



Potato Progress

Research & Extension for the Potato Industry of
Idaho, Oregon, & Washington

Andrew Jensen, Editor. ajensen@potatoes.com; 509-760-4859
www.nwpotatoresearch.com

Volume XVII, Number 9

16 June 2017

Selected Fungicides for Managing Potato Late Blight in the Columbia Basin

Dennis A. Johnson, Jeffrey S. Miller, and Mike Hubbard. Washington State University, Pullman, WA;
Miller Research LLC, Rupert, ID; and Hubbard Agricultural Science, Bonners Ferry, ID, respectively.

Several fungicides are labeled for use against potato late blight. Following is a list of selected fungicides that are effective against late blight. Fungicides are most effective when they are applied to foliage before infection occurs or when the disease is in very early stages of development. Later applications are helpful in reducing the rate in which the disease spreads but are not nearly as effective as early applications. Late blight is very difficult to manage once infections become established in sprinkler-irrigated fields because the microclimate within the canopy usually favors further disease spread whenever the field is irrigated. Intervals between applications should be shortened when disease pressure is high.

Total crop and canopy coverage with fungicides is essential for late blight management. The late blight organism, *Phytophthora infestans*, will most likely find and infect any plants or plant surfaces missed during application. Given the nature of the potato canopy after row closure, achieving complete coverage of leaves and stems with fungicides can be difficult if proper application methods are not followed. Application skips from air, chemigation or ground applications have frequently resulted in large areas of late blight infected plants.

Standard Protectant Fungicides have a broad spectrum of activity against several potato diseases including early blight and brown spot. They are also broad spectrum in activity against metabolic pathways of sensitive pathogens and should be used in fungicide programs to prevent the development of fungicide resistance within pathogen populations. Mancozeb and metiram, when included in a fungicide program during tuber maturation, can provide an effective soil barrier that can help protect tubers in soil from infection.

- **EBDC** (ethylene bis-dithiocarbamate) fungicides are **metiram** (Polyram), **mancozeb** (Dithane M-45, Manzate Pro-Stick and Penncozeb), and **maneb** (Manex).
- **Chlorothalonil** (e.g. Bravo, Echo)

Narrow Spectrum Fungicides are often specific for late blight and have activity on only one or a few metabolic pathways of the pathogen. Standard protectant fungicides should be alternated and tank mixed with narrow spectrum fungicides to prevent development of fungicide resistance in the pathogen population. Some

combinations of narrow spectrum fungicides, such as **dimethomorph** (Forum) plus an EBDC, **cymoxanil** (Curzate) plus an EBDC, and **oxathiapiprolin** + chlorothalonil (Oronidis Opti) have post-infection activity that inhibits sporulation and/or restricts lesion expansion. These products are often used when late blight pressure is expected to be high.

- **Cyazofamid** (Ranman) plus an EBDC or chlorothalonil
- **Cymoxanil** (Curzate) plus an EBDC or chlorothalonil. Tanos contains 25% cymoxanil and 25% famoxate. The famoxate component of Tanos provides activity against early blight.
- **Dimethomorph** (Forum) plus an EBDC or chlorothalonil. Zampro contains ametoctradin + dimethomorph.
- **Fluazinam** (Omega, Omega Top MP). Omega also provides protection against white mold when used at proper timing.
- **Mandipropamid + difenoconazole** (Revus Top). Revus Top also provides protection against early blight and brown spot.
- **Mefenoxam** (Ridomil Gold formulations). Mefenoxam-based products can be highly effective against late blight if the strain is sensitive (e.g. US-23). These products must be used with caution because the late blight pathogen can develop resistance to mefenoxam quickly. Some isolates of the US-23 strain developed resistance near the end of the season in southern Idaho in 2015.
- **Oxathiapiprolin** (Oronidis Opti = oxathiapiprolin + chlorothalonil)
- **Propamocarb hydrochloride** (Previcur), plus EBDC or chlorothalonil
- **Pyraclostrobin** (Headline) and **azoxystrobin** (Quadris) are effective against late blight at double the early blight rate (12 fl oz/acre for both products). **Fenamidone** (Reason) is effective against both early blight (5.5 fl oz. rate) and late blight (8.2 fl oz.).
- **Zoxamide** (Gavel = zoxamide + mancozeb, Zing = zoxamide + chlorothalonil)

Tuber Protection

Phosphorus acid (e.g. Phostrol and other salts of phosphorous acid) are systemic, and foliar applications will provide protection to tubers. Two to three foliar applications at two week intervals (beginning at initial tuber bulking, tubers 14 to 70g in weight) provide excellent tuber protection in storage, but little protection on foliage. Two applications are effective for cultivars with moderately resistant tubers such as Umatilla and three applications are needed for cultivars with very susceptible tubers such as Ranger.

Post-harvest application to tubers is effective if late blight is found in tubers prior to harvest, or if late blight is present in the field at the end of the season. The phosphorous acid application cannot cure infected tubers, but keeps healthy tubers from becoming infected if they are exposed to spores of the late blight pathogen during the harvest operation. The rate should be 12.8 fl oz/ton of tubers applied in 0.5 gallons of water/ton tubers.

Fungicides not recommended

Mefenoxam (Ridomil Gold, Ultra Flourish) prepacks are not recommended for management of late blight if the strain is mefenoxam resistant. Mefenoxam can be effective for management of pink rot and Pythium leak.

- **Tin** based products such as Agri Tin and Super Tin alone will not adequately control severe late blight, but are effective against late blight when mixed with Polyram or another EBDC fungicide. Tin provides protection against early blight and brown spot. Tin can cause phytotoxicity when applied at low spray volumes or when temperatures are high.
 - **Copper fungicides** alone will not adequately control foliar late blight in conventional (non-organic) fields in the Columbia Basin. Copper may be an alternative for organic potatoes.
 - **Endura** and **Luna Tranquility** are effective against early blight and white mold when used at the appropriate rate (5.5 oz for Endura and 11.2 fl oz for Luna Tranquility). Neither of these products is effective against late blight.
 - **Priaxor** (fluxapyroxad + pyraclostrobin). If Priaxor is used at the high label rate (8 fl oz/acre), then the amount of pyraclostrobin (Headline) is about 87% of the active ingredient that would be applied if Headline was used alone at 12 fl oz. However, use rates of 4 or 6 fl oz/acre of Priaxor would result in a dose of pyraclostrobin which is 45% and 67% of the recommended late blight dosage, respectively.
-

Proceedings of the 2017 WA/OR Potato Conference Available

Every year since 1962 there has been a Proceedings from the Washington, and now Washington/Oregon, Potato Conference. It is typically released in June, giving authors time to compose articles after the conference. The 2017 Proceedings was just completed and is posted on the front of the Northwest Potato Research Consortium website, <http://www.nwpotatoresearch.com/>. In the coming weeks each article will be entered into the research library so that they are fully searchable.

Potato Late Blight

See also: <http://www.nwpotatoresearch.com/>



Foliar Late Blight



D. Johnson, WSU Pullman



D. Johnson, WSU Pullman

Leaf infections show areas of dead or dying tissue surrounded by a pale halo. Lesions are not delimited by leaf veins. Also, note the whitish sporulation of the pathogen around the dead tissue.



J. Gigot, WSU-NWREC



D. Johnson, WSU Pullman

Stems are also infected, and show typical sporulation at high humidity and moderate temperature.



M. Derie, WSU-NWREC

Field infections can start from infected seed or sprouts from volunteer plants.

Management

1. Prevention is key
2. Manage volunteer potatoes and cull piles
3. Plant healthy seed
4. Use a seed treatment containing mancozeb or other preventive fungicide
5. Treat with foliar fungicides according to University recommendations
6. Monitor fields carefully for late blight infections, especially early in the season
7. Avoid planting potatoes in ground that is expected to be excessively wet, such as pivot centers and pivot overlaps

Idaho Potato Commission (Phone: 208-334-2350)