

There are several species of flea beetles that may be found in cornfields. This species is most often the one encountered. Corn flea beetles remove leaf tissue of corn as they feed and leave long scratch marks on the leaves. More importantly, corn flea beetles are the primary vector of Stewart's wilt bacterial disease. Stewart's wilt is an economically important disease of sweet corn hybrids and seed corn inbreds that are not resistant to it.

Description

Corn flea beetles are small, shiny, black beetles, approximately 1/16- inch long, with enlarged hind legs. Adults are easily disturbed and are known for their ability to jump long distances. The larvae are small, white, and not very active. Full-grown larvae are 1/6-inch long and most body segments are non-pigmented. Only the prothorax and the last abdominal segment are slightly darkened.

Life Cycle

The corn flea beetle passes the winter as an adult, in the soil and debris in fencerows, roadsides, or the edges of woodlands. It becomes active early in the spring when temperatures warm to 65-70°F, although they may be seen feeding on grasses on warm days during the winter. Corn is the primary host of the corn flea beetle, but adults and larvae also feed on a number of secondary hosts such as orchard grass, Kentucky bluegrass, yellow foxtail, giant foxtail, fall panicum, and several other grasses. Wheat, barley, oats, and Timothy have also been identified as food plants for the flea beetle. In the spring, adults feed on corn and other hosts, mate and lay eggs on plant leaves, in the ground, or at the base of plants near underground stems and roots. Not much is known about the larvae, but they feed on the roots of grass plants for about two weeks before pupating. The generation time of the corn flea beetle is approximately one month. However, higher temperatures result in faster development rates. Larvae complete their development, pupate, and adults emerge in June. The adults continue to feed on available host plants and lay eggs for another generation. Second-generation adults appear in early August and feed until late in the fall before overwintering. Summer generations of the corn flea beetle may overlap and in some circumstances, the very southern portions of Illinois may experience a third generation.

Injury

Little is known about damage caused by the larvae, but damage by the adults is very evident. The adult corn flea beetle injures corn plants by removing leaf tissue and by transmitting pathogenic bacteria. Injury by the adults appears as scratches in the upper and lower surfaces of the leaf, usually parallel to the veins. They feed on both the upper and the lower epidermis of corn leaves, but they do not chew completely through the leaves. The scratches, or windowpane effect, rarely result in economic injury. High densities and heavy feeding can result in the skeletonization of leaves and death of seedling. The leaves of severely injured plants appear whitish or silvery. During June and August, when the newly emerged adults appear, the leaves of corn may be partly covered with their feeding scars.

More importantly, the beetles transmit the bacterium *Erwinia stewartii* (= *Pantoea stewartii*), the causal organism of Stewart's wilt, to susceptible varieties of corn. During the feeding process, adult flea beetles disseminate the bacterium which accumulates in and clogs the vascular system of the plant, affecting

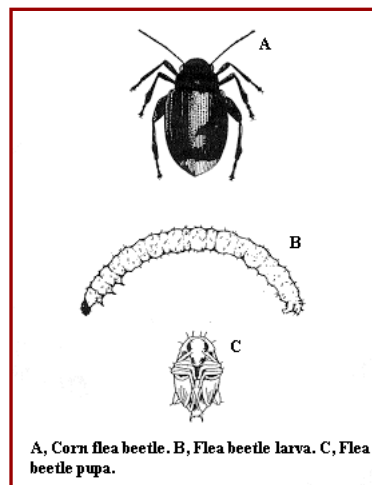
water and nutrient movement. Susceptible corn plants may become infected by *E. stewartii* at any time during plant growth, and two phases of Stewart's wilt will occur on corn. Some plants are infected in the seedling stage, whereas others may not be infected until tasseling or later. Most varieties of commercial field corn are resistant to the wilt phase of this disease while many are somewhat susceptible to the leaf blight phase. However, many seedcorn inbreds and sweet corn hybrids have varying susceptibility to Stewart's wilt.

Generally, field corn infested with Stewart's disease will show little sign of disease until late in the summer when numerous leaf lesions will appear on the leaves. However, in years when flea beetles are abundant and the disease is widely disseminated, some varieties of corn will wilt and the plants may die before tasseling. Drought can aggravate or accentuate the diseased condition of a plant. The result is often small ears or no ears at all. When conditions are favorable for both the beetles and the wilt, nearly 100 percent of the susceptible varieties of field corn will show symptoms of Stewart's disease by late fall.

Evidence of Stewart's disease is more common and the results more drastic in sweet corn than in field corn. Sweet corn plants infected at an early stage are usually most severely affected. Infected young plants usually wilt, become stunted, and exhibit water-soaked lesions with wavy margins. The late infection phase or "leaf blight phase" of Stewart's wilt occurs after tasseling and is generally not a concern in sweet corn because ears are harvested before damage occurs.



Corn flea beetle adult



A, Corn flea beetle. B, Flea beetle larva. C, Flea beetle pupa.

North Carolina State University



Flea beetle injury, "windowpane effect"



Severe flea beetle feeding



Stewart's wilt in sweet corn

Scouting Procedure

Corn should be scouted for corn flea beetles when plants begin to emerge in the spring. Examine newly emerged corn for the presence of beetles and count the approximate number per plant. They will first appear around field edges as they move from grassy areas and other overwintering sites.

Field Corn. Control may be justified in commercial corn when there is an average of five or more beetles per plant prior to the 4-leaf stage. If the infestation is so severe that some plants are being killed, or if more than half the leaves are whitish, it may be profitable to treat.

Seed Corn. Prior to the 5-leaf stage, susceptible seedcorn inbreds may require an insecticidal treatment when 2 to 3 beetles per plant are present and 10% of the plants are silver or whitish due to severe foliar feeding.

Sweet Corn. In susceptible sweet corn hybrids, some recommendations suggest rescue treatments when the threshold of 6 beetles per 100 plants is reached.

Treatment decision considerations should include flea beetle densities, plant growth stages, and environmental conditions. Plants in hot and dry surroundings are more likely to suffer from leaf feeding injury than those plants growing under more ideal conditions.



Corn flea beetles on seedling corn plant

Management

Corn flea beetles acquire the bacterium that causes Stewart's wilt from infected plants during the summer and fall, and the bacterium overwinters in the gut of the flea beetle. Like many insects, winter survival of the corn flea beetle is affected by the severity of the winter. Mild winters improve the survivability of the corn flea beetle as well as the bacterium that causes Stewart's wilt. The probability of Stewart's wilt during a growing season can be predicted using a Winter Temperature Index. Based on the Stevens-Boewe system, the current model of the

temperature index predicts the severity of Stewart's wilt based on the average monthly temperatures of December, January, and February. By using the average temperature of these three months, the index value fluctuates around the temperature of freezing and is more easily understood. For example, when the average of the winter temperatures is significantly greater than freezing, the potential for severe Stewart's wilt is high. When the average temperatures drop farther below freezing, the risk of disease decreases.

Little is known how other weather-related factors such as snow cover (depth and duration) and soil temperatures affect corn flea beetle survival over the winter and subsequent Stewart's wilt infection the following summer.

An important management tool for Stewart's wilt is to plant resistant hybrids. Should susceptible hybrids be used, consider altering planting dates to avoid the overwintering generation. Also begin scouting corn plants as they emerge in the spring for leaf feeding injury.

Stewart's wilt forecast using the average monthly temperatures of December, January, and February

Average Monthly Temperature	Early season wilt probably will be	Late-season blight will probably be
<27° F	Absent or nearly so	A trace, at most
27-30° F	Light	Light to moderate
30-33° F	Moderate	Moderate to severe
>33° F	Severe	Severe

Corn flea beetle feeding may be reduced with the use of insecticidal seed treatments and foliar insecticides. Systemic seed treatments provide early season control against the corn flea beetle. The use of systemic seed treatments has been shown to reduce corn flea beetle feeding and Stewart's wilt infection. There are a number of insecticides registered for rescue treatment of corn flea beetles during the growing season.

More Information

Corn Flea Beetle on Sweet Corn, Ohio State University Extension Fact Sheet.
<http://ohioline.osu.edu/cv-fact/1000.html>

Handbook of Corn Insects, Entomological Society of America.

Sweet Corn Disease Nursery: Stewart's Bacterial Wilt, University of Illinois.
<http://sweetcorn.uiuc.edu/stewarts.html>

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