



Stewart's Wilt of Corn

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IMPORTANCE

Historically, Stewart's wilt of corn (FIGURE 1) has resulted in losses for corn producers. Although this disease still occurs occasionally, it has become less prevalent in recent years in Kentucky and surrounding states. Stewart's wilt has been known by other names, such as bacterial leaf blight, Stewart's leaf blight, and maize bacteriosis.

Stewart's wilt can limit yield directly through stand reductions and the production of fewer and smaller ears. In addition, infected plants are more susceptible to stalk-rotting organisms, which can result in indirect losses from this disease. This disease occurs on sweet corn, popcorn, and field corn. Although sweet corn and popcorn varieties tend to be more susceptible to Stewart's wilt than field (dent) corn, there may still be susceptible field corn inbreds and varieties on the market.

SYMPTOMS

Stewart's wilt appears as two different phases on corn. The first phase is a seedling wilt, which occurs when young plants are infected systemically. Once the tassels emerge, the leaf blight phase may occur.

Seedling wilt

- Rapid wilting occurs in highly susceptible varieties.
- Linear lesions with wavy margins develop parallel to leaf veins (FIGURE 2). These lesions form at the site of insect feeding wounds.
- Lesions may be pale green to yellow in color and turn tan-brown as leaves die (FIGURE 3).



FIGURE 1. SYMPTOMS OF STEWART'S WILT (LEFT) AND SYMPTOMLESS CORN PLANT (RIGHT). (PHOTO: JK PATAKY, UNIVERSITY OF ILLINOIS)

- Discoloration and cavities in the pith near the soil line (FIGURE 4) may be present in severely infected plants.



FIGURE 2. PALE GREEN AND/OR YELLOW WAVY LINES DEVELOP PARALLEL TO LEAF VEINS. **FIGURE 3.** LESIONS FORM AT THE SITE OF INSECT FEEDING AND TURN TAN-BROWN. (PHOTOS: JK PATAKY, UNIVERSITY OF ILLINOIS). **FIGURE 4.** SEVERELY INFECTED PLANTS DEVELOP CAVITIES IN THE PITH AREA NEAR THE SOIL LINE. (PHOTO: RL NIELSEN, PURDUE UNIVERSITY). **FIGURE 5.** CORN FLEA BEETLE PLAYS AN INTEGRAL PART IN THE STEWART'S WILT DISEASE CYCLE (PHOTO: FRANK PEARIS, COLORADO STATE UNIVERSITY, BUGWOOD.ORG)

Leaf blight

- Foliar symptoms are similar to the seedling wilt phase and are generally most apparent after tasseling. Lesions form at the site of insect feeding wounds.
- Entire leaves may die and dry up.
- Bleached, dead tassels form on plants that survive seedling wilt.
- This phase is not as damaging as the seedling wilt phase.

Plants affected by Stewart's wilt may resemble those affected by drought, nutrient deficiencies or insect injury. Symptoms of Goss's wilt, another bacterial disease of corn, which has been reported in neighboring states of Illinois and Indiana, may also be confused with symptoms of Stewart's wilt. When uncertain of the correct diagnosis, contact a local Extension agent to assist.

CAUSE & VECTORS

Stewart's wilt is caused by the bacterial pathogen *Pantoea stewartii* subsp. *stewartii* (syn. *Erwinia stewartii*). This bacterium overwinters within the body of the corn flea beetle (*Chaetocnema pulicaria*, FIGURE 5), which is the primary vector (transmitter) of Stewart's wilt. The bacterium is unable to spread from plant to plant without the corn flea beetle. Other insects, including 12-spotted cucumber beetle (both adult and larva), toothed flea beetle, as well as larvae of the seedcorn maggot, wheat wireworm, and May beetle, can also transmit the bacterium; however, none of these insects is a vector of concern under field conditions. The Stewart's wilt bacterium can only survive winter in the gut of corn flea beetles.

The Stewart's wilt bacterium can also be seedborne, but transmission rates to seed corn are very low (0.02% or less).

DISEASE DEVELOPMENT

The incidence of Stewart's wilt is closely related to winter weather conditions as they affect the survival of corn flea beetles. Warmer winters allow greater numbers of corn flea beetles to survive, increasing the possibility that the Stewart's wilt bacterium will also persist through winter. Thus, higher numbers of surviving corn flea beetles can mean increased potential for plant infections and disease development.

One generally accepted method for assessing the potential risk of Stewart's wilt utilizes the sum of monthly mean temperatures for December, January, and February. This sum can indicate the likelihood of corn flea beetle survival, and, thus, the level of risk for Stewart's wilt the following summer. Refer to the following table to identify the potential risk of disease based on various sums.

| <u>If the sum is:</u> | <u>then the potential risk of Stewart's wilt is:</u> |
|-----------------------|--|
| over 90 | high |
| between 85 & 90 | moderate to high |
| between 80 & 85 | moderate to low |
| less than 80 | low |

Mean monthly temperatures for all Kentucky counties may be found at Kentucky Mesonet by identifying the site as the county of interest.

There are several other factors that can affect the severity of Stewart's wilt on corn. In general, high temperatures and soil moisture increase disease severity. Mineral nutrition can also influence corn variety susceptibility to *P. stewartii*. High levels of ammonium nitrogen and phosphorus increase susceptibility, while high levels of calcium and potassium tend to decrease susceptibility.

DISEASE MANAGEMENT

Once Stewart's wilt is established in a planting, nothing can be done to moderate the disease's effects. The use of resistant varieties is recommended in areas where there are mild winters and where corn

flea beetle is endemic. The following preventative measures could help reduce the incidence of Stewart's wilt in corn.

Resistant varieties

- Growing resistant varieties is the best means of managing Stewart's wilt.
- Sweet corn varieties range from resistant to highly susceptible.
- Most field corn varieties are highly to moderately resistant to Stewart's wilt.
- Late-maturing varieties are generally more resistant than those that mature early.

Insecticides

- Insecticide seed treatments can kill corn flea beetles before the bacteria are transmitted to corn plants.
- Seed-treatment insecticides have been proven to be more reliable than foliar or in-furrow applications.
- Seeds of nearly every field corn variety available are treated with an insecticide, which has likely led to the decline of Stewart's wilt observations in Kentucky and surrounding states.

ADDITIONAL RESOURCES

- Plant Pathology Extension Publications
<http://plantpathology.ca.uky.edu/extension/publications>
- A Comprehensive Guide to Corn Management in Kentucky (ID-139)
<http://www2.ca.uky.edu/agcomm/pubs/id/id139/id139.htm>
- Kentucky Integrated Crop Management Manual for Corn (IPM-2)
<http://www.uky.edu/Ag/IPM/manuals/ipm2corn.pdf>
- Kentucky Mesonet
http://www.kymesonet.org/historical_data.php

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