Goss's Wilt - Diagnosis and Sample Submission

- Goss's wilt is also called leaf freckles and wilt of corn, Goss's bacterial wilt, and Nebraska bacterial wilt and leaf freckles.
- Proper identification of Goss's wilt is essential for effective management in future plantings.
- Knowing the life cycle of the pathogen, identifying symptoms, and the environmental conditions for development can be helpful for scouting activities.

Symptoms

Infection commonly occurs following severe weather that creates wounds to leaves through which the bacteria can enter the plant. Goss's wilt (caused by *Clavibacter michiganensis* subsp. *nebraskensis*) occurs as either a vascular wilt or leaf blight. Systemic infection may occur early in the season at very early vegetative growth stages (prior to V6) causing severe wilting and plant death on less resistant products.

Leaf blight symptoms usually appear mid-season as long, gray-green to black, water-soaked streaks extending along leaf veins (Figures 1A, 2A, 2B). Small, dark, water-soaked flecks, referred to as "freckles", often occur inside larger lesions and at edges of lesions where symptoms are advancing (Figure 1A). Leaf freckles are luminous when lighted from behind, such as when the sun is used as backlighting (Figure 2C). Bacterial cells may ooze from infected leaves and dry on leaf surfaces forming a shellac-like sheen (Figure 1B). As lesions mature, large areas of tan to brown dead leaf tissues are apparent (Figure 2).

Can be Confused with...

Symptoms of Goss's wilt can somewhat resemble and be confused with drought, nutrient deficiency, northern corn leaf blight (NCLB), Stewart's wilt, or other causes of leaf necrosis (Figure 3). Growth of saprophytic fungi on dead leaf tissue may be confused with "freckles" associated with Goss's wilt (Figure 1).
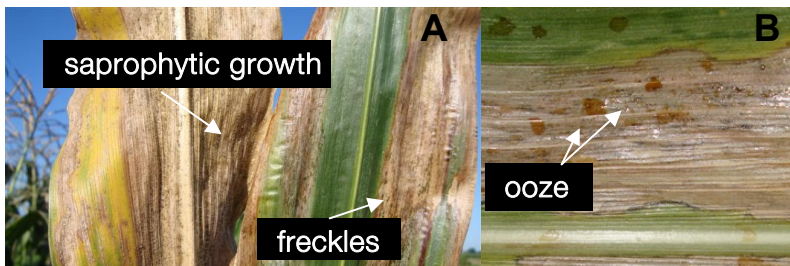

Figure 2A. Photo taken inside the canopy.

Figure 2B. The freckles appear dark with the sun behind the person holding up the leaf.

Figure 2C. The freckles appear illuminated when held up to the sun.

Figure 2A-C. These photos show how different lighting sources in the field can change appearance of the exact the same leaf.

saprophytic growth

freckles

ooze

Figure 1. Identifying characteristics for Goss's wilt.

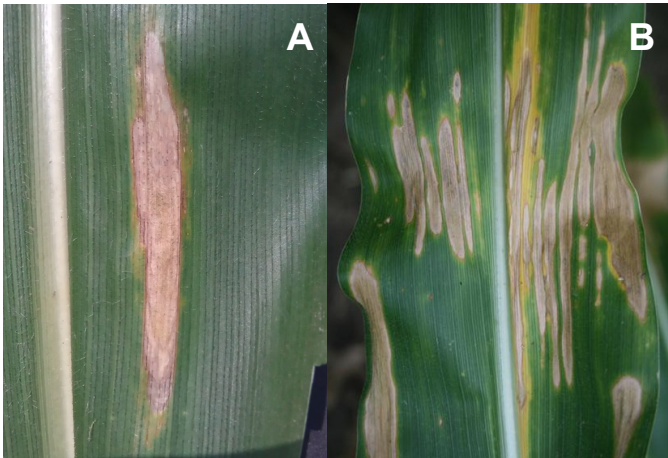# Goss's Wilt - Diagnosis and Sample Submission

Figure 3. Symptoms of NCLB (A) or sun scald (B) can be confused with symptoms of Goss's wilt.

Favorable Conditions

The Goss's wilt pathogen overwinters in crop residue. Mild temperatures are optimal for the pathogen. In order for the bacteria to infect corn, they usually enter the plant through wounds created by hail, strong wind, or blowing sand. The bacteria can be spread from infected crop residue to wounded corn tissues by irrigation or splashing water (i.e. rain). Additional hosts of the pathogen include sugarcane, sorghum, green foxtail, shattercane, barnyardgrass, and sudangrass.

Identification May Require Laboratory Confirmation

Samples are evaluated for the following:

- Typical symptoms: long, chlorotic to necrotic lesions that roughly follow leaf veins, often with gray to silver, water-soaked margins indicative of lesion expansion and sometimes with darkened margins of lesions.

- Dark green to black leaf freckles, often found at margins of symptomatic tissues and frequently appearing luminous when back-lighted (Figure 2C).

- Confirmation of bacterial streaming or "ooze" when viewed with a compound microscope, particularly from leaf veins.

- Bacterial exudates appearing shellac-like on leaf surfaces may or may not be present, depending on prevailing weather.

- Results from immunological tests (i.e. immunostrips) and/or plating of bacteria on selective media.

Leaf Sampling Tips

- Collect fresh leaves. Send a generous amount of material, if available.

- Ship in a crush-proof container (box, padded envelope) immediately after collecting. Leaves can be placed flat in newspaper or paper towels inside shipping container.

- DO NOT WRAP LEAF TISSUE IN WET PAPER TOWELS.
- Ship packages to arrive on weekdays.

University Plant Clinics

Samples should be accompanied by completed forms for the specific clinic. Complete any other information that may be useful for a correct diagnosis, including any other factors that you suspect may have caused symptoms similar to Goss's wilt.

In summary, Goss's wilt of corn is caused by the bacterium *Clavibacter michiganensis* subsp. *nebraskensis,* which infects corn leaves through wounds created by high winds and/or hail damage. Mild temperatures are optimal condition for the pathogen. Leaf lesions created by the pathogen generally have wavy margins with a water-soaked appearance on the edges. Dark spots (freckles) can be found within the lesions. Proper identification of Goss's wilt by a University diagnostic clinic is important for effective management in future plantings.

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Sources: Jackson, T. 2007. Goss's bacterial wilt and leaf blight. Plant Disease Central. University of Nebraska. http://pdc.unl.edu (verified 6/19/14); Corn disease management. 2002. Illinois Agronomy Handbook, the 23rd edition. University of Illinois Extension.