Halo Blight of Bean
Pseudomonas syringae pv. *phaseolicola*

Hosts: Common bean (*Phaseolus vulgaris*), lima bean (*Phaseolus lunatus*), and many others in the bean family, such as pigeon pea (*Cajanus cajan*), butterfly pea (*Clitoria ternatea*), and purple bean (*Villosa perpurpurea*), scarlet runner bean (*Phaseolus coccineus*), garden pea (*Pisum sativum*), kudzu vine (*Pueraria lobata* and *Pueraria thunbergiana*), mung bean (*Vigna radiata*), black-eyed pea or cow pea (*Vigna unguiculata*), soybean (*Glycine max* and *Glycine javanica*), and yam bean or jicama (*Pachyrhizus erosus*).

Disease common name: Halo blight.

Pathogen: *Pseudomonas syringae* pv. *phaseolicola*; syn.: *Pseudomonas savastanoi* pv. *phaseolicola* and *Pseudomonas phaseolicola*.

Disease Cycle

Inoculum: Bacteria are seedborne and are found in plant debris and alternate hosts.

Transmission: Bacteria in infested seed contaminate seedlings during germination and spread rapidly to adjacent plants during early-season rain and overhead irrigation. Contaminated equipment also transmits the disease. The pathogen colonizes leaves of many plants, but although this may not cause disease, resident populations serve as a source of inoculum.

Infection: The pathogen infects all parts of the bean plant. Bacteria enter leaves through stomata and wounds and colonize the substomatal chambers. The disease is usually systemic but not in all cultivars, and this also depends upon the strain of the pathogen. When xylem is colonized, bacteria infect seed through the funiculus. Infection of foliage occurs most readily during cool (less than 80°F or 27°C), wet weather and especially during hard, wind-driven rain.

Symptoms and signs: Initial symptoms are water-soaked spots on leaves (Figs. 1 and 2), which become necrotic, dry, and turn brown (Fig. 3). Water-soaked spots are usually surrounded by characteristic, chlorotic halos (Figs. 2 and 4) caused by a toxin. However, halos are not produced in all cultivars (Fig. 1) nor does systemic infection occur with all cultivars. Distortion of systemically infected leaves coupled with chlorosis is a characteristic symptom (Figs. 5–7). Cultivars that exhibit tolerance to inoculation produce reddish brown spots that darken and eventually dry with no progression of the disease (Fig. 8). Pods are very susceptible to infection with the formation of circular, water-soaked lesions (Fig. 9) that later become necrotic spots (Fig. 10). Halos are also found in other hosts of this pathogen, such as yam bean (jicama) (Fig. 11).

Survival: The bacterium survives on seed, plant debris, and susceptible weed hosts.

Disease Management

Resistant cultivars are available; however, cultivars vary greatly in susceptibility depending upon the pathogen strain(s) in the region. Thus, whereas one cultivar will be resistant or tolerant to a particular strain, it can be susceptible to others. It is important to use certified pathogen-free seed. One or two infected seeds in a lot are enough to cause a severe outbreak in the field. A rotation of 2–3 years is recommended with crops other than bean. Workers should not work in fields when leaves are wet. Weed hosts should be rogued and infected fields plowed after harvest to bury debris for enhanced decomposition; however, the pathogen may survive in debris during mild winters. Equipment should be cleaned between fields.

References

Bradbury, J. F. 1986. Guide to Plant Pathogenic Bacteria. CAB International, Slough, U.K.

Schroth, M. N., Vitanza, V., and Hildebrand, D. C. 1971. Pathogenic and nutritional variation in the halo blight group of fluorescent pseudomonads of bean. Phytopathology 61:852-857.

Schwartz, H. F., Steadman, J. R., Hall, R., and Forster, R. L., eds. 2005. Compendium of Bean Diseases, 2nd ed. American Phytopathological Society, St. Paul, MN.

Figure 1. Water-soaked lesions on lima bean leaf. No halos were produced. (Courtesy M. Schroth)

Figure 2. Typical water-soaked lesions with yellow halos on highly susceptible kidney bean plant. (Courtesy M. Goto)

Figure 3. Late stage of disease on bean leaves (cultivar unknown) with large, necrotic lesions with no water-soaking or halos. (Courtesy S. Thomson)

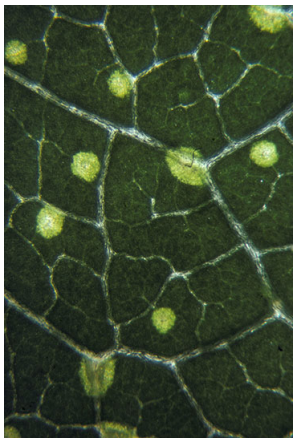

Figure 4. Early stage of leaf infection of cv. Bountiful bean with difficult-to-see tiny lesions and large halos. (Courtesy M. Schroth)

Figure 5. Chlorotic, systemic symptoms on common bean cv. Romano, without visible lesions. (Courtesy M. Schroth)

Figure 6. Chlorotic, systemic symptoms on common bean cv. Romano, with visible necrotic lesions. (Courtesy M. Schroth)

Figure 7. Systemic chlorosis and leaf distortion on common bean. (Courtesy A Hayward)

Figure 8. Small, dark lesions on a red kidney bean leaf, a tolerant reaction. (Courtesy M. Schroth)

Figure 9. Early stage of infection on pods of common bean with water-soaked lesions (greasy spots). (Courtesy A. Hayward)

Figure 10. Late stage of halo blight on kidney bean pods with brown lesions. (Courtesy M. Goto)

Figure 11. Distinct yellow halos on yam bean (jicama) leaves**.** (Courtesy L. Fucikovsky)