

TOMATO LATE BLIGHT: FALL CLEAN-UP

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Some of the information is adapted from Luke LaBorde, Penn State Food Science and Meg McGrath, Vegetable Extension Pathologist, Cornell, LIREC

Now that the growing season is coming to a close, many home gardeners, consumers and growers are asking about processing fruit from infected plants, treating soil in gardens where late blight was observed and/or preventing late blight next season. Below are answers to some of the more frequently asked questions that I have received the past several weeks.

Are tomatoes from late blight infected plants safe to can/process?

Yes, if the fruit are not showing symptoms of late blight. Not all the fruit on a late blight infected plant will develop symptoms. If tomatoes are harvested early from infected plants leave them on the counter for several days and check daily for the development of symptoms. There is a latent (waiting) period between when a spore of the pathogen lands on the fruit and visible symptoms develop. If symptoms develop, discard the fruit. If symptoms do not develop then they are safe to use. If harvesting ripe tomatoes, process healthy fruit as quickly as possible. The USDA Complete Guide to Home Canning (1994 ed) recommends that canners select only disease-free, preferably vine-ripened, firm tomatoes for canning. The reason for this recommendation is that fungus infection may raise the pH of the tomato flesh to a level that makes it unsafe for canning.



Luke LaBorde, Penn State Food Science, recommends not using any tomatoes showing signs of late blight for canning. This even applies to tomatoes with only minor lesions because the infection could have spread to the interior of the fruit. Internal infection is not always clearly visible and the internal fruit may look healthy when in fact is could be infected with late blight. It is safe, however, to process disease-free tomatoes that are growing on plants with leaves, stems or adjacent fruit that show symptoms of infection. As an extra level of protection, remember to follow the acidification directions for all tomato products in the USDA Complete Guide to Home Canning (http://www.uga.edu/nchfp/publications/publications_usda.html):

To ensure safe acidity in whole, crushed, or juiced tomatoes, add two tablespoons of bottled lemon juice or ½ teaspoon of citric acid per quart of tomatoes. For pints, use one tablespoon bottled lemon juice or ¼ teaspoon citric acid. Acid can be added directly to the jars before filling with product. Add sugar to offset acid taste, if desired. Four tablespoons of a 5% acidity vinegar per quart may be used instead of lemon juice or citric acid.

He also does not recommend that consumers eat fresh or freeze diseased tomatoes. Although the disease organism by itself is not harmful to consume, the damaged tissue can create conditions that are more favorable

for other potentially harmful microorganisms. "When in doubt, throw it out." For more information from Luke LaBorde see <http://foodsafety.psu.edu/LateBlight.htm>.

Can plants with late blight be disposed of by composting?

In theory if done correctly, however (if you are like me) often this is not achieved. Proper composting involves going through both the active and curing phase of composting. The duration of the process is dependent on the inputs (original materials), composting method used and compost pile management; it can take as little as three months or as long as a year. The composting of diseased plant material and weeds is generally not recommended because of the potential spread of weed seeds and disease-causing pathogens when the compost is applied and incorporated back into the garden. Plant tissue can survive in the center of a warm compost pile. As long as the plant tissue is alive, the pathogen can survive.

Late blight can survive in infected potato tubers overwinter and can be a potential source of the disease the next year. Therefore, potato tubers should not be dumped on top of a compost pile. If they are infected, it is best to dispose of them in the regular trash. Another option would be to chop-up infected tubers and spread on the soil surface so they freeze overwinter thus killing both the plant tissue and late blight pathogen. Next season it will be important to destroy all volunteer tomato and potato plants. For additional information on backyard composting check out http://backyardcompost.cas.psu.edu/howiscompostmade/how_is_compost_made.html. Also, guidelines have been developed on composting cull potato tubers for commercial operations: <http://www.umaine.edu/umext/potatoprogram/Fact%20Sheets/Composting%20Cull%20Potatoes.pdf>.

Unless you know that you are composting properly, it is still recommended that you dispose of infected plants, fruit and tubers in the trash. Keep in mind...kill the plants and this will kill the pathogen! The pathogen cannot survive outside of living plant tissue.

Do I need to treat the soil this fall to prevent late blight from developing next year?

No. The late blight pathogen is an obligate pathogen and thus requires living plant tissue to survive overwinter. Once the tomato plant tissue is dead, the pathogen cannot survive on the crop debris like many other vegetable pathogens. The specialized overwintering survival structure (oospore) of the late blight pathogen requires two mating types (equivalent to male and female) to go through sexual reproduction and form. To our knowledge, there is only one mating type in Pennsylvania and the Northeast. Without the compatible mating type, no oospores form and therefore there is no risk of this season's late blight surviving in the soil and being a source of the disease next season. This means that there is no need to treat the soil this fall or next spring to prevent late blight next year. The late blight pathogen can, however, survive in potato tubers, so it will be important to destroy any volunteer plants next year. Both mating types have been found in Florida.

Can the late blight pathogen survive in or on tomato seed?

No. Fortunately this pathogen is not able to get inside seed and it does not produce a type of spore that is able to survive on the outside of the seed. Thus there is no concern that late blight will develop as a result of growing plants next year from seed that were in tomato fruit infected with late blight. There are other pathogens (especially bacterial pathogens) that can survive in and/or on the seed thus there are other reasons to only use seed from healthy plants.

Could the late blight pathogen survive on tomato cages and stakes between seasons?

No. Therefore, it is not necessary to discard or even disinfect the cages or stakes to manage this disease. It is a good idea, however, to disinfect stakes and cages to help control bacterial diseases (bacterial spot, bacterial speck and/or bacterial canker). These bacterial pathogens can survive overwinter in the cracks and crevices and be a source of the disease next season. Disinfectants include: quaternary ammonium chloride salts (e.g. Green-Shield), sodium hypochlorite (Clorox or other household chlorine bleach 5.25%, so use 0.5% = 1 part bleach + 9 parts water), and hydrogen dioxide (e.g. OxiDate). Clean off soil and organic matter first because

this inactivates disinfectants and can protect pathogens that are inside. This is especially important when using bleach. Soak at least 10 minutes. Disinfectant solution can be reused until it becomes dirty or ineffective (replace Green-Shield after 24 hours; half-life for bleach is only 2 hours).

Are there late blight resistant tomato varieties that I should consider planting in the future?

Currently, there are some potato varieties described as having some resistance. These include Elba, Kennebec, Allegany, Sebago, Rosa, Defender, Jacqueline Lee and Ozette. Elba is considered the most resistant. There are some tomato varieties in the final stages of development and are expected to be available as soon as 2010.



What can home gardeners and growers do to prevent another late blight epidemic next year?

Make sure that all late blight infected tomato plant and fruit tissue from this season is dead/destroyed. Once dead, the pathogen can no longer survive since it is an obligate pathogen and cannot survive outside a living host. Destroy potato tubers that appear to be infected by late blight and also volunteer potatoes that grow next year. The late blight pathogen cannot survive in infested dead plant debris, but it can survive in tubers.



Next year, make sure to plant healthy disease-free transplants. Examine your plants regularly for symptoms of late blight, especially if cool wet conditions prevail like this past year. In general, good disease management focuses on creating a less favorable environment for the pathogen. The pathogen survives and spreads more effectively when leaf surfaces are wet. Avoid wet leaves by watering at the base of the plant or by using overhead irrigation during mid-morning so the leaves dry quickly. Improve air circulation by spacing plants farther apart and eliminating weeds. These practices will also help with the management of other common tomato diseases.

For more information please visit

http://www.ppath.cas.psu.edu/EXTENSION/VEGDIS/Vegetable_Pathology_Home.htm and/or contact your local Penn State Cooperative Extension Office.

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