

## **Potato late blight control recommendations for southern Idaho in 2020**

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The potential for another outbreak of late blight in 2020 remains high. This is primarily due to the presence of the disease in South central Idaho in 2019, 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 any cool wet weather conditions in April and May could all potentially contribute to the development of a late blight epidemic again this year. As such, it would 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 the implementation of 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 should begin after emergence when the first plants are 4 to 6 inches tall. Field scouting should be a vital component of a grower's IPM program. 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), 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 in the 2019 growing season indicated that the US23 strain in Idaho had developed resistance to mefenoxam. As such, Ridomil Gold SL and other products containing mefenoxam only, may not be effective in the control late blight in Idaho in the 2020 growing season. Their use is not recommended for late blight control until we have collected and tested enough *P. infestans* isolates to determine whether isolates involved in any 2020 outbreak are resistant or sensitive to mefenoxam. If they are sensitive, then mefenoxam-based products will be an effective tool. Ridomil has been shown to have curative properties and may halt a late blight epidemic if it is applied early enough in an outbreak (less than 1% field infection). If you are using mefenoxam based products in a program for control of pink rot and pythium leak you should continue to do that as there are no known issues with resistance in these pathogens in Idaho. 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>

### Late blight foliar symptoms



**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.)**

<b>Product name (rate /A)</b>	<b>Active Ingredient(s)</b>	<b>PHI</b>	<b>REI</b>	<b>FRAC number</b>	<b>Comments</b>
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 Ultra (5.5 – 8.0 fl oz)	Oxathiapiprolin + mandipropamid	14 days	4 hrs	U15 + 40	Max single application rate is 8.0 fl oz/A. Max annual rate is 32.0 fl oz/A/year. Do not apply >0.125 lb ai/year of oxathiapiprolin. Do not apply >0.522 lb ai/year of mandipropamid. Make no more than 2 sequential applications before rotating to a different mode of action. Do not follow soil applications of oxathiapiprolin with foliar applications of Oronidis Ultra.
Oronidis Opti (1.75 – 2.5 pt)	Oxathiapiprolin + chlorothalonil	7 days	12 hrs	U15 + M5	Max single application rate is 2.5 pt/A. Max application annual rate is 10 pt/A/year. Do not apply >0.125 lb ai/A/year of oxathiapiprolin. Do not apply >11.25lb ai/A/year of chlorothalonil.
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)	fenamidone	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.
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**Note:** Results from fungicide resistance screening of *P. infestans* isolates (US23) collected late in the 2019 growing season 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 2020 growing season until we have collected and tested enough *P. infestans* isolates to determine whether isolates involved in any 2020 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 <sup>a</sup>	Medium Risk <sup>b</sup>	High Risk <sup>*</sup>
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

<sup>a</sup> With the absence of late blight in south eastern Idaho in 2019, it could be considered at low risk in 2020.

<sup>b</sup> With the limited out breaks of late blight in the Magic Valley in 2019, the area could be considered at high risk in 2020.

† 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.