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Potato Late Blight Control Recommendations for Southern Idaho in 2016

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The potential for another outbreak of late blight in 2016 remains high. This is primarily due to the presence of the disease in SE Idaho in 2015, followed by the mild winter conditions across the whole Snake River Valley which enabled the survival of volunteer potatoes over winter. Infected volunteer potatoes, cull piles, and seed tubers along with the cool wet weather conditions that we experienced in April and May could all potentially contribute to the development of a late blight epidemic again this year. So far we are facing almost exactly the same environmental conditions as we did in spring 2015 which lead to the earliest outbreak of late blight (on July 10, 2015) in southern Idaho for over 10 years. It would therefore be prudent to plan ahead for the management of any potential late blight outbreak before or shortly after the emergence of the potato crop in many areas of southern Idaho.

Effective management of late blight requires an integrated disease management approach, including 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. Before planting growers should take several measures to control late blight. Firstly, it is important to eliminate potential sources of inoculum. These are likely to be infected potatoes in cull piles, infected volunteer potato plants that survived the winter and infected seed tubers. For information on volunteer and cull potato management see the Potato Progress XVI (4) article (<http://bit.ly/1XSWHsS>). Field scouting is a vital component of a grower's IPM program and should begin after emergence when the first plants are 4 to 6 inches tall. Scouting allows growers to make informed disease and pest management decisions and provides early detection of other problems that may be present in the field, such as nutrient deficiency or herbicide injury. By using information collected by scouts, growers can time

fungicide applications for optimal effectiveness. This is especially important for the control of late blight as fungicides are 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 (Table 1). 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), and 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, 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 and can be applied up to late crop senescence. Results from fungicide resistance screening of *P. infestans* isolates (US23) collected late in the 2015 growing season (Sept-Oct, 2015) indicated that the US23 strain in Idaho had developed resistance to mefenoxam. As such, Ridomil Gold, Ridomil Gold SL, and other products containing mefenoxam should NOT be used to control late blight in Idaho in the 2016 growing season until we have collected and tested enough *P. infestans* isolates to determine whether isolates involved in any 2016 outbreak are resistant or sensitive to mefenoxam.. Table 2, shows suggestions for late blight control using protectant, systemic, and semi-systemic fungicides under different late blight risk conditions prior to any reported late blight outbreak. For more information on a mid – late season spray program to manage late blight see <http://bit.ly/1KWft6a>.

Table 1. Common potato fungicides registered for control of late blight in Idaho. This list does not include seed or in-furrow treatments and is not comprehensive. For a more complete list see (<http://bit.ly/1TXPSDr>).

Product name (rate /A)	Active Ingredient(s)	PHI	REI	FRAC number	Comments
Agri Tin, Super Tin 4L, Super Tin 80WP (2.5 – 3.75 oz)	triphenyltin hydroxide	7 days	48 hrs	30	Restricted use pesticide. A 1.87 oz/a rate can be used when tank mixed with another fungicide
Bravo WeatherStik, Echo 720, Equus 720 (1 – 1.5 pt) Bravo Ultrex (0.9 – 1.36 lb) Echo Zn (1 to 2.125 pt)	chlorothalonil	7 days	12 hrs	M5	Do not apply more than 11.25 lbs a.i. per season.
Cabrio Plus (2.9 lb)	pyraclostrobin + metiram	3 days	24 hrs	11+M3	No more than 17.4 lb/a per season. Do not apply more than 2 sequential applications.
Curzate 60DF (3.2 oz foliar)	cymoxanil	14 days	12 hrs	27	Locally systemic. Must be tank mixed with a protectant fungicide.
Dithane F45 Rainshield (0.4 – 1.6 qt) Dithane M45 (0.5 – 2 lb) Penncozeb 80WP, Penncozeb 75DF (0.5 – 2 lb) Penncozeb 4FL, Manzate Flowable (0.4 – 1.6 qt) Manzate Pro-Stick (1 to 2lb)	mancozeb	14 days	3 days	M3	Maximum rate per season is 11.2 lb a.i.
Evito 480 SC (3.8 fl oz)	fluxastrobin	7 days	12 hrs	11	Maximum rate per season is 0.72 lbs a.i. No more than 6 applications per season.
Forum (4 – 6 oz)	dimethomorph	4 days	12 hrs	40	Do not exceed 30 oz/ season. Must tank mix with other fungicide.
Gavel 75DF (1.5 – 2 lb)	zoxamide + mancozeb	14 days	48 hrs	22 + M3	Do not apply more than 6 applications or 12 lb/a.
Gem 500SC (3.8 fl oz)	trifloxystrobin	7 days	12 hrs	11	Do not exceed 23 fl oz/a per season. Always mix with a ¾ rate of protectant when targeting late blight.

Table 1 (cont.)

Product name (rate /A)	Active Ingredient(s)	PHI	REI	FRAC number	Comments
Headline (6 to 12 fl oz)	pyraclostrobin	3 days	12 hrs	11	Do not exceed 72 fl oz/a per season.
Omega 500F (5.5 fl oz)	fluazinam	14 days	48 hrs	29	Do not exceed 3.5 pts/a per season.
Omega Top MP (5.5 fl oz) co-pack label sold with Top MP	fluazinam	14 days	48 hrs	29	Do not exceed 3.5 pts/a per season.
Oronidis Opti A (1.4 – 4.8 fl oz)	oxathiapiprolin	5 days	4 hrs	U15	Oronidis Opti A and B are intended to be tank mixed to produce Oronidis Opti.
Oronidis Opti B (0.75 – 1.5 pt)	chlorothalonil	7 days	12 hrs	M5	Oronidis Opti B is intended to be tank mixed with Oronidis Opti A.
Polyram 80DF (1.5 – 2 lb)	metiram	3 days	24 hrs	M3	Do not apply more than 14 lbs per season
Previcur Flex (0.7 – 1.2 pts)	propamocarb hydrochloride	14 days	12 hrs	F	Must tank mix with another fungicide. Do not exceed 6 pts/a per season. Always tank mix with low rate of protectant.
Priaxor (4 – 8 fl oz)	fluxapyroxad + pyraclostrobin	7 days	12 hrs	7+11	Do not apply more than 24 fl oz/a per season. Labeled for suppression of late blight only.
Quadris (6 to 15.5 fl oz)	azoxystrobin	14 days	4 hrs	11	Do not apply more than 2 lb a.i./a per season. Always tank mix with a protectant
Quadris Opti (1.6 pts)	azoxystrobin + chlorothalonil	14 days	12 hrs	11+M5	Alternate with non Group 11 fungicides to manage resistance
Ranman (1.4 to 2.75 fl oz)	cyazofamid	7 days	12 hrs	21	Follow label for resistance management
Reason (5.5 to 8.2 fl oz)	fenamidione	14 days	12 hrs	11	Do not exceed 24.6 fl oz per season
Revus Top(5.5 to 8 fl oz)	mandipropamid + difenoconazole	14 days	12 hrs	40+3	Do not exceed 28 fl oz/a per season. Use of an adjuvant is recommended.
Tanos (8 to 10 oz)	cymoxanil + famoxadone	14 days	12 hrs	27+11	Alternate with non Group 11 fungicides to manage resistance
Zampro (11 – 14 fl oz)	ametoctradin + dimethomorph	4 days	12 hrs	45+40	Do not make more than 2 sequential applications. Follow label for resistance management.
Zing! (32 -34 fl oz)	zoxamide + chlorothalonil	7 days	12 hrs	22+M5	Do not make more than 2 sequential applications. No more than 8 applications per season.

Note: Results from fungicide resistance screening of *P. infestans* isolates (US23) collected late in the 2015 growing season (Sept-Oct, 2015) indicated that the US23 strain in Idaho had developed resistance to mefenoxam. Ridomil Gold, Ridomil Gold SL and other products containing mefenoxam should **NOT** be used to control late blight in Idaho in the 2016 growing season until we have collected and tested enough *P. infestans* isolates to determine whether isolates involved in any 2016 outbreak are resistant or sensitive to mefenoxam. Based a table by A.J. Gevens, University of Wisconsin.

Table 2. Suggestions for late blight control using protectant, systemic and semi-systemic fungicides under different late blight risk conditions in susceptible potato varieties, assuming that late blight has not been found in the state.[‡]

Application timing	Low risk^a	Medium Risk^b	High Risk^{c*}
When plants are at 50% emergence	none	[†] Protectant only	Revus Top, Tanos, Forum, Previcur Flex, Orondis Opti (or similar systemic) + protectant
Row closure	lowest labeled rate of protectant fungicide or fungicide program targeting early blight/white mold. e.g Luna Tranquility, Endura, Quadris Top etc.	Highest labeled rate of protectant fungicide or systemic fungicide with dual activity against late blight and early blight/white mold. e.g. Revus Top, Omega, Quadris Top, Tanos, Gavel.	Curzate, Tanos, Forum, Previcur Flex (or similar systemic) + protectant
7 days after row closure	none	none	highest labeled rate of protectant. every 7 days until row closure
14 days after row closure	Lowest labeled rate of protectant fungicide or continue early blight / white mold program	Highest labeled rate of protectant, or continue early blight program.	
Late season (close to vine kill)	Gavel or Zing! or protectant + Super Tin	Gavel or Zing! or protectant + Super Tin	Gavel or Zing! or protectant + Super Tin

^a With the absence of late blight in southwestern Idaho in 2015, it could be considered at low risk in 2016.

^b With the limited outbreaks of late blight in the Magic Valley in 2015, the area could be considered at medium risk in 2016.

^c With the widespread outbreaks of late blight in southeastern Idaho from Fremont south to Cassia and Minidoka counties, the area should be considered at high risk in 2016.

[†] Protectant = EBDC (e.g. Dithane or Penncozeb etc) or Chlorothalonil (Bravo, Echo etc)

* If weather conditions become particularly conducive to a late blight outbreak (persistent cool, wet weather), or late blight is found in the county then the program may need to be changed to a 5 day spray schedule with a systemic fungicide alternating with a protectant. For more information on a mid – late season spray program to manage late blight see <http://bit.ly/1KWft6a>.

[‡] **DISCLAIMER:** References to commercial products or trade names on this page are provided as a convenience only and do not imply endorsement by the University of Idaho or bias against those not mentioned.

For Updates on Late Blight throughout the Season, See the Following Resources

Washington's Late Blight Information Line: 800-984-7400.

Idaho Potato Diseases on Twitter: <https://twitter.com/potatodiseases>.

Upcoming Field Days across the Northwest

University of Idaho Pest Management Tours

Please join us for the UI Snake River Pest Management Tour. Both tours begin at 8:30 am with registration starting at 8:00 am. The tours will include industry sponsored lunches.

- June 14: The Aberdeen R & E Center tour will focus on potato weed management and will include information on other pest management issues in other crops.
- June 15: The Kimberly R & E Center tour will include stops for weed, insect or disease management in dry beans, cereals, potatoes, sugar beets, and turf.

Idaho State Department of Agriculture Pesticide Applicator Recertification Credits and Certified Crop Advisor credits (Kimberly) will be available.

Oregon State University Hermiston Potato Field Day

Potato field day is schedule for Wednesday June 22 from 8:00 am – noon at the Hermiston Agricultural Research and Extension Center. Lunch will be provided to our guests courtesy of Syngenta Crop Production. Come and learn the latest information <http://oregonstate.edu/dept/hermiston/2009-field-days>.

Washington State University Potato Field Day – Thursday June 23, 2016

Located at WSU Othello Research Unit – 1471 W Cox Rd, Othello. Coffee and snacks at 8 am, with events and things to do through lunch, which is provided to all attendees.

Register Now for the 100th Annual Meeting of the Potato Association of America

The annual meeting of the Potato Association of America (<http://potatoassociation.org/>) is the premier educational and networking opportunity for every person interested in the North American potato industry. This event includes updates from the latest in potato research, presentations from industry representatives, and numerous tours of the industry. Attendees will have the opportunity to network with the diverse range of potato industry representatives while attending sessions built around improving the potato industry as a whole. This is one event you do not want to miss!

The 100th annual meeting of the Potato Association of America will be held from July 31st to August 4th at the Amway Grand Plaza Hotel in Grand Rapids, MI. Register now!

<http://www.cvent.com/events/2016-paa-annual-meeting/event-summary-028ed94f9fe4425395058276242f93c2.aspx>