

Late Blight Occurrence and Management in Potatoes and Tomatoes in the Northeastern United States in 2009

Margaret Tuttle McGrath

Department of Plant Pathology and Plant-Microbe Biology, Cornell University
Long Island Horticultural Research and Extension Center
3059 Sound Avenue, Riverhead, NY 11901; mtm3@cornell.edu

Occurrence of late blight in 2009 is unprecedented. First reports in the northeast came in June. It was soon evident that this disease was more widespread than it had ever been so early in the growing year, and, even more alarming, it was being found on tomato plants being sold in retail garden centers. Most gardeners are not familiar with late blight unless they are located in a major potato production area where it occurs routinely. Thus there was great concern that gardeners would not know what was affecting their plants nor the potential impact this disease developing in their garden could have on commercial crops if affected plants were not immediately destroyed because the pathogen produces spores easily dispersed by wind. An intensive effort therefore was made to educate the public. After learning about late blight, gardeners began reporting about their experiences, which included that some affected plants were purchased in May. This could account for how widespread late blight became in commercial fields. By July 16 late blight had been found in 38 of the 56 counties in NY; a survey was not conducted in each county thus it may have been present in more. Another unprecedented aspect of the 2009 epidemic is that extension educators and faculty did not know where the initial affected plantings were. When late blight starts to develop as usual in commercial fields, extension specialists are informed and they alert other growers so that they can protect their crops. Some crops were lost in 2009 because growers were caught unaware. By early Aug states that had reported late blight in 2009 included Florida, Alabama, South Carolina, North Carolina, Kentucky, Tennessee, Virginia, West Virginia, Ohio, Maryland, Delaware, New Jersey, Pennsylvania, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, Vermont, Maine, Indiana, Illinois, Michigan, and Wisconsin.

Rainy, cloudy conditions have been providing favorable conditions for the pathogen to successfully be dispersed and to infect. Clouds protect spores being dispersed in wind from the killing effect of ultraviolet radiation.

All tomato and potato crops are at high risk of developing late blight this season, especially if the rainy weather continues. All growers should assume their crops eventually will be affected and thus should be on a weekly schedule to both thoroughly inspect their potato and tomato plantings and apply fungicides. Late blight is considered unmanageable with fungicides applied after symptoms are seen.

Classic symptoms are large (at least nickel sized) olive green to brown spots on leaves with slightly fuzzy white fungal growth on the underside when conditions have been humid (early morning or after rain). Sometimes the lesion border is yellow or has a water-soaked appearance. Leaf lesions begin as tiny, irregularly-shaped brown spots. Brown to blackish lesions also develop on upper stems. Firm, brown spots develop on tomato fruit. Numerous photographs are posted on the web, including at:

http://www.hort.cornell.edu/department/Facilities/lihrec/vegpath/photos/lateblight_tomato.htm

http://vegetablemndonline.ppath.cornell.edu/factsheets/Potato_LateBlt.htm

The guidelines that follow are for conventionally managed crops. Management in organic crops is covered in other write-ups.

When late blight is found in a localized spot in a field, promptly destroy all symptomatic plants plus a border of surrounding plants to eliminate this source of inoculum. Physically pull and drop affected plants, spray with herbicide, or disk. The herbicides diquat and paraquat are good choices for applying with a hand sprayer. Gramoxone is effective but dangerous; there is no antidote in the event of accidental exposure. When disking is used the crop should first be sprayed with fungicide because of the potential to move spores on equipment especially while driving out of the field, and the equipment should be pressure washed afterwards.

Conventional Fungicides

Begin a fungicide program with products specifically for late blight in this field and other fields near by. These products have translaminar activity and thus provide better coverage than contact, protectant fungicides. A five- to seven-day spray interval is recommended when weather conditions are wet and cool. It can be extended to 10 days under hot, dry conditions.

Alternate among fungicides in different chemical groups (as indicated by FRAC Code) to manage resistance. The late blight pathogen has demonstrated ability to develop resistance; Ridomil fungicides are no longer recommended because of resistance. Include in each application a protectant fungicide like maneb, mancozeb or chlorothalonil, or triphenyltin hydroxide for potatoes. This is important for resistance management and ensuring effective control, and is specified on the label and thus is a requirement. A spray program with just protectant fungicides applied regularly starting before late blight begins to develop can provide adequate control, but this is challenging to achieve when plants are actively growing and conditions are very favorable for disease development, as has been occurring this spring to summer.

Curzate (FRAC Group 27 fungicide) or Tanos (also contains cymoxanil, active ingredient in Curzate) can be a good choice for the first application because these fungicides have some kickback activity, thus they can suppress some new lesions. The maximum kickback is about two days when it is cool, declining with increasing temperatures to about zero above 80 degrees F. Cymoxanil has little residual activity, therefore, five days later apply another fungicide.

Previcur Flex (Group 28) has some systemic activity, which is an important attribute even though it is not as systemic as Ridomil. It was the only fungicide rated good for symptoms on stems and also for protecting new growth in a bulletin from the University of Maine; it is not known how effective many of the other products are on new growth that develops after the application. The product was not rated as highly as other late blight fungicides for leaf symptoms (good versus excellent). It is considered a good choice for an application made right before rain, as the product is rainfast in 30 minutes. According to the manufacturer, Previcur Flex provides best control when applied in blocks of two applications alternated with two applications of other fungicides.

Revus Top (Group 40 + 3) is a new fungicide that has excellent activity for late blight. It gets into plants fast, in about 30 minutes, then slowly moves in the plant providing good residual. It has some kickback activity. It does not need to be applied with a protectant fungicide. Unfortunately, the U.S. inventory of this product has been used up. However, the manufacturer

has responded to the situation and prepared a supplemental label for another fungicide, Revus (Group 40), which was not labeled at the time of the outbreak for use on tomatoes and potatoes. EPA approved it promptly. These fungicides, especially when mixed with other products, should not be left in the spray tank as irreversible settling can occur.

Other fungicides to consider including in the fungicide program are Gavel (Group 22), Forum (Group 40), and Ranman (Group 21) plus Presidio (Group 43) for tomatoes and Omega (Group 29) for potatoes. Gavel is the only late blight fungicide formulated with a protectant. Note that Presidio was not yet registered in NYS as of Aug 10.

Group 11 fungicides (Headline, Quadris, Reason, etc) and Group 33 (phosphorous acid) fungicides are not considered as effective for late blight as the other products.

Good fungicide coverage is critical. Pathogen spores can be moved on equipment and workers, therefore spray and work in affected fields last and clean equipment between fields.

Late blight can develop in high tunnels and greenhouses. The pathogen that causes late blight needs only high humidity to infect. Thus it is similar to the pathogens that cause gray mold and leaf mold, which commonly occur in tomatoes grown in these protected environments where humidity typically is higher than outdoors. Fungicides that can be used for late blight in high tunnels and greenhouses include Curzate, Revus, Revus Top, and several mancozeb and copper fungicides. Previcur Flex is labeled for use in greenhouses applied to soil for root rot and damping-off.

As soon as harvest is complete or the field is abandoned, apply an herbicide like diquat to kill plants and/or disk down the field. Disk on a sunny day when foliage is dry to minimize the quantity of spores dislodged and able to survive wind dispersal to another crop.

With potato crops affected by late blight, vine kill early before there are many symptoms on main stems and before heavy rain is forecast to avoid an opportunity for spores to be washed down to tubers. Infection is more likely to occur when soil temperatures are cool (below 54F). Tubers should not be harvested when wet. Avoid bruising and skinning while harvesting. Harvest separately and last any areas that are low or had more severe symptoms of late blight. tubers from an affected field should not be marketed until checked for blight. Prompt marketing is recommended. If stored, cool down quickly and provide good ventilation in storage. Check stored tubers frequently for symptoms. Destroy any affected tubers. This is how the pathogen survives over winter. Recommended methods include chopping, burial, burning, spreading on fields where they will freeze completely over winter, or feeding to livestock. Do not put in cull piles. Promptly destroy any volunteer potatoes in subsequent years. These can be a source of the late blight pathogen.

Information from Labels for Late Blight Fungicides:

Curzate 60DF (Group 27). 3.2-5 ounces per acre (3.2 ounces for potatoes). 5 oz on 5-day interval when late blight present. 30 oz/A seasonal max. 3 d PHI.

EPA Reg No. 352-592. Active ingredient is Cymoxanil. 12 h REI. Must be tank-mixed with a protectant fungicide.

Forum (Group 40). 6 fluid ounces. 30 fl oz/A seasonal max. 2 consecutive spray max. 4 d PHI.

EPA Reg No. 241-427. Dimethomorph. 12 h REI. Must be applied with another fungicide.

Gavel (Group 22). 1.5-2 pounds. 16 lb or 8 application seasonal max. 5 d PHI tomato; 3 d PHI for potato (14 d in some states). Latron surfactant recommended.

EPA Reg No. 62719-441. Zoxamide + mancozeb. 48 h REI.

Omega 500F (Group 29). 5.5 fl oz for potatoes. 3.5 pts/A seasonal max. 14 d PHI.

EPA Reg No. 71512-1-100. Fluazinam. 48 h REI.

Presidio (Group 43). 3-4 fl oz for tomatoes. 12 fl oz/A seasonal max. 2 consecutive spray max.

EPA Reg No. 59639-140. Flupicolide. 12 h REI. 2 d PHI. Not registered in NYS yet.

Previcur Flex (Group 28). 0.7-1.5 pint (1.2 pints max for potatoes). 7.5 pts/A seasonal max for tomatoes; 6 pts/A for potatoes. 5 d PHI for tomato; 14 d PHI for potato.

EPA Reg No. 264-678. Propamocarb hydrochloride. 12 h REI.

Ranman (Group 21). 1.4–2.75 fluid ounces (2.1-2.75 for tomato). 16.5 fl oz or 6 application seasonal max for tomatoes; 27.5 fl oz or 10 applications for potatoes. 0 d PHI for tomatoes; 7 d for potatoes.

EPA Reg No. 71512-3-279. Cyazofamid. 12 h REI.

Revus (Group 40). 5.5 to 8 fluid ounces. 2 consecutive spray max. 32 fl oz/A seasonal max. 1 d PHI for tomato; 14 d PHI for potato.

EPA Reg No. 100-1254. Mandipropamid. 12 h REI.

The specific directions on fungicide labels must be adhered to. They supersede these recommendations (above), if there is a conflict. Check state registration and organic approval before using a product. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.

Some of this information on management was provided by Dr. Steve Johnson, University of Maine Cooperative Extension, and Dr. Tom Zitter, Cornell University.