Corn Bacterial Diseases

The majority of corn diseases are caused by fungi. However, some are caused by bacteria. Within the corn-growing area, the primary bacterial diseases are Holcus leaf spot, Goss’s Wilt, Stewart’s wilt, and bacterial stalk rot. Bacterial diseases generally enter the plant through wounds caused by insects, wind, hail, or blowing soil. Management of bacterial diseases can include resistant products, tillage, rotation, and weed control.

Holcus Leaf Spot

Holcus leaf spot is a leaf disease that initially appears as dark green, round to oval shaped, water-soaked spots on lower leaves. As the 1/4 inch lesions mature, they become light tan to nearly white in color and often are surrounded by a yellowish halo (Figure 1). Lesions can grow together forming irregular spots and streaks of dead tissue. Lesion margins may have reddish to light brown borders.

The bacteria overwinter in crop debris and enter leaves through the stomata (transpiration openings). Scouting should be prior to the R1 crop stage, although there is no in-season management options for Holcus leaf spot. The disease can be confused with eyespot, which has similar lesions, or with injury from paraquat herbicide drift. Generally, the potential for yield loss is small.¹

Favorable conditions for Holcus leaf spot development include: rainy, windy, hail, blowing soil, and warm temperatures (77° to 86° F), especially early in the season. Management of weedy hosts such as foxtail and Johnsongrass, planting resistant corn products, crop rotation, and tillage can help reduce the potential for infection.

Stewart’s Bacterial Wilt and Leaf Blight

Stewart’s wilt has two phases, the seedling phase and the leaf blight phase that usually occurs after tasseling. The disease is vectored to corn by the feeding of infected corn flea beetles. The very small, shiny, black beetles that jump like typical dog fleas introduce Stewart’s wilt bacteria into corn leaves as they feed. Evidence of feeding appears as white streaks on leaves as the tissue is scraped away. Infected young plants develop white to yellowish streaks on the lower leaves (Figure 2) and can wilt and die if the base of the stalk becomes rotted (Figure 3).

The leaf blight phase is characterized by long, water-soaked lesions extending the length of the leaf. Lesions eventually turn necrotic (Figure 4). The lesions can resemble those of Goss’s Wilt; therefore, a laboratory confirmation may be required. To help in the diagnosis of Stewart’s wilt, flea beetles should be present or the plants should display evidence of flea beetle feeding. Stewart’s wilt does not occur in the absence of flea beetles. Yield loss is generally not a significant factor with Stewart’s wilt because of seed product tolerance; however, other stalk rots can develop if leaf area and photosynthetic carbohydrate production is reduced.

Corn flea beetles overwinter as adults and emerge in the early spring, coinciding with corn emergence. The beetles may harbor Stewart’s wilt bacteria throughout the winter or may acquire the bacteria by feeding on infected plants in the spring. Stewart’s wilt is solely dependent on the survival of corn flea beetles. If the sum of the average monthly winter temperature for each month (December through February) is greater than 90 °F, corn flea beetle survival and disease risk is high, but if the sum of the average temperature for each month is less than 80 °F, corn flea beetle survival and disease risk is low.²

The widespread use of neonicotinoid seed-treatment insecticides in the past decade, has substantially reduced flea beetle populations, even following relatively warm winters. Consequently, the occurrence of Stewart’s wilt has been lower than expected based on winter temperature forecasts.

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Goss’s Wilt

Goss’s Wilt, like Stewart’s wilt, has two phases: a seedling wilt that can result in a systemic infection, and a leaf blight phase. Once systemically infected as seedlings, plants are affected throughout the season. Systemic Goss’s Wilt is observed less frequently than the leaf blight phase; however, early seedling infection can have devastating effects on plant survival and yield. The seedling wilt phase is characterized by infection of the vascular tissue with movement of the bacterium through the water-conducting (the xylem) system of the plant. Symptoms can progress from a discoloration of the xylem to a water-soaked, general wilt of plants or death. Susceptible corn products can suffer severe losses during epidemics of systemic Goss’s Wilt.

The leaf blight phase causes gray to light yellow lesions with wavy margins that roughly follow leaf veins (Figure 4). The extent to which leaf tissue is colonized by the bacteria depends on levels of resistance or susceptibility. Two characteristic symptoms help distinguish Goss’s Wilt from other leaf diseases with similar symptoms. Dark green to black water-soaked spots near the edges of expanding lesions or within infected areas of leaves appear as “freckles”. Goss’s “freckles” are luminous when leaves are held to block the sun. Bacterial ooze on leaf surfaces can also be used to differentiate Goss’s Wilt. The ooze has a shiny, shellac-like appearance when dried. Goss’s Wilt can be confused with symptoms of northern corn leaf blight, Stewart’s wilt, or necrotic leaf areas resulting from drought or nutrient deficiencies (Figure 4).

Goss’s Wilt can develop after rain and wind disseminate bacteria that overwinter in infected plant residue on the soil surface. Wounds from wind or hail provide entry locations for the bacteria. Hot, dry weather can inhibit disease development, except in fields with overhead irrigation.

Planting corn products with genetic resistance to Goss’s Wilt is the best management method (Figure 5). Tillage and rotating away from corn for two or more years with soybean, dry bean, small grains, or alfalfa can help reduce inoculum in infected corn residue. Shattercane, foxtails, and barnyardgrass should be controlled as they also are hosts.

Bacterial Stalk Rot

Although called bacterial stalk rot, distinct symptoms of this disease often occur when plants are in the whorl stage. Tissues are degraded by soft rot bacteria creating infections that are slimy masses of decomposed corn tissue with a distinct foul odor. Initial symptoms are a discoloration of leaf sheaths and stalk nodes, which are followed by a decay within the whorl and/or stalk. When the decay or rot develops prior to tasseling, upper leaves forming the whorl are dead and easily removed from the plant, while lower leaves are healthy. A foul odor accompanies the soft-rotted tissues in the lower portion of the whorl. After tasseling, when the bacteria cause stalk rot, splitting stalks reveals a soft, slimy rot and discoloration at the nodes (Figure 6). The bacteria can infect the plant at any node from the soil surface up to the tassel. Being sporadic in nature, individual plants may be infected while neighboring plants are unaffected.

The bacteria enters the plant through wounds from insects, hail, wind, and blowing soil. High humidity and high temperatures (88° - 95° F) following pollination favor development. Soft rot at the whorl stage can be a problem in areas with heavy rainfall or overhead irrigation resulting in water standing for prolonged periods in whorls. Infection at the soil line can occur if plants have been in standing water for a few days following heavy rain and warm temperatures.

There is very limited host resistance to soft rot bacteria. Therefore, the best management practices are fall cultivation to incorporate residue adoption of practices that reduce disease inocula, and an avoidance of excessive irrigation.

Sources:
1 Robertson, A. 2004. Holcus leaf spot being found on corn. Integrated Crop Management. IC-492(14)

Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower’s fields. ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. 140611070145 051618TAM