated seed are the primary means of pathogen survival and dissemination. Survival in soil for months or possibly years occurs by oospores in certain areas of the world where P. infestans sexual mating occurs.

Plant Response and Damage

Late blight symptoms first appear on foliage as small, irregularly-shaped necrotic spots. As lesions develop, they become more circular with a necrotic center surrounded by a yellow or pale-green margin. Under humid conditions, white downy mycelium is visible surrounding necrotic lesions. Petioles and stems also become infected and produce water-soaked, dark green to black lesions.

Tuber infections appear initially as reddish brown, dry lesions that can extend an inch or more into tubers. The boundary between healthy and infected tissue is discontinous.

Yield losses of 100% in the field and continuing into storage are not uncommon with susceptible varieties if not regularly treated with fungicides. The disease reduces yield, seed quality, marketability, and processing value.

Management Approaches

Biological Control

No biological control practices have been developed for potato late blight.

Cultural Control

Plant high quality seed free from the late blight pathogen. Varieties less susceptible to late blight can slow epidemics and reduce the need for fungicides, and should be planted if available. Promoting air movement and leaf wetness in the crop canopy can slow secondary disease spread. Since the pathogen must have a living host to survive in the High Plains, destruction of volunteers, alternate hosts, and culls will reduce initial inoculum sources.

Chemical Control

Fungicides are essential to suppressing potato late blight when disease occurs. Seed treated mancozeb-containing fungicides can reduce the contamination of healthy seed pieces during cutting and handling.

Protectant fungicides should be applied prior to infection. Disease forecasting systems have been developed that can improve scouting and fungicide timing in the High Plains, and should be used, if available, to reduce unnecessary sprays. Fungicides banded over seedlings at emergence can reduce secondary spread of disease early in the growing season, if forecasts call for treatments to be applied. Strains of the pathogen resistant to metalaxyl are found in many areas of the High Plains. Fungicides with a different mode of action should be used where resistant strains are common.

Common/Trade Name	Product per Acre	Application Frequency (days)	Remarks
Chlorothalonil			
Agronil 500	1-2 1/8 pt	7-10 days	May be applied through sprinkler irrigation with 10-day application interval.
Agronil 720	0.75- 1.5 pt	7-10 days	May be applied through sprinkler irrigation with 10-day application interval.
Bravo 500	1 - 2 1/8 pt	7-10 days	Maximum of 23 pints per acre; May be applied through sprinkler irrigation with 10 day application interval.
Bravo 720	0.75-1.5 pt	7-10 days	Maximum of 16 pints per acre; May be applied through sprinkler irrigation with 10 day application interval.
Bravo S	3-4 pt	7-10 days	
Bravo Ultrex	0.7 –1.4 lb	7-10 days	Maximum of 14.5 pounds per acre
Bravo Weather Stik	0.75-1.5 pt	7-10 days	Maximum of 16 pints per acre

Bravo Zn	1 –2 1/8 pt	7-10 days	Maximum of 23 pints per acre
Chlorothalonil 4L	1 -2 1/8 pt	7-10 days	
Equus 720	0.75-1.5 pt	5-10 days	Maximum of 15 pints per acre; May be applied through sprinkler irrigation at no more than 10-day interval; other formulations of Equus are available
Quadris Opti	1.6 pt	5-7 days	Maximum of six applications per season; Rotate with fungicides with a different mode of action; 14 day PHI
Ridomil Gold Bravo	2 lb	14 days	Maximum of 3 applications, alternating with a full rate of a protectant fungicide; 14 day PHI
Terranil 6L	0.75-1.5 pt	7-10 days	Maximum of 16 pints per acre; 7 day PHI
Terranil Cu	1.7-3.4 pt	7-10 days	Maximum of 36 pints per acre; 7 day PHI
Terranil S	3-4 pt	7-10 days	
Terranil Zn	1-2 1/8 pt	7-10 days	Maximum of 21 pints per acre; 7 day PHI
Copper Fungicides			
Copper Flowable	2/3-4 pt	3-10 days	Will also suppress Colorado Potato Beetle
C-O-C-S Copodust	25-35 lb	3-10 days	
C-O-C-S WDG	1 ½-4 lb	3-10 days	
C-O-C-S Wettable	1 ½-4 lb	3-10 days	
Kocide 101	1-4 lb	3-10 days	
Kocide 2000	0.75 to 3 lb	3-10 days	
Kocide 4.5 LF	2/3- 2 2/3 pt	3-10 days	Efficacy will be improved by tank mixing with other compatible fungicides registered for use on potatoes.
Kocide DF	1-4 lb	3-10 days	pH of spray solutions should no be below 6.5 as phytotoxicity will result.
KOP-Hydroxide 50	1-4 lb	3-10 days	
Manicure T/O Flowable	1 ½ tsp/gal to cover 200 sq ft of crop	7-10 days	
Nu-Cop 3L	0.5-4 pt	3-10 days	Will also suppress Colorado Potato Beetle
Nu-Cop 50DF	1-4 lb	3-10 days	If late blight is a problem, apply prior to digging or in vine kill

			spray.
Cymoxanil			
Curzate 60DF	3.2 oz	5-7 days	Maximum of 7 applications per season; Must be tank-mixed with another late blight fungicide such as Bravo Weatherstik; 14 day PHI
Dimethomorph			
Acrobat 50WP	4-6.4 oz	5-10 days	Maximum of 32 ounces per season; 4 day PHI
Acrobat MZ	1.25-2.25 lb	5-10	Maximum of 11.25 pounds per season; 14 day PHI
Forum	4-6 oz	5-10 days	Maximum of 30 ounces per acre; minimum of 5 gal of water/acre aerially and 20 gal/acre by ground; rotate with other fungicide chemistry; 4 days PHI
EBDC			
ManKocide	1.5-5 lb	7-10 days	14 PHI
Manex	0.8-1.6 qt	7-10 days	Maximum of 11.2 quarts per acre
Polyram 80 DF	1.5-2 lb		Include a nonionic surfactant to improve performance
Fluazinam			
Omega	5 fl oz	7-10 days	Maximum of 3.5 pints per season; 14 day PHI
Iprodione			
Rovral	1-2 lb		Do not irrigate within 24 hours of application; Maximum of 4 applications per season; 14 day PHI
Rovral 4 Flowable	1-2 pt		Do not irrigate within 24 hours of application; Maximum of 4 applications per season; 14 day PHI
Mefenoxam Mixtures			
Ridomil Gold Bravo	2 lb	14 days	Maximum of 3 applications, alternating with a full rate of a protectant fungicide; 14 day PHI
Ridomil Gold MZ	2.5 lb	14 days	Maximum of 3 applications, alternating with a full rate of a protectant fungicide; 14 day PHI
Ridomil Gold Bravo Liquid	1 pack per 10 acres	14 days	Maximum of 3 applications, alternating with a full rate of a protectant fungicide; 14 day PHI

Neem			
Trilogy	1.0% in 25 to 100 gal per acre		Maximum of 2 gallons per acre; cannot be tank-mixed with sulfur, Bravo, or other similar fungicides
Strobilurin and Stobilurin Mixtures			
Gem	6-8 oz	7- 14 days	Maximum of six applications per season; Rotate with fungicides with a different mode of action; 14 day PHI
Headline	12 fl. oz	7- 14 days	Maximum of six applications per season; Rotate with fungicides with a different mode of action; 14 day PHI
Quadris FL	6.2 - 15.4 fl oz	7- 14 days	Maximum of six applications per season; Rotate with fungicides with a different mode of action; 14 day PHI
Quadris Opti	1.6 pt	5-7 days	Maximum of six applications per season; Rotate with fungicides with a different mode of action; 14 day PHI
Tanos	6-8 oz pt	5-10 days	Maximum of six applications per season; Rotate andt tank mix with fungicides with a different mode of action; 14 day PHI
Triphenyltin Hydroxide			
Super Tin 80WP	2.5-3.75 oz		Maximum of 15 ounces per season; tank mixes with Polyram or mancozeb are recommended; will suppress Colorado potato beetle; 21 day PHI tank mixes

Categories: Potato, Disease, Late Blight

Date: 03/03/2007