



UMASS
EXTENSION



Vegetable Notes

For Vegetable Farmers in Massachusetts

RECOGNIZING TOMATO BLIGHTS

Growers are justifiably nervous after last year's devastating late blight epidemic and early reports of late blight in New England this season. We've received numerous calls and samples from concerned growers who've spotted something suspicious in their potato or tomato crops. No late blight has been confirmed by the Diagnostic Lab. Now some of the other leaf blights of tomato and potato are appearing. While it's impossible to determine which pathogen is causing leaf symptoms without a lab confirmation, the information in this article may help you to distinguish a possible late blight infection from some of the other common blights.

Late Blight (*Phytophthora infestans*). This is the disease that everyone is worried about this year. Effective management of this disease is largely dependent on an accurate assessment of risk, and knowing where and when the disease is present is a key component in assessing the risk to your crops. The danger with this disease is that, under the right weather conditions, the development and spread of the pathogen can be explosive. This explosive growth is what devastated tomato and potato crops in 2009. The 2009 growing season combined highly favorable weather for the disease (cool and moist) with numerous points of inoculation. Assessing the risk for this season depends on those two things – favorable weather conditions and the presence of the pathogen. We're tracking the weather conditions as well as we're able – see the update on disease forecasting in this issue of Vegetable Notes. We're also trying to assess the presence of the pathogen by scouting fields, analyzing samples that come into the disease lab, and trying to catch the leading edge of the disease development here in Massachusetts.



Late blight lesion on potato. Note the sunken, water-soaked tissue around the dark lesion.

The most common symptoms on tomatoes are sunken, dark green or brown lesions on leaves and brown lesions on stems, with white fungal growth developing under moist conditions. (See images)

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 slightly yellow or has a water-soaked appearance (see image). Leaf lesions begin as tiny, irregularly shaped brown spots quickly grow larger – spots that are consistently small are most likely septoria leaf spot (see below). Brown to blackish lesions develop on upper stems and leaf petioles. These stem lesions are a fairly distinctive of late blight and should definitely raise a red flag. Firm, brown spots develop on tomato fruit.

If the lesion has a yellow border and is occurring on the bottom of plant, it is likely due to infection of either early blight or Septoria spot.



Late blight on tomato. Note the lesions on the stem and petioles.

Septoria leaf spot (*Septoria lycopersici*). Septoria leaf spot is one of the most destructive diseases of tomato foliage and it occurs worldwide wherever tomatoes are grown. This disease can destroy most of a plant's foliage resulting in sunscald,

failure of fruit to mature properly, and low yields. Once infections begin, they can spread rapidly from lower to upper tomato canopy.

Symptoms consist of circular tan to grey lesions with a dark brown margin that appear on lower leaves first, after the first fruit set. If conditions are favorable, lesions can enlarge rapidly, form pycnidia (fruiting bodies that look like black specks) and turn infected leaves yellow then brown. With a 10X hand lens, these black specks can be seen in the center of the lesions. These fruiting bodies, plus the generally smaller size of the lesions, and the absence of target-like circular bands within the lesion distinguish this disease from early blight. The fruiting bodies, smaller lesion size, and associated yellowing of heavily infected foliage help to distinguish this disease from late blight.



Septoria leaf spot on tomato. The small, round lesions and overall leaf yellowing are typical of this disease.

Fruit infection is rare, but lesions occur on foliage, stems, petioles, and the calyx. The pathogen overwinters on infected tomato debris or infected solanaceous weed hosts, and can also survive on stakes and other equipment. Seed infection is possible, but rare. Once introduced, Septoria is spread by splashing water, insects, workers, and equipment.

Early blight (*Alternaria solani*). Early blight occurs on the foliage, stem, and fruit of tomato and also occurs worldwide.



Early blight on tomato. Note the concentric rings in the lesion - this 'target spot' appearance is characteristic of this disease.

It first appears as small brown to black lesions on older foliage. The tissue surrounding the initial lesion may become yellow, and when lesions are numerous entire leaves may become chlorotic. As the lesions enlarge, they often develop concentric rings giving them a 'bull's eye' or 'target-spot' appearance. As the disease progresses, plants can become defoliated, reducing both fruit quantity and quality. Fruit can become infected either in the green or ripe stage through the stem attachment. Fruit lesions can become quite large, involve the whole fruit, and have characteristic concentric rings. Infected fruit often drop and losses of 30-50% of immature fruit may occur. On potato, foliar symptoms are quite similar though complete defoliation rarely results. The concentric rings in the lesions are fairly diagnostic for this disease, and help to distinguish it from either late blight or Septoria.

Management of Septoria leaf spot & early blight. Some varieties of tomato with early blight resistance or tolerance are available, however most tomato cultivars are susceptible to Septoria leaf spot. Adequate nitrogen fertility throughout the season can help delay disease development; lower leaves become more susceptible as the nitrogen demand increases with fruit load and older leaves decline in nitrogen. Protectant fungicide sprays at regular inter-

vals (depending on weather conditions and disease pressure) will delay onset of the disease. Many of the systemic & contact fungicides that are labeled for the control of late blight will also provide control of early blight and Septoria leaf spot. See the New England Vegetable Management Guide for details and current recommendations.

Both pathogens survive between crops on infected plant debris, soil, and other solanaceous host weeds and can be carried on tomato seed. Early blight can be transmitted in infected potato tubers. Rotate out of tomato crops for at least two years, control susceptible weeds, and incorporate debris after harvest. Reduce the length of time that tomato foliage is wet by using trickle irrigation, wider plant spacing, and staking. Keep workers and equipment out of wet fields where possible.

Leaf Mold (*Fulvia fulva*). This disease occurs in both soil and hydroponic production and is most important in poorly ventilated plastic greenhouses. It can occur in the field but is most common in greenhouses. Symptoms



Fulvia leaf mold on tomato. Lesions on the underside of the leaves often appear fuzzy and have been mistaken for late blight. This disease is more common in greenhouse tomatoes.



Fulvia leaf mold on tomato. Lesions on the upper surface of the leaf start out as pale yellow spots with a fuzzy sporulation visible on the underside of the leaf.

look somewhat like late blight. The high temperatures in the greenhouse make late blight less likely, but growers on hyper-alert for late blight have been concerned. Infections begin on older leaves with yellow areas visible on the upper leaf surface. Corresponding to these, on the underside, are areas of olive-green to grayish-purple fuzzy growth where the fungus is making spores. Leaves turn yellow, then brown.

The disease can spread rapidly as spores disperse throughout a greenhouse on air currents, water, insects, and workers.

Management: Start with certified disease free seed. Improve air circulation by adequate row/plant spacing and removal of lower leaves. Avoid the formation of water droplets on leaves by watering in the morning. Reduce relative humidity by a combination of heating and venting, especially at night. Avoid excessive nitrogen fertilization. Remove diseased leaves, place in plastic bag, and destroy. At the end of the crop cycle, remove all plant residue and destroy and disinfest the entire greenhouse.

Many fungicides are registered and effective against these diseases. For organic growers, copper hydroxide products are probably the best option for protectant fungicides. Please see the New England Vegetable Management Guide (www.nevegetable.org) for current management recommendations.

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