

Bacterial spot of Tomato and Pepper

Symptoms

Bacterial spot symptoms include numerous angular spots on leaves, stems and fruits (Fig. 1-4). Lesions initially are water-soaked spots, occasionally surrounded by a yellow halo; mature lesions become tan to brownish-red, and the center may dry out and fall off (Fig. 1, 2, and 4).



Figure 1. Bacterial spot on pepper leaves. Photo: Diana Schultz.

On fruits, young spots have a blister appearance but later turn brown with a scabby appearance (Fig. 3). Lesions tend to be more frequent in areas of the leaf that remain wet longer, such as tips and margins (Fig. 1). Heavily infected young leaves may become deformed or may drop prematurely. On tomatoes, the diseased foliage remains attached to the plants giving them a blighted appearance. Defoliation is more common in peppers than in tomatoes. Defoliation results in sun scald (Fig. 4), secondary fruit rots, and reduced yields. On pepper, lesions of the peduncle induce shedding of blossoms and young fruits (Fig. 4); if young fruits survive the infection they become misshapen. Under dry conditions, lesion centers may dry up and drop off.



Figure 2. Bacterial spot on tomato leaves: top of leaf (top), bottom of leaf (bottom). Photo: Diana Schultz.



Figure 3. Bacterial spot on immature tomato fruit. Photo: Diana Schultz.

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Figure 3. Bacterial spot on pepper fruit. Spots on peduncle, blossom shedding (top); sun-scald as a result of defoliation (bottom). Photo: Diana Schultz.

Causal Agent

Bacterial spot is caused by several species of bacteria in the genus *Xanthomonas*: *X. euvesicatoria* = [*Xanthomonas axonopodis* (syn. *campestris*) pv. *vesicatoria*], *X. vesicatoria*, *X. perforans*, and *X. gardneri*. There are strains virulent only on pepper, others only on tomato, and some others virulent on both, pepper and tomato. Pepper and tomato are the main hosts.

Inoculum Source and conditions

Contaminated seed, infected transplants and volunteer hosts are the main inoculum sources. Bacteria can also survive on plant debris in the soil. When temperatures are warm (75°F and above), and humid weather, that supports leaf wetness periods of 24 hrs or longer, is present, bacteria multiply, and spread by rain splash or irrigation. Bacteria enter the host through stomata, hydathodes, or wounds. The disease is very damaging in transplant houses, where crowding, high humidity and frequent irrigation provide the ideal conditions for bacterial multiplication and spreading. Lesion size and severity increase in the presence of high humidity. Many cycles of disease may occur per season if conditions remain favorable.

Management

- Use disease-free or treated seed, and disease-free transplants. Cultivars with resistance to some of the strains are readily available and should be used; there is no cultivar with resistance to all the known strains available yet.
- Remove and destroy vines, and plow under plant debris.
- Destroy cull piles; remove volunteer hosts and weeds.
- Rotate tomato and pepper crops with non-host crops.
- Avoid or limit overhead irrigation to reduce the time that leaves remain wet to less than 24 hrs.
- Avoid handling plants while wet. Work healthy areas of the field first and decontaminate tools frequently.
- If non-organic production, apply streptomycin before transplanting. After transplanting, apply copper (organic/inorganic) to protect foliage and fruits. It is important to keep the plant protected before and during rainy periods, to avoid infection. There is no curative control.
- Biological control with bacteriophages has been successful in transplant production.

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