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STEWART'S WILT AND BLIGHT OF SWEET CORN

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Stewart's wilt and seedling blight of sweet corn, is caused by the bacterium *Erwinia stewartii*. The disease commonly occurs from southern new England to the Middle Atlantic states and west to Kansas and the Dakotas. Scattered outbreaks occur outside this general area. Bacterial wilt is more prevalent in southern regions of the Corn Belt. It has not become established in areas with dry climates, nor in areas without corn flea beetles (*Chaetocnema pulicaria*), the vector of the bacterium. It is much more severe on susceptible sweet corn and popcorn hybrids than on most field corn hybrids.

Figure 1. Seedling wilt phase.

Symptoms

The bacterial wilt organism infects sweet corn plants at any stage of growth. Infected seedlings may die prematurely. The disease is usually most conspicuous and serious in young plants under two feet tall. In seedlings, the bacterium often spreads systemically throughout plants of susceptible hybrids. Symptoms are limited to localized areas of leaves in hybrids with moderate levels of resistance. The older leaves of young plants develop narrow yellowish streaks, which later turn brown. Several streaks on a leaf cause it to shrivel, and die (Figure 1). These symptoms may be confused with symptoms of frost damage, drought, nutrient disorders, or insect injury.

Symptoms on more mature plants commonly appear as irregular, pale green to yellowish streaks with wavy margins that sometimes extend the length of the leaf blade (Figure 2). The streaks can often be traced back to flea beetle wounds, usually on the top half of the leaf. The streaks later become dry and brown. On extremely susceptible hybrids, plants are stunted and die prematurely. In older plants, necrotic tissue resulting from Stewart's wilt may resemble severe symptoms caused by multiple infections by the northern leaf blight pathogen, *Exserohilum turcicum*.

Figure 2. Foliar symptoms on mature plants.

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Figure 3. Water soaking and rotting symptoms in stem tissues

When a wilted or dying plant with a normal green stalk is cut through and squeezed, small droplets of yellowish bacterial ooze appear on the cut ends of the vascular bundles. Cavities may develop within the lower stalk of a severely infected plant (Figure 3). The bacteria in such plants are systemic and may pass through the cob into the kernels.

On very susceptible hybrids a yellow, slimy ooze infrequently collects on the surface of the inner ear husks or covers the kernels. Other kernels may have grayish spots (lesions) with dark margins or they may be deformed and shrunken.

Losses of up to 90 percent can occur in Illinois on very susceptible hybrids following mild winters, especially in early plantings in the southern half of the state. Yield losses are influenced by the number of infective flea beetles in the field, the relative susceptibility of the hybrid to Stewart's wilt, and the growth stage of the plant at the time of infection. Susceptible hybrids infected at the 3 to 5 leaf stage will have greater yield reductions than will the same hybrids infected at later growth stages (Table 1).

Table 1. Effects of host resistance and growth stage on yield reductions due to Stewart's wilt.

	PERCENT REDUCTIONS IN YIELD		
HYBRID REACTION	3 TO 5 Leaf Stage	5 to 7 Leaf Stage	7 to 9 Leaf Stage
Resistant	0	0	0
Moderately Resistant	0 - 30	0	0
Moderately Susceptible	10 - 40	0-10	0
Susceptible	40 - 100	15 - 35	3 - 10

Disease Cycle

The bacterium causing Stewart's disease overwinters almost exclusively in the digestive tracts of hibernating, adult corn flea beetles. In areas where wilt was severe the previous summer, approximately 20 percent of the surviving beetles in the spring are contaminated with the bacterium. These insects migrate and are carried by air currents 20 miles or more. Young corn plants become infected by the feeding of the flea beetle. Non-infested flea beetles feed on infected plants and then carry the wilt bacterium to healthy plants. As the summer progresses, new broods of flea beetles become infested, greatly increasing the number of contaminated insects. The flea beetles carry and transmit the bacterium as long as they live.

The number of flea beetles emerging in spring from hibernation depends on the severity of winter temperatures. Low temperatures are unfavorable for beetle survival. The numbers of emerging adults can be estimated by calculating a winter temperature index by averaging the mean temperatures (expressed in °F) for December, January, and February. Thus, the winter temperature index can be used for disease forecasting (Table 2).

Table 2. The relationship between the winter temperature and disease severity.

If the average temperature for Dec., Jan., and Feb. is	Early-season wilt will probably be
Below 27°F	Absent or nearly so
Between 27 and 30°F	Light
Between 30 and 33°F	Moderate
Above 33°F	Severe

Flea beetles seldom survive in the northern half of Illinois because of low winter temperatures. Those found in late spring or summer have migrated from the south. Snow or other winter cover apparently has little effect in providing sufficient shelter to enhance survival of the overwintering flea beetles. Prolonged periods of wet summer weather are unfavorable for beetle multiplication and feeding, while dry weather is favorable.

The causal bacteria may live for several months in seed, manure, soil, and old cornstalks; however, the number of plants that become infected from these sources is insignificant.

The toothed flea beetle, adult 12-spotted cucumber beetles, and larvae of corn rootworms, seed corn maggot, wheat wireworm, and white grubs also may carry the wilt bacteria from one plant to another during the summer.

Control

1. Grow well-adapted, wilt-resistant sweet corn varieties. At present, there are very few early maturing hybrids with high levels of resistance to Stewart's wilt. Consult current seed catalogs and trade publications for additional information on disease resistant hybrids.

2. Where corn flea beetles are an annual problem the application of an approved insecticide may help reduce the spread and overall severity of Stewart's wilt.

3. Delayed or later plantings may have less flea beetle activity than early-season plantings.

4. Plant disease-free seed. Reputable seed companies produce their seed corn where bacterial wilt is absent. Therefore, almost no infected seed corn enters the trade. Seed treatments are **not** an effective control measure.

Table 3. Sweet corn hybrids among the most resistant to Stewart's wilt

Hybrid	RM[a]	Source[b]
Yellow sugary		
Bonus	5	Rog
Eliminator	4	Cr
GH 0934-A	4	Rog
GH 0937-A	4	Rog
GH 2628	5	Rog
GH 2783	5	Rog
HMX 8389	5	HM
Shield Crest	5	HM
Bi-color sugary		
Sweet Sue	5	HM
Yellow sugary enhancer		
Miracle	4	Cr
Seneca Sentry	4	Sen
Summer Flavor 79 Y	3	AC
Sundial	4	HM
Topacio	5	HM
Bi-color sugary enhancer		
Ambrosia	3	Cr
Buckeye	4	Mes
Encore	5	Mes
Lancelot	5	Mes
Seneca Nation	4	Sen
Seneca Wardance	3	Sen
Table Treat	3	Sdw
White Sugary enhancer		
20242	4	Mes
Argent	4	Cr
HMX 5349 WES R	3	HM
Yellow Shrunken		
ACX 95 CN 232	4	AC
HMX 8392 S	4	HM
Maverick	4	Asg
Mecca	4	Asg
Sch 20777	5	IFS
Sucro	5	Rog
Summer Sweet 7620	4	AC
Summer Sweet 7630	4	AC
Summer Sweet 7710	4	AC
Trigger	5	Cr
Ultimate	4	HM
XPH 3076	3	Asg
Xtra Tender 171A	1	IFS
Xtra Tender 179A	3	IFS
Xtra Tender 182A	4	IFS
Zenith	4	HM
Bi-Color Shrunken		
Sch 44144	4	IFS
Summer Sweet 7902	3	AC
Xtra Tender 277A	3	IFS
Xtra Tender 278A	3	IFS
White Shrunken		
Xtra Tender 378A	3	IFS
Yellow Brittle		
Sugar 74 bt	6	Rog

[a]**RM** = relative maturity estimates from seed source: 1 - first early
2 - second early
3 - mid-season
4 - main season
5 - full season

[b]**SEED SOURCES**

AC - Abbot & Cobb
Asg - Asgrow
Cr - Crookham
HM - Harris Moran
IFS - Illinois Foundation Seeds
Rog - Rogers Seeds
Sen - Seneca