College of Agriculture, Food and Environment
Cooperative Extension Service

Plant Pathology Fact Sheet **PPFS-VG-06**

Bacterial Canker of Tomato

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Importance

Bacterial canker is a potentially serious disease of tomato that can occur in commercial plantings and residential gardens. This infectious disease is capable of spreading rapidly, resulting in devastating losses. In addition, the pathogen can be difficult to eradicate once it has been introduced into a greenhouse, garden, or field.

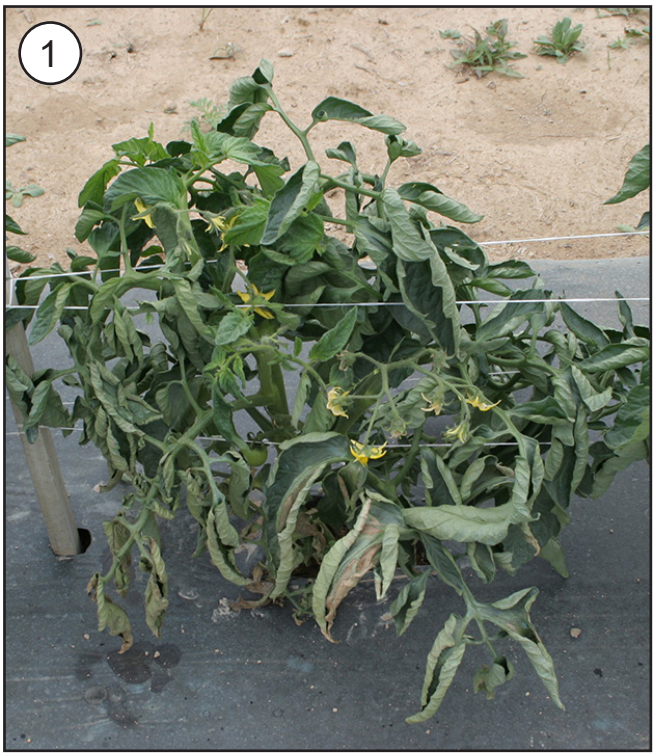

Figure 1. Wilting is often the first indication that tomato plants are affected by bacterial canker. **Figure 2**. Stem canker and pith necrosis develop as a result of bacterial canker.

Symptoms

Aboveground parts of tomato plants of all ages are susceptible to bacterial canker.

Seedlings

Infected seedlings may not show symptoms until after transplanting. Most seedling infections occur as a result of infested seed. Seedlings initially develop brown-black areas on leaf margins. Plants may become stunted and/or wilt. In many cases, affected seedlings die.

Established plants

Wilting is often the first symptom observed on mature plants (Figure 1), although this symptom can occur with other diseases and abiotic issues. Later, infected stems split, resulting in open cankers that give this disease its name. When cut lengthwise, the vascular system of diseased stems has a reddish-brown discoloration. Stem centers (pith) may be discolored and grainy or pitted (Figure 2).

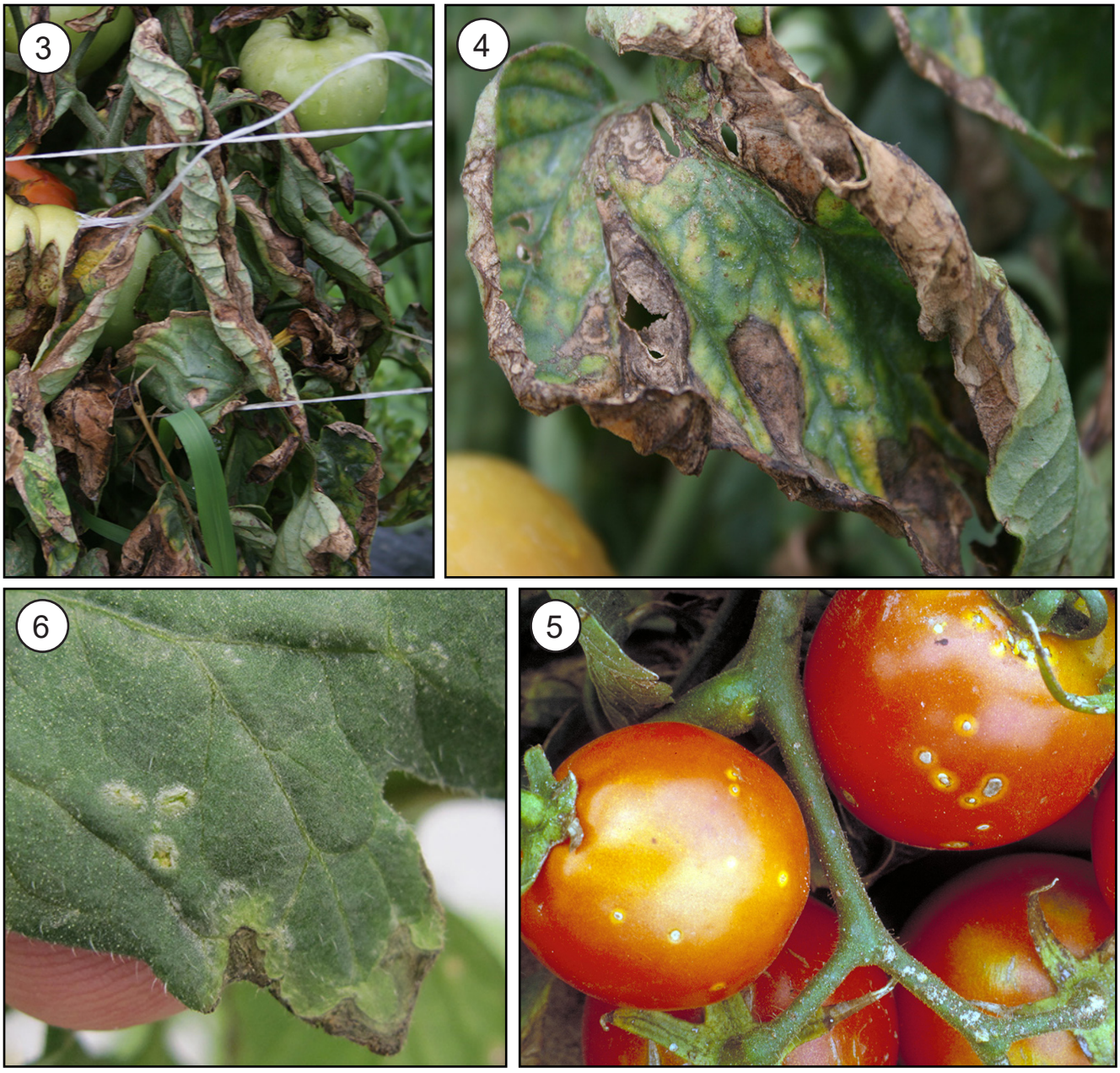

Figure 3. Marginal necrosis of older leaves (often called "firing") occurs as a consequence of foliar infections. **Figure 4.** Close-up of a tomato leaf showing "firing" symptoms. **Figure 5.** Secondary infections from rain-splashed bacteria cause blister-like lesions. **Figure 6.** Infected fruit develop "birds-eye" spots that reduce fruit quality.

As symptoms progress, marginal browning or necrosis (also called "firing") becomes evident on older leaves (Figures 3 & 4). Firing occurs when the pathogen is present on leaf surfaces, causing foliar infections. Brown (necrotic) leaf tissues may have a yellow border, and affected leaves tend to curl upward. Secondary foliar infections from rain-splashed bacteria develop circular, somewhat raised lesions with brown centers and white-tan margins (Figure 5).

Fruit

The primary fruit symptom appears as raised lesions with white margins (Figure 6). These "bird's eye" spots, which can reach 1/4 inch in diameter, reduce fruit quality. A yellow to brown internal breakdown of fruit can occur when the bacterium invades the fleshy tissue.

Cause & Disease Development

Bacterial canker is caused by the bacterium *Clavibacter michiganensis* subsp. *michiganensis* (*Cmm*). This organism is introduced into plantings primarily via infected seed or transplants. *Cmm* can be present at low levels on symptomless plants, multiplying rapidly when favorable weather conditions are present.

The pathogen enters through leaf stomata and/or small wounds, and plants become systemically infected. *Cmm* is spread within plantings by splashing rain and human activity. Warm temperatures (75°F to 90°F), along with high moisture or relative humidity, favor disease development. Once established, *Cmm* can survive on plant residues for as long as 3 years, and this pathogen will persist on stakes and equipment for up to 7 months.

Disease Management

Managing bacterial canker can be difficult once symptoms are observed. A preventative disease management program is the best defense.

Planting stock

- Use certified pathogen-free seed and transplants. Currently, there are no cultivars resistant to this disease.
- Do not transplant seedlings with symptoms.
- Avoid saving seed from previous crops unless necessary (e.g., heirloom tomatoes).
  - If seed must be saved, avoid collecting from obviously diseased plants.
  - Saved seed should always be hot-water treated or soaked in a solution of bleach (1 part bleach to 3 or 4 parts water) to eliminate this pathogen and any others that might be present. For more information on the specifics of seed treatment, refer to Appendix I in the UK Cooperative Extension Service Publication ID-36, *Vegetable Production Guide for Commercial Growers*.
  - Heirloom tomato producers should treat seed routinely since they face greater risks from seedborne pathogens.

Crop rotation

- In the field, rotate away from tomatoes and other solanaceous crops for at least 3 years.

Sanitation

In greenhouses

- Remove and destroy symptomatic plants as quickly as possible. Wash hands thoroughly after handling diseased plants.
- Clean up plant and soil debris from benches and greenhouse floors between production cycles. Wash soil and other debris from containers, trellis materials, surfaces, and tools.
- Sanitize benches, tools, and equipment with 10% bleach (1 part bleach to 9 parts water), quaternary ammonias, or other commercial disinfectants before starting a new crop.
- Do not re-use potting media.

In gardens and fields

- Remove symptomatic plants and their immediate neighbors from the production area; bury or burn in a non-cropping area (this may not be practical if more than a few plants are affected).
- Metal trellis materials can be sanitized with 10% bleach (1 part bleach to 9 parts water), quaternary ammonias, or other commercial disinfectants. Wooden stakes used in infested fields should be destroyed; they are difficult to clean and properly sanitize due to their porous nature.
- If bacterial canker was a problem the previous year, sanitize implements, tools, and cages prior to use.

Other cultural practices

- Irrigate early in the morning to minimize the length of time that foliage remains wet.
- Use drip irrigation or a soaker hose rather than overhead irrigation once plants are transplanted to gardens or fields.
- Avoid working plants when the foliage is wet; bacterial canker can easily be spread when stringing, suckering, or harvesting tomatoes.
- Incorporate crop residues into soil as quickly as possible at the end of the growing season to promote thorough breakdown of potentially contaminated plant material.

Chemicals

- Applications of fixed copper plus mancozeb may reduce secondary spread of bacterial canker, and Actigard may reduce disease severity. However, preventing introduction of *Cmm* into plantings is by far the most effective management strategy.

Additional Resources

- Greenhouse Sanitation (PPFS-GH-04)
https://plantpathology.ca.uky.edu/files/ppfs-gh-04.pdf

- Home Vegetable Gardening (ID-128)
http://www2.ca.uky.edu/agcomm/pubs/id/id128/id128.pdf

- IPM Scouting Guide for Common Pests of Solanaceous Crops in Kentucky (ID-172)
http://www2.ca.uky.edu/agcomm/pubs/id/id172/id172.pdf

- Vegetable Production Guide for Commercial Growers, ID-36 (University of Kentucky)
http://www2.ca.uky.edu/agcomm/pubs/id/id36/id36.pdf

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