

Late Blight Devastates Northeast Tomato Crops

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The Northeast has been hit by the devastating vegetable disease known as Late Blight, (*Phytophthora infestans*) on tomatoes and potatoes. Dr. Meg McGrath, plant pathologist from the Cornell Univ. Long Island Extension Center, points out that this Latin name is apt: it means “plant destroyer”. This is the same pathogen that caused the Irish potato famine back in the 1840s. Normally late blight hits our region rarely, and late in the season, but this year it is widespread. Penn State reported it had been confirmed in at least 26 counties by the end of July. Tomato transplants grown in the south and shipped to “big box” stores all over the Northeast were apparently infected with late blight. The disease turned up in home gardens all over the region, and the cool wet weather this June enabled wide dispersal of the deadly spores.

What does it look like?

The first symptoms of Late Blight on tomatoes are small, dark, circular to irregularly shaped lesions, which appear on the leaves and stems 3 to 5 days after infection. These can appear all over the plant, especially if the weather is humid. During cool, moist weather, lesions expand rapidly into large, dark brown or black spots that look water-soaked. In humid conditions, the underside of the leaf spot will show a grey or whitish powdery substance, that is primarily spores. You may also see a white velvety coating over the spots and stems, especially when it is damp in the morning. (see excellent [photos on the Cornell website](#)). This looks quite different from Early Blight (*Alternaria solani*) – in Early Blight the lower leaves start to show yellow spots, then mottling, and then brown circular spots appear with eventually a “bulls-eye” pattern. Early Blight is an annual problem, and leaves die from the bottom up, but it does not kill the plants off rapidly like Late Blight.

Can it be controlled organically?

While conventional growers have an arsenal of fungicides they can use to protect their crops, organic growers have very few. Once plants have been infected, it is very difficult to stop this disease. Copper sprays are effective as protective materials, but they do not work to kill the fungus already in the plant. If the infection is not too bad, and you spray right away, and then monitor daily to prune any affected leaves, AND the sun shines, you may be able to limit the damage.

Here is some advice for organic farmers from Dr. McGrath of Cornell and Dr. Steve Johnson, University of Maine about **managing late blight in organic systems**.

1. Check with weather reports and extension service for information about late blight occurrence. Note that during cloudy conditions spores of the late blight pathogen can survive being dispersed in wind currents long distances (miles!) because they are protected from the killing effects of UV radiation. Rain can bring these spores down on to plants far from the affected plants that were their source.

2. Apply fungicides preventatively, using a 5-7 day schedule when conditions are favorable. Copper is effective for protecting a crop, but copper has been found to be ineffective when used as the sole practice for controlling late blight once it has started to develop. Thorough spray coverage is critical since copper is a contact fungicide. Use a pressurized sprayer if possible, and apply to undersides as well as top of leaves.
3. If symptoms of late blight are found in isolated areas in a planting, it may be possible to save the crop. Success depends on how early in disease development symptoms are found, how many infections are present that have not yet resulted in symptoms (spore germination to symptom takes about 1 week), how quickly and thoroughly diseased tissue will be removed, environmental conditions, proximity to other gardens or farms where late blight is developing, and what management steps will be taken. Immediately remove affected plant tissue. It is best to do this in the middle of a sunny day after the leaves have dried when there will be fewer spores and those dislodged in the process will likely be exposed to UV radiation. Put affected tissue in garbage bags, dig a hole and bury it, or put it in a pile and cover with a tarp. Heat that develops from sunlight hitting the tarp will quicken death of plant tissue and the pathogen. Inspect plants daily thereafter for a week in order to find any additional affected plants that develop symptoms, and then return to inspecting at least once a week. Apply copper fungicides every 5-7 days as indicated on the label until final harvest or the crop is destroyed. It is not possible to control late blight by solely relying on removing affected tissue. Even when rain is not occurring, dew over night can provide a sufficient leaf wetness period for infection. Especially when conditions are favorable it may not be possible to control late blight with copper. Monitor disease development and be prepared to destroy fields if it gets out of hand.
4. Work in affected fields last. Clean equipment between fields.
5. When late blight starts to become severe the foliage should be destroyed to eliminate the planting being a source of spores for other tomato or potato plantings on the farm or other farms. Propane flamers are a good way to quickly kill foliage, but are not suitable where tomatoes are grown with straw or plastic mulch or trellised. This is an obligate pathogen that needs living host tissue to survive. To initiate plant death with trellised tomatoes, go through the planting and cut all main stems at the base, then come back through and cut stems further up in the canopy. Disturb foliage as little as possible to minimize the amount of spores dislodged. It is best to do this work in the middle of a sunny, preferably calm day after any moisture on leaves has dried to minimize the quantity of spores and also their likelihood of survival in the process. Next remove trellising line and stakes, then flail chop. Bagging affected tissue or burying is recommended where feasible with small plantings.

The late blight pathogen is not thought to be able to survive in plant debris; therefore it is not necessary to physically remove affected plant tissue from a field.

The late blight pathogen cannot survive on stakes, therefore it is not necessary to trash or

even disinfect the stakes to manage this disease. Stakes should be disinfected however, especially if bacterial diseases also developed in the planting.

9. Fruit from an affected field can develop symptoms after harvest and thus should be inspected just before marketing.
10. **For potatoes:** monitor and spray as above. When late blight starts to become severe the foliage should be destroyed to protect the tubers from infection and to eliminate the planting being a source of spores for other tomato or potato plantings on the farm or other farms. It is especially important to vine kill when late blight is developing on stems because from this location spores can more easily be washed down to tubers than from leaves. Destroy foliage in the middle of a sunny, preferably calm day after the leaves have dried to minimize the quantity of spores and also their likelihood of survival in the process. Propane flammers are a good way to quickly kill foliage. Flail chopping is another option.

Applying copper fungicide to protect stems that remain from late blight is not recommended because conditions are much less likely to be favorable for infection once all the foliage is removed. Do not hill potatoes that remain in the field in an effort to protect the tubers because the pathogen can be easily spread on equipment, and the root pruning that will occur may stop plant growth for several days.

11. Harvest tubers after foliage has died but before significant rainfall is predicted. Waiting two weeks to harvest after vine kill is considered to provide an adequate time for spores to die. Rain can wash spores down to tubers. And tubers should not be harvested when wet. Infection is more likely to occur when soil temperatures are cool (below 54F). Avoid bruising and skinning while harvesting. 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.
12. **Destroy any affected tubers. This is how the pathogen survives over winter.** Late blight cannot live on dead plant tissue, it only survives here on potato tubers (not in tomato plants or debris). It is important to destroy all cull potatoes left in the field. Recommended methods include chopping, burial, burning, spreading on fields where they will freeze completely over winter, or feeding to livestock.
13. Promptly destroy any volunteer potatoes in subsequent years. These can be a source of the late blight pathogen

Current OMRI approved copper products:

Champ WG by Nufarm

COC WP by Albaugh

Nu Cop 50WP by Albaugh

Concern Copper Soap Fungicide - by Woodstream

Cueva Fungicide Concentrate by Neudorff
Lilly Miller Cueva Copper Soap Ready to Use by Lilly Miller
Nordox 75 WG by Nordox

PCO has also approved:

Soap-Shield Flowable Liquid Copper Fungicide by Gardens Alive
Liquid Copper Fungicide Concentrate by Bonide

It is important to follow all label instructions when applying copper products. There is a 24 hour restricted entry interval and other worker protection requirements when applied to crops intended for market.

Other organic approved biological products that have labels for late blight include Sporatec (plant essential oils including rosemary, clove and thyme oil), Serenade, Sonata (both are *Bacillus subtilis* products), and Oxidate (hydrogen peroxide, peracetic acid). There is little data about effectiveness of any of these products however.

CROP LOSS:

If you anticipate a crop loss, please contact a representative from your County Emergency Board to file a loss report. A representative would be the County Agricultural Agent or a representative from the local Farm Service Agency (FSA) or Natural Resource Conservation Service (NRCS). All growers should contact their crop insurance agent, if insured. This is important because the county emergency representatives will document the loss, submit it to the State Emergency Board, who will make a recommendation to Sec. Wolff regarding requesting a disaster designation from the USDA via the Governor's Office. This may make funds available for compensation.

For more information:

Cornell website: with excellent photos and links to more info, including a advice on what to do with initial outbreaks:

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

Penn State Dept. of Plant Pathology website: includes latest updates on disease outbreaks in PA.
<http://www.ppath.cas.psu.edu/>