

Bacterial Diseases of Corn

Although there are no in-season practices to effectively manage Stewart's wilt, Goss's Wilt, bacterial stalk rot, and holcus leaf spot, understanding the distinctions between these diseases can aid future management.

What to Consider

Stewart's wilt occurs from mid-Atlantic states westward throughout the Corn Belt. Stewart's wilt can reduce yield potential. Overwintering corn flea beetles vector the bacterium on susceptible plants. The majority of field corn products are resistant to this disease; however, sweet corn products are susceptible. Stewart's wilt has not been reported in the absence of flea beetles.¹ Field corn, sweet corn, and popcorn are hosts for the bacterium.

Stewart's wilt occurs as either a seedling wilt phase or as a leaf blight phase. In the seedling phase, the overwintering generation of corn flea beetles infect plants with the bacterium soon after early-planted corn emerges. Long, chlorotic lesions with wavy margins follow leaf veins as a result of bacteria in xylem. Vascular tissues can be discolored or death can occur at the base of the stalk of susceptible products. The leaf blight phase occurs near or after tasseling as a result of the feeding by the summer generation of infected corn flea beetles. Water-soaked lesions extend the length of the leaf and become necrotic. Lesions are similar to Goss's Wilt lesions late in the leaf blight phase (Figures 1 and 2). The bacteria causing both diseases can be differentiated in a lab.

Goss's Wilt can infect all corn, but is particularly severe on susceptible field corn, sweet corn, and popcorn products. There are two phases of disease. Seedlings can become infected resulting in a systemic infection, and older more mature plants can have leaf blight. Although the seedling systemic wilt is observed less frequently than the leaf blight phase, early infection of seedlings can have devastating effects on plant survival.²

Bacterial stalk rot is caused by a soft-rot bacterium that produces enzymes to degrade host tissues. Initial symptoms include: 1) discolored leaf sheaths and stalk nodes, 2) soft rot with slimy masses of degraded corn tissue, 3) a foul odor, 4) discoloration at the nodes, 5) upper leaf death and upper leaves can be pulled easily from the whorl, 6) tasseling and pollination disruptions from infections high in the plant. This infection is more frequent earlier in the season when it rots corn leaves in whorls prior to tassel emergence.³

Holcus leaf spot (HLS) initially appears as dark green, round to oval shaped, about 1/4-inch diameter, water-soaked spots, on the tips of lower leaves. Lesions become light tan to nearly white in color, have a halo around them, and eventually turn brown as they dry.⁴



Northern Corn Leaf Blight Heat Stewart's Wilt Goss's Wilt
Figure 1. Leaf blights with similar symptoms.



Figure 2. Goss's Wilt lesions with illuminated freckles.

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Environmental Effects on Disease

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.¹

Goss's Wilt follows weather events in which rain and wind disseminate overwintering bacteria from infested plant residues. Wind or hail damage to leaves and other plant parts create wounds for bacteria to enter the plant. Hot, dry weather can inhibit disease development, except in fields with overhead irrigation. Symptoms can progress from discolored xylem, to water-soaked lesions, to wilting of plants, and eventual death. Susceptible corn products can suffer severe losses during epidemics of systemic Goss's Wilt infection.²

Bacterial stalk rot is favored by high humidity and warm temperatures during mid-season. Common areas where these conditions exist include those with heavy rainfall, overhead irrigation, or where water is pumped from a lake, pond, or slow-moving stream. Infection at the soil line occurs if plants have been in standing water for a few days following heavy rain and warm temperatures. Infection is associated with water remaining in whorls for extended periods.

Holcus leaf spot bacteria enter wounds created by hail, blowing soil, or wind. Early season temperatures between 75° to 85° F with wet, windy conditions favor HLC.⁴ Symptoms may appear suddenly with heavy rains; however, they do not spread to new leaves.

Management

Stewart's wilt can be managed with several corn products available with Stewart's wilt resistance. Neonicotinoids, seed-applied insecticides can help manage corn flea beetles and have been associated with lower than expected levels of Stewart's wilt.

Goss's Wilt overwinters in infested corn residue on the soil surface. Infested debris is the primary source of

inoculum for the following corn crops. Continuous corn rotations enhance damage from Goss's Wilt due to an abundance of overwintering inoculum. Infection requires leaf injury (hail, sand-blasting, wind, equipment).



Figure 3. Corn stalk with bacterial stalk rot.

- Planting corn products with tolerance to Goss's Wilt.
- Tillage to bury corn residue reduces levels of overwintering inoculum.
- Rotation away from corn for two or more years with soybean, dry bean, small grains, or alfalfa allows time for degradation of infected residue.
- Control foxtail, Barnyardgrass, volunteer sorghum, large crabgrass, annual ryegrass, and Johnsongrass weeds as they can act as a secondary host.⁵

Bacterial stalk rot can survive in corn or sorghum stalks and residue, is a sporadic disease, and often affects individual plants. There is very limited host tolerance to soft rot bacteria. Therefore, the best management practices are fall cultivation to incorporate residue, a reduction of pathogen, and an avoidance of excessive irrigation.

Holcus leaf spot is mostly cosmetic but can resemble other fungal leaf diseases such as eyespot or chemical injury such as paraquat drift.⁴ Therefore, proper identification is important to avoid mismanagement.

Sources

¹ Jackson, T. and Wright, B. 2012. Nebraska corn at elevated risk of Stewart's wilt and flea beetle damage. University of Nebraska Extension. UNL—Crop Watch.

² Jackson, T.A., Harveson, R.M., and Vidaver, A.K., 2007. Goss's bacterial wilt and leaf blight of corn. University of Nebraska Extension. G1675. <http://extensionpublications.unl.edu/>.

³ Jackson-Ziems, T.A., Rees, J.M., and Harveson, R.M. 2009. Common stalk rot diseases of corn. University of Nebraska Extension EC-1898. <http://extensionpublications.unl.edu/>.

⁴ Robertson, A.E. 2004. Holcus leaf spot being found on corn. Integrated Crop Management. Iowa State University. 1529. <http://lib.dr.iastate.edu/cropnews/1529>.

⁵ Freije, A., Ikley, J. Wise, K., and Johnson, B. 2015. Goss's wilt on grass hosts. Purdue University Extension. BP-88-W.