

## LATE BLIGHT ON TOMATO AND POTATO IN 2009

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It's been an exceptionally rainy and cool summer and one of the consequences is that Late Blight disease has been reported in every corner of Vermont and across the Northeast. With these weather conditions Late Blight rapidly kills the foliage of tomato and potato plants. Many hundreds of farmers and gardeners have already been stricken, and it is likely that the situation will get worse unless the weather turns hot and dry.

Late Blight is caused by a fungus, *Phytophthora infestans*, and it's the same disease that led to the Irish potato famine almost 150 years ago. The disease is not directly harmful to people as it only infects potatoes, tomatoes, and some related weeds.

The good news is that the disease does not persist in the soil from year to year, so with proper action, farmers and gardeners should be able to avoid this problem next year. In addition, infected potato crops may still yield edible tubers if the diseased foliage is destroyed soon after infection is observed.

Late blight needs living plant tissue to survive, so infected tomato plants should be destroyed as soon as the disease is identified. In small plantings this means removing plants in trash bags and sending them to the landfill; in larger gardens and farms the plants should be gathered into piles and burned, or simply turned into the soil so they can decompose. In the late summer and early fall there is still plenty of warm weather that will allow plant residues to break down before winter.

A month or so after initial incorporation, the residues should be lightly tilled and mixed with soil again, and then a winter cover crop should be sown. Winter rye or oats planted in early fall will protect the soil over winter and further promote biological activity. Do not put plants in the compost pile just in case some portion is protected from the elements and makes it through the winter.

Once potatoes are confirmed with late blight, the tops (vines) should be mowed or cut off before the stems get heavily infected. That will help prevent spores from washing down to the tubers. Wait to dig the tubers at least 2 or 3 weeks until the vines are completely dead, as that will limit the number of spores on the soil surface when the tubers are dug. It also allows time for the tuber skins to toughen up underground, and that will limit the number of cuts and bruises created at harvest, reducing places for spores to get into the tubers.

When harvesting, be sure to get all the potatoes out of the ground, to limit the chances of the disease surviving the winter in a living tuber. After harvest, do not wash the tubers until it's necessary, as that could spread disease among them. Keep them in a dark, dry location for 3-4 days to allow harvest wounds to heal, then store in a cool location (ideally 38-40 degrees F) to suppress disease development, and check them often, removing any rotten tubers.

Late blight spores are easily carried long distances on the wind, so anyone growing tomatoes or potatoes should be watching their plants for signs of the disease, and act quickly to destroy them in order to limit spread of the disease to other growers.

The symptoms of late blight on tomato and potato leaves and stems and fruit are dark, water-soaked spots of irregular shape, about the size of a nickel to a quarter, often beginning at leaf tips or edges. These spots become abundant when the foliage has been wet due to rain or dews. The infected areas often become covered with light layer of white fungal growth that contains the spores of the disease. Infected tomato fruit develop large brown areas, either on the plant, or a few days after harvest.

There are other common diseases of tomato and potato that can be mistaken for late blight. If the infected area has a yellow border and is occurring on the bottom of the plant, it is probably due to Early Blight or Septoria Leaf Spot. These two diseases are found in home gardens and farms every year in the Northeast, but they are less likely to kill plants, and they don't spread long distances.

Late blight can also infect tomatillos, petunia and some solanaceous weeds. The good news is that peppers and eggplant do not appear to be susceptible.

Hot dry weather can slow the spread of the disease but otherwise, with rainy weather or heavy dews, fungicides are needed for protection. Homeowners can apply a garden fungicide labeled for tomato or potato use that contains the active ingredient chlorothalonil. Organic growers can apply a copper fungicide labeled for these crops. These products can only be effective if used before the disease appears and they should be reapplied every 5-7 days if wet weather persists. If spraying any type of fungicide, remember that these materials only protect healthy tissue – infected leaves cannot be saved. Good coverage of all the foliage is critical, and repeat applications are needed to protect new growth from infection. Always read the pesticide label and follow the instructions carefully.

For more information on Late Blight, including many pictures of the symptoms, see:

<http://www.hort.cornell.edu/lateblight>

<http://www.umassvegetable.org/LateBlightAlertforTomatoandPotato.html>

Here is information on conventional fungicides for late blight from Meg McGrath at Cornell Cooperative Extension:

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.

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.

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.

Late blight can develop in high tunnels and greenhouses. Fungicides that can be used include Curzate, Revus, Revus Top, and several mancozeb and copper fungicides.