Strawberry Angular Leaf Spot
Xanthomonas fragariae

Host: Strawberry (*Fragaria ×ananassa*).

Disease common name: Angular leaf spot.

Pathogen: *Xanthomonas fragariae*.

Disease Cycle

Inoculum: Inoculum is commonly found in infected crowns used as planting stock, dead leaves, and plant debris.

Transmission: Dissemination is by rain, overhead irrigation, planting of diseased transplants, and harvesting procedures.

Infection: Little is known about infection, but it is assumed that it is similar to other leaf spot diseases. Disease development is favored by moderate to low daytime temperatures (around 20°C) and low nighttime temperatures (near or below freezing), coupled with moisture and high humidity. It is not known what triggers the crowns to become infected or what environmental conditions are conducive for systemic invasion. This stage of the disease often is called “vascular collapse” since the plant dies rapidly.

Symptoms and signs: Typical symptoms are small, water-soaked lesions on the lower surface of leaves (Fig. 1). The lesions later expand and have a brown to reddish appearance delimited by small veins (Fig. 2). When conditions are moist, yellowish ooze may exude from the lesions. Lesions later become necrotic and have a dry appearance during the summer months. Necrotic spots are seen on both surfaces of the leaves and on flower parts (Fig. 3). The bacterium has a systemic phase, probably resulting from infected transplants, and is characterized by dying of the crown (Fig. 4). Typically at this stage, there are signs of systemic invasion of adjacent stems and death of stems and leaflets. A new strawberry disease distinct from angular leaf spot (bacterial leaf blight) has been reported in Italy. Characteristic symptoms are small, reddish brown lesions on the lower leaf surface and reddish spots on the upper surface. The lesions do not appear to have a water-soaked or translucent stage. The disease progresses to a complete yellowing and whitening of the leaf. The pathogen is different than *Xanthomonas fragariae* and has been named *Xanthomonas arboricola* pv. *fragariae*.

Survival: The pathogen overwinters in soil on previously infected plant material and on live plants, including transplants. It can persist for extended periods on dry leaves even when buried into soil.

Disease Management

The disease is kept to a minimum by using certified planting materials. Chemical controls are typically ineffective against this pathogen. Copper-containing compounds are registered but have caused phytotoxicity with repeated applications. Crop rotation and avoiding overhead irrigation reduces disease incidence.

References

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

Hildebrand, D. C., Schroth, M. N., and Wilhelm, S. 1967. Systemic invasion of the strawberry by *Xanthomonas fragariae* causing vascular collapse. Phytopathology 57:1260-1261.

Janse, J. D., Rossi, M. P., Gorkink, R. F. S., Derks, J. H. J., Swings, J., Janssens, D., and Scortichini, M. 2001. Bacterial leaf blight of strawberry (*Fragaria* (×) *ananassa*) caused by a pathovar of *Xanthomonas arboricola*, not similar to *Xanthomonas fragariae* Kennedy & King. Description of the causal organism as *Xanthomonas arboricola* pv. *fragariae* (pv. nov., comb. nov.). Plant Pathol. 50:653-665.

Maas, J. L., ed. 1998. Compendium of Strawberry Diseases, 2nd ed. American Phytopathological Society, St. Paul, MN.

Rat, B. 1993. *Xanthomonas fragariae*: Cause of angular leaf spot of strawberry. Pages 69-70 in: *Xanthomonas*. J. G. Swings and E. L. Civerolo, eds. Chapman and Hall, London.

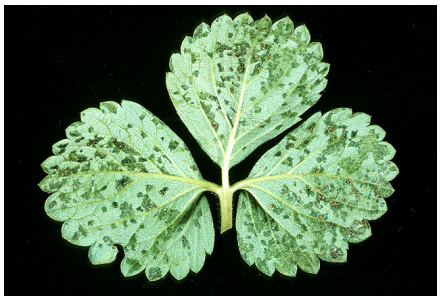

Figure 1. Early stage of infection of leaflet with water-soaked, angular lesions, sometimes with yellow bacterial ooze, as seen here. (Courtesy M. Schroth)

Figure 2. Strawberry leaf with angular, necrotic, dry, brownish lesions on upper surface of a leaf. (Courtesy A. Alvarez)

Figure 3. Infected sepals on fruit. (Courtesy M. Schroth)

Figure 4. Vascular collapse of plant resulting from systemic infection of the crown. (Courtesy M. Schroth)