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Bacterial Leaf Spot: *Pepper and Tomato in the Greenhouse*

Greenhouse-grown pepper and tomato transplants and seedlings allow for earlier field production. The greenhouse environment also is conducive to the development of bacterial leaf diseases. This e-GRO Alert focuses on identification and control of this problem.

Bacterial leaf spot, caused by four distinct species of *Xanthomonas* (*X. vesicatoria*, *X. euvesicatoria*, *X. perforans*, and *X. gardneri*), can affect tomato and one of these species (*X. vesicatoria*) also can affect pepper. In the greenhouse, the bacteria can be introduced by diseased transplants or infested seed. The bacteria may reside in crop debris in re-used pots or trays, contaminated equipment, and on volunteer tomato and pepper plants.

Conditions for disease development are ideal in the greenhouse situation; overhead irrigation, dense plant spacing, and a warm (75-86 °F), humid environment encourage disease development.

Bacterial leaf spot can occur on all above-ground parts: leaves, stems, and fruit. On leaves, spots may have a water-soaked (or greasy) appearance, particularly during heavy, wet periods (Fig. 1). Spots eventually turn dark brown and the area around the spots will turn

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Figure 1. Water-soaked spots associated with bacterial leaf spot on pepper transplants.
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yellow (Fig. 2). Spots generally are no bigger than about 3-5 mm, but spots may coalesce and result in a blighted appearance of the lower or affected leaves (Fig. 3). See Figures 4 to 6 for a similar progression of symptoms on tomato.

Management of bacterial leaf spot on tomato and pepper requires an Integrated Pest Management approach:

- 1. Ensure seed and transplants are disease-free.** Raw seed should be treated with a 1% hypochlorite (bleach) solution, hydrochloric acid treatment, or hot water treatment. Be sure to test these treatments on a small lot of seed (100) and germinate them to calculate germination rate before treating the entire lot. For more information see the Southeastern US Vegetable Crops Handbook. For transplants, purchase from a reputable source and only purchase healthy seedlings.
- 2. Minimize leaf wetness in the greenhouse.** Water plants when the leaves will dry quickly (i.e., in the morning and early afternoon). Avoid watering plants just before dusk to minimize leaf wetness overnight.



Figure 2. Bacterial leaf spot on pepper transplants. The spots turned dark brown and the area around the spots turned yellow. Photo copyright by Brian Whipker

3. Minimize handling plants, particularly when wet. Avoid handling plants when wet as this will spread the disease more rapidly.

4. Sanitize greenhouse structures and equipment between crops. The bacteria can survive on equipment such as benches, trays, flats, hand tools, and other structures. Use new trays for each crop. If trays must be re-used, ensure that ALL crop debris and soil are removed from the trays before sanitizing. Foam trays are best sanitized by steam treatment. For more information, see the North Carolina Ag Chemical Manual.

5. Remove volunteer tomatoes and peppers. Avoid any weeds inside or just outside the greenhouse structure. This strategy is important for other tomato and pepper diseases, as well.



Figure 3. Over time, spots may coalesce and result in a blighted appearance of the lower or affected leaves.
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6. Apply preventative pesticides, if history of disease. In the greenhouse, seedlings may be treated with streptomycin, copper-based bactericide applied with mancozeb, or bacteriophages such as Agri-Phage. Follow all label instructions—it is the law. If there is a history of copper-resistant or streptomycin-resistant strains from the

greenhouse, avoid the use of that active ingredient.

Resources:

Southeastern US Vegetable Crops Handbook

http://www.thepacker.com/sites/produce/files/SE%20Veg%20Guide%202016_COMPLETE%20PDF%20optimized.pdf

North Carolina Ag Chemical Manual

<http://content.ces.ncsu.edu/north-carolina-agricultural-chemicals-manual/disease-control>

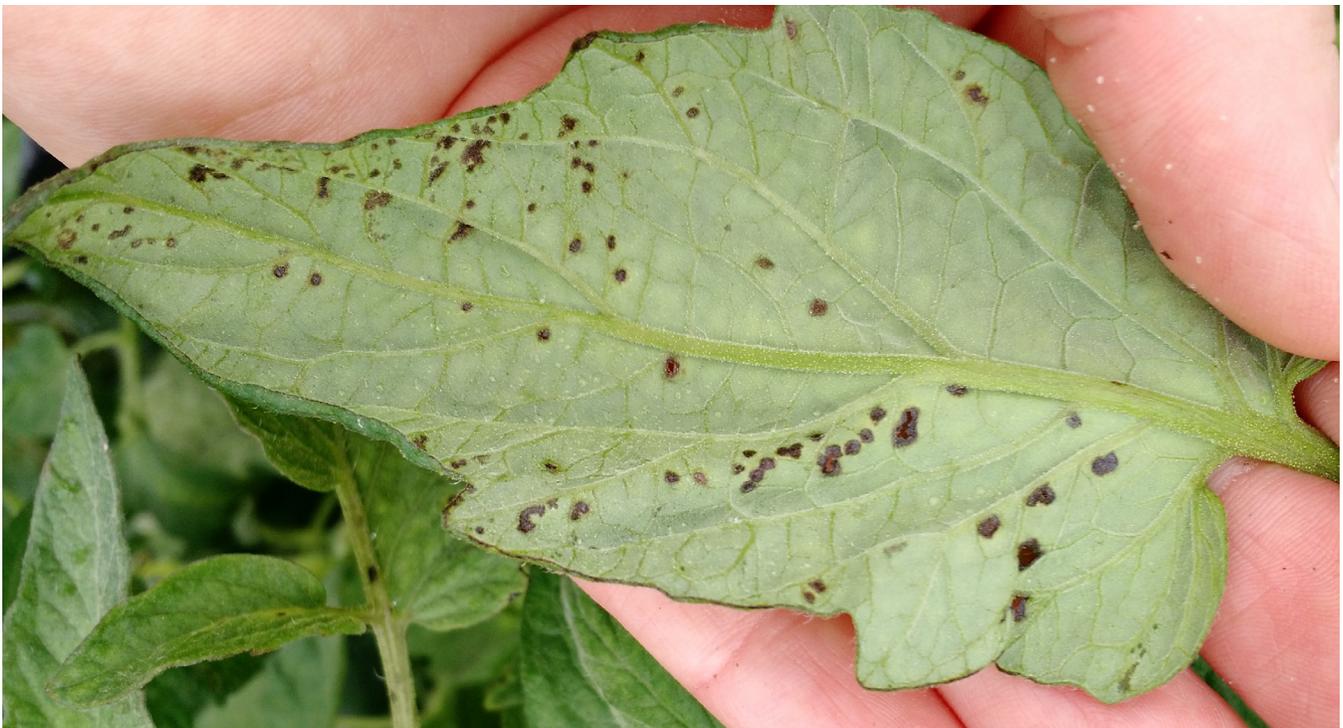


Figure 4. Water-soaked spots associated with bacterial leaf spot on tomato transplants. Photo copyright by Erin Eure, Area Socialized Extension Agent - Fruit and Vegetable Crops, Eastern NC



Figure 5. Bacterial leaf spot on tomato transplants. The spots turned dark brown and the area around the spots turned yellow.
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Figure 6. Over time on tomato, spots may coalesce and result in a blighted appearance of the lower or affected leaves.
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