Late blight has been confirmed on tomato from a home garden in Adams County (8/16/2012). Symptoms were consistent with those of late blight and subsequent testing confirmed the diagnosis. This is the first report of late blight on tomato in Wisconsin this year.

Confirmations of late blight this season have been on potato in Barron, Adams, Portage, Oneida, and Waushara Counties. All samples of late blight tested by allozymes analysis so far are US-23, a prolific spore-producing strain that is pathogenic on potato and tomato.

Managing Late Blight in Tomatoes

**Introduction:** Late blight is a potentially destructive disease of tomatoes (and potatoes) caused by the fungal-like organism, *Phytophthora infestans*. This pathogen is referred to as a ‘water mold’ since it thrives under wet conditions. Symptoms of tomato late blight include leaf lesions beginning as pale green or olive green areas that quickly enlarge to become brown-black, water-soaked, and oily in appearance. Lesions on leaves can also produce pathogen sporulation which looks like white-gray fuzzy growth. Stems can also exhibit dark brown to black lesions with sporulation. Fruit symptoms begin small, but quickly develop into golden to chocolate brown firm lesions or spots that can appear sunken with distinct rings within them; the pathogen can also sporulate on tomato fruit giving the appearance of white, fuzzy growth. The time from first infection to lesion development and sporulation can be as fast as 7 days, depending upon the weather. In Wisconsin, late blight has been reported in each of recent years since 2009, after having an approximately 7 year period (2002-2009) without detection. We know that the predominant clonal lineage (strain or genotype) of *Phytophthora infestans* that we have in WI this season is US-23 and can be aggressive on tomato and potato. Based on the biology of the pathogen, we know that this A1 mating type late blight strain cannot produce persistent overwintering spores in the soil without pairing with a strain of the opposite (A2) mating type. However, the pathogen can overwinter on infected plant material that is kept alive through the winter. Such plant materials can include late blight infected tomato plants kept warm in a compost pile and late blight infected potato tubers that remain in the soil after harvest or are stored in a warm place. For this reason, do not compost late blight infected tomatoes or potatoes, do get seed potatoes from a certified clean source, and do control volunteer tomato and potato plants in your 2013 planting. Although the late blight pathogen has the potential to infect
other plants in the Solanaceae family (tomato, potato, pepper, eggplant, nightshade weeds), we have seen late blight on just tomatoes and potatoes in recent years.

Management: Every effort should be made to avoid introducing late blight into the production field. This includes getting potato seed from certified clean sources and purchasing only healthy-appearing tomato transplants (or raising your own transplants from seed). There are tomato varieties with varying levels of resistance to late blight. A list of tomato varieties with documented late blight resistance can be found at the “Late Blight” tab of the UW-Vegetable Pathology website cited at the start of this document. Once late blight has been identified in a region, it is critical that tomato plants be protected prior to first infection. Although there are several fungicides registered for control of tomato late, there are considerations to be made for your specific production system.

For organic production, coppers are most effective if applied before initial infection and applied repeatedly. Copper products must be present on new foliage in order to have a protective, disease-slowing effect, so repeat sprays are necessary. Little disease control can be had when copper applications are made only after disease onset. A recent study compared copper and non-copper containing organic-approved fungicides for late blight control on potato. Results from these replicated trials showed that the best organic-approved fungicide for potato late blight control was copper (Dorn, et al. 2007. Control of late blight in organic potato production: evaluation of copper-free preparations under field, growth chamber, and laboratory conditions. Eur. Journal of Plant Pathology 119:217-240). If you are a certified organic grower, check with your certifying agency as to what copper products you can use. From year to year, the list of OMRI-approved coppers may change.

In the laboratory, my research group has evaluated several organic fungicides for control of late blight on tomato. Our results indicate great variability in efficacy – and we have evaluated the application of materials only in advance of disease (prior to inoculation with US-23 late blight pathogen). We are interested in further evaluating the potential of these fungicides for use in...
Foliar disease control of vegetables, as the timing of their application in the disease cycle may prove useful in developing an overall program. However, at this time, we do not have conclusive or field level data supporting use of non-copper materials for effective late blight control.

For conventional production, there are many fungicides registered for managing tomato (and potato) late blight. A complete list of registered products can be found in the University of Wisconsin Extension publication entitled Commercial Vegetable Production in Wisconsin Guide A3422 (available at the UW-Extension Learning Store). Previous newsletters further describe effective fungicides for late blight control. Archived newsletters can be found at the UW-Vegetable Pathology website (link above). For smaller operations or home gardens, the list is a bit more narrow and includes products which contain chlorothalonil and/or copper. Both products can be effective when applied in advance of initial infection and when applied repeatedly, if conditions remain favorable for disease. Be sure to follow all label instructions to ensure that the product you select is used in the safest, most effective means possible.

For home gardeners: Scouting plants on a daily basis is recommended. Management of late blight in the home garden can result in healthy produce for the gardener and limits the amount of inoculum which can contribute to larger commercial epidemics that can be costly and require use of additional pesticides to control. We recently released a fact sheet which list fungicides available to the home gardener (link below). Fungicides containing chlorothalonil or copper can be effective. Home gardeners with no or limited experience in using pesticides should pay close attention to the label instructions and consult a UWEX county agent for assistance. If late blight has become out of control, plants should be destroyed to limit production of more spores which lead to new infections.

http://www.plantpath.wisc.edu/wivegdis/pdf/2012/Home%20Garden%20FungicidesLC.pdf

Frequently asked questions

Where did this late blight come from?
Based on symptoms, timing of appearance of symptoms, and spread of this disease in WI, it is likely that inoculum (source of spores for late blight infection) entered the state on air that had moved into WI. The late blight pathogen produces a lot of spores on infected plants and spores can move in air up to 40 miles. Many states have experienced late blight epidemics on tomatoes and potatoes this season. Such states include: CA, CT, FL, MA, ME, NC, NH, NJ, NY, PA, VA, VT, and WI.

Where can I find more information on tomato late blight symptoms and management?
http://www.plantpath.wisc.edu/wivegdis/
http://www.extension.org/article/18351
http://www.extension.org/article/18361
http://www.attra.org/attra-pub/lateblight.html

How do I destroy and/or dispose of my late blight-infected tomato plants?
There are several methods of destroying infected plants: 1) pull up plants by the roots, bag, leave in the sun for a few days for plant and pathogen to die, and put out for trash pickup. This method
is OK for a few plants. 2) For many infected plants, plants can be cut at the base and allowed to
die in place. Once plants are dead, you can go in and remove stakes, strings, and plastic and
dead plant material can be incorporated into the soil. Shallow incorporation of debris is
recommended to avoid creating a warm, sheltered environment which would keep the plant
tissue and pathogen alive for extended periods of time beneath the soil surface. 3) Plants can be
flame-killed with a propane or other torch; and 4) infected plants can be pulled and placed in a
small pile covered over with a dark colored plastic tarp and left in the sun.  This will create heat
in the pile from the sun beating on the plastic tarp and plants will die within a few days.  The
winter will provide an excellent freeze kill for exposed infected plants. Do not compost late
blight infected plant material, as many piles may have warm centers that can allow plant material
and the pathogen to remain viable.  The goal is to kill the plants and this will kill the pathogen.

*Are tomato fruits from late blight infected tomato plants safe to eat?*
Healthy-appearing fruit from late-blight-infected tomato plants are safe for human consumption.
If they have been infected, but aren't yet showing symptoms, they won't keep in storage. There
are some concerns about canning infected fruit because bacteria can enter late-blight infected
fruit and impact quality.  UW-Extension food science extension specialist, Dr. Barbara Ingham
recommends avoiding canning tomatoes that exhibit late blight infection. Further information:

*How fast will late blight infected tomato plants die?*
This depends upon how many points of infection the plant received, the cultivar (some cultivars
are more susceptible than others), the history of use of protectant fungicides (such as copper),
and on the weather. Hot, dry, sunny weather typically holds back late blight; whereas cool,
rainy, overcast weather will cause late blight to progress rapidly killing the plant in 7 to 10 days.

*I have tomato late blight in my garden – will I get it next year if I plant tomatoes again?*
The strain of late blight that we have detected in WI in 2012 (US-23) cannot survive outside of
living plants. It requires living plants or plant parts to remain viable and infective. Therefore, it
is critical to kill infected tomato plants and plant parts such as fruit. Infected potato tubers can
also serve as a source of overwintering inoculum and should be destroyed.

*Can late blight be seedborne in tomatoes?*
Generally, the late blight pathogen is not considered a seedborne pathogen in tomato.

In order to help better understand the epidemic at hand, please submit samples to my lab or work
through your county agent and request that they send to me for genotyping.  All we need to know
is the county of sample origin, we do not need to have specific field or grower information
associated with the sample. Identification of genotype at the county level would be very helpful.
Lab address:  Amanda Gevens, 1630 Linden Dr, Room 689, Plant Pathology Dept., University of
Wisconsin, Madison, WI 53706. Please send infected leaves in a slightly inflated ziplock bag
with no paper towel. Overnight shipping is best.

For further information on any fungicides that may be mentioned in this newsletter, please see the 2012 Commercial
Vegetable Production in Wisconsin Guide A3422. An online pdf can be found at the link below or a hard copy can
be ordered through the UWEX Learning Store.
http://learningstore.uwex.edu/assets/pdfs/A3422.PDF