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BACTERIAL LEAF SPOT OF HERBACEOUS ORNAMENTALS

Bacterial leaf spot is a common foliar disease on many annual and perennial ornamental plants including begonias, geraniums, poinsettias, zinnias, chrysanthemums, salvias, lavenders, ferns, and Shasta daisies in greenhouse, nursery and landscape settings. When conditions are conducive, bacterial leaf spot can cause yellowing and browning of leaves and early defoliation, which may significantly reduce the quality of the ornamental plant although the disease may not kill the plant.

Figure 1. Water-socking and brown angular spots on a zinnia leaf.

Figure 2. Water-socking lesions and blights on a zinnia flower.

SYMPTOMS AND DIAGNOSTICS

Bacterial leaf spots mainly attack leaves, but occasionally on stems and flowers. Symptoms of bacterial leaf spots may vary among plant species or varieties. In general, the initial symptom appears as water-soaked spots (Figures 1, 2, and 3), and then the spots turn to brown, tan, or black lesions with rounded, angular, or irregular shapes (Figures 1, 3, 4, 5, 6, 7, 8, 9, and 10). On some plant species, symptoms are characterized as yellow halo at the edge of necrotic tissues (Figures 5, 6, and 12). As the disease develops, numerous spots may merge and form large, irregular brown or black patches (Figures 10 and 11). Bacterial leaf spots normally start from lower portions of plant's canopy and spread gradually toward the top. Bacterial leaf spot diseases may cause cankers when the bacteria infect stems (Figure 11). Many fungal leaf spots resemble the

symptoms of bacterial leaf spots. Therefore, plant samples with suspected symptoms need to be sent to a plant clinic for a correct disease diagnosis.

DISEASE DEVELOPMENT

Bacterial leaf spots of herbaceous ornamentals are caused by various species in genera *Pseudomonas* and *Xanthomonas*. Most of these species are host specific and only infect closely related plant species. The pathogens survive in seeds, plugs, transplants, and plant debris. Movement of infected seeds, liners, and transplants is a means of long-distance dissemination of the pathogens. The bacteria also survive in dried plant debris for one to two years, but they will lose viability when plant debris is completely decomposed. Infected host weeds may serve as inoculum sources. Splashing water from wind-driven rain and overhead irrigation are responsible for disease spreading between plants in greenhouses or gardens. Human activity, such as handling plants when they are wet, also disperses bacteria between plants. The bacteria enter plant tissues through natural openings, such as stomata and hydathodes, as well as through mechanical or insect wounds. The infection requires free water on the surface of plant tissues for several hours. So, prolonged periods of high humidity and leaf wetness are favorable for

Figure 3. Water soaking lesions and brown spots on a catchfly leaf.

Figure 4. Brown spots on lavender leaves.

Figure 5. Brown spots with yellow halo on geranium leaves.

Figure 6. Small brown spots with yellow halo on poinsettia leaves.

Figure 7. Brown lesions on fern leaves.

Figure 9. Brown spots on chrysanthemum leaves.

Figure 8. Brown spots on salvia leaves.

Figure 10. Irregular water socking black lesions on heuchera leaves.

pathogen infection and disease development.

MANAGEMENT

Cultural practice: Inspect incoming plants and plant materials for bacterial leaf spot diseases and remove symptomatic plants. Use pathogen-free certified seeds or disease-free cuttings, plugs, and transplants to prevent the introduction of pathogens into greenhouses or gardens. In greenhouse settings, clean and sanitize benches, tools, pots, and flats between crops. Avoid overhead irrigation and use drip or ground irrigation if possible. Water plants early in the day to minimize durations of leaf wetness. Provide proper plant spacing to promote good air circulation. Reduce relative humidity in greenhouses or hoophouses. Avoid handling plant materials when they are wet.

Hot-water seed treatment: Soak pre-heated or soaked seeds that are placed in a piece of cotton cloth in a water bath/pot at the temperature range 118-125°F and for 20-60 minutes depending on plant species. After treatment, cool the seed under tap water and air dry at room temperature.

Chemical control: Apply bactericides prior to disease development or as soon

as the disease is detected. Once a disease has become established, it is difficult to control. Registered bactericides include copper products, *Bacillus subtilis* strain QST 713, and *Bacillus amyloliquefaciens* strain D747. Following the product label directions is critical for the effective and safe use of bactericides in disease management.

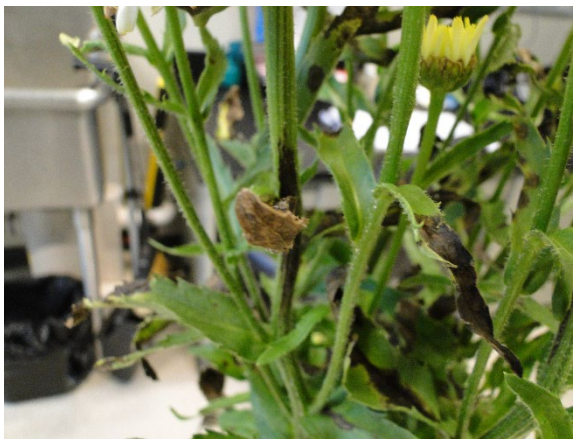

Figure 11. A daisy plant with irregular black lesions on leaves and stems.

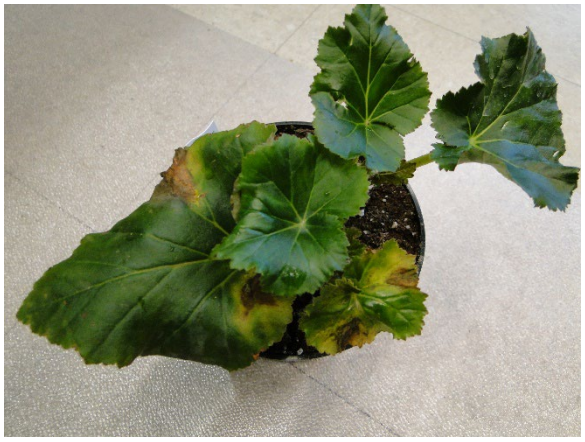

Figure 12. V-shaped brown lesions with yellow halo on begonia leaves.

READ THE LABEL BEFORE APPLYING ANY PESTICIDE! We keep all archives of our fact sheets posted. While most practices for disease management do not change over time, please be aware that changes in pesticide regulations occur constantly. When applying pesticides, always consult the label to make sure the pesticide is approved for use on your plants.