

# Sweet Corn Diseases and Control Measures

Sweet corn is widely grown throughout New York in small to large fresh-market commercial plantings as well as in extensive processing sweet corn acreages, and sometimes in backyard gardens. Also important is the fact field corn is an important row crop in New York because pathogens infecting sweet corn also infect field corn which can be an important source for sweet corn especially of pathogens capable of long-distance dispersal.

The diseases affecting sweet corn in New York are numerous and are caused by three major groups of plant pathogens — bacteria, fungi, and viruses. Fourteen diseases are discussed in this report. All the diseases listed are not found every year because their occurrence is influenced by environmental factors (temperature, humidity, soil moisture), host resistance, previous cropping histories, crop location within the state, and availability of insect vectors. Several listed diseases rarely occur. Sweet corn is one crop where seedborne diseases are not an important factor (ex. included here are head smut and maize dwarf mosaic virus). In addition, most corn seed is sold treated with a fungicide/insecticide mixture to manage seed rot and seedling blights. Most of the diseases listed occur sometime after plant establishment. Insect pests usually are a greater concern than diseases because several directly attack ears.

Some diseases are more important to manage in fresh-market than processing crops, notably northern corn leaf blight and common rust, because symptoms can develop on husks which affects marketability.

Some diseases have become more important, for example northern corn leaf blight which is most likely due to this pathogen having evolved new virulence able to overcome resistance used in breeding of field corn, thereby increasing amount of inoculum of the pathogen. While other diseases have become less important because of improved management practices, notably Stewart's wilt for which there are now numerous resistant varieties. It was among the more common diseases in New York.

Goss's wilt and tar spot are two new diseases affecting sweet corn in midwestern states to be aware of because of potential for the pathogen to spread to New York.

Because resistant varieties are an important management practice and new sweet corn varieties are introduced each year, some with added disease resistance, it is worthwhile each year to check the resistant sweet corn variety list and the latest seed catalogs for up-to-date information.

The two tables below contain information about diseases that occur in New York (or could) grouped by pathogen type and listed in order of importance:

Table 1 has relative importance of each disease in terms of occurrence and potential severity in the absence of management.

Table 2 has plant parts affected, favorable conditions, symptoms, survival, spread, and control measures.

## Sweet Corn Diseases and Casual Pathogens that can Occur in New York

Pathogen Type & Disease Name	Pathogen Scientific Name	Occurrence	Severity
		(Rare=1 to Common=4)	(Slight =1 to Very=3)
<b><u>Bacteria</u></b>			
• Holcus spot	<i>Pseudomonas syringae</i>	2	1
• Stewart's wilt (aka Bacterial wilt)	<i>Erwinia stewartia</i> ( <i>Pantoea stewartii</i> )	1	1 to 2
• Goss's bacterial wilt and blight	<i>Clavibacter michiganensis</i> subsp. <i>nebraskensis</i>	Not detected	
<b><u>Fungi</u></b>			
• Northern corn leaf blight (NCLB)	<i>Exserohilum turcicum</i> ( <i>Setosphaeria turcica</i> )	4 (widespread)	1 to 3
• Common rust	<i>Puccinia sorghi</i>	4 (widespread)	1 to 3
• Common smut	<i>Ustilago maydis</i>	3	1
• Eyespot	<i>Aureobasidium zeae</i> ( <i>Kabatiella zeae</i> )	2 (farm specific)	1 to 2
• Gray leaf spot	<i>Cercospora zeae-maydis</i>	2 (mostly western NY)	1 to 2
• Carbonum leaf spot	<i>Bipolaris carbonum</i> ( <i>Cochliobolus carbonum</i> )	1	1
• Head smut	<i>Sphacelotheca reiliana</i>	1	2 to 3
• Southern leaf blight (SLB)	<i>Bipolaris maydis</i> ( <i>Cochliobolus heterostrophus</i> )	1 (occurred recently on LI)	1
• Tar spot (fungus)	<i>Phyllachora maydis</i>	Not detected	

<b>Viruses</b>			
<ul style="list-style-type: none"> <li>• Barley yellow dwarf</li> <li>• Cereal yellow dwarf</li> </ul>	Barley yellow dwarf luteovirus (BYDV)  Cereal yellow dwarf polerovirus (CYDV)	2 (farm specific)	1 to 2
<ul style="list-style-type: none"> <li>• Maize dwarf mosaic</li> </ul>	Maize dwarf mosaic potyvirus (MDMV)	1	1

<b>Disease and causal agent</b>	<b>Plant parts affected</b>	<b>Conditions favorable for the disease</b>	<b>Symptoms and effect of the disease</b>	<b>Survival and spread</b>	<b>Control</b>
<b>Holcus spot</b>  <i>Pseudomonas syringae</i> pv. <i>syringae</i>	Foliage, occasionally ears	Often appears after a rain storm when warm (75-86°F is favorable). During storms, splashing water disperses the pathogen and wounds that occur (such as by blowing soil) enable the pathogen to enter the leaf.	Round, small, white to light tan spots on leaves. Spots typically have a brown border. Yield not impacted but spots on husks can affect marketability.	Bacteria over-winter in crop debris. The pathogen has a wide host range including many grasses and dicots.	Crop rotation and tillage to incorporate debris.
<b>Stewart's wilt (Bacterial wilt) &amp; leaf blight</b>  <i>Erwinia stewartii</i>	Foliage, stem pith, roots, tassels, cobs, and kernels	High temp., high levels of ammonium N & P, low levels of Ca and K increase plant susceptibility; mild winters favor survival of flea beetles, hence increases chance of transmission. Abundance of bacterial wilt is limited by the availability of the corn flea beetle. An index of potential problems is calculated from the sum of the monthly mean temperature for the previous winter (December, January, and February). When the index exceeds 100, bacterial wilt is highly probable.	Linear pale green to yellow streaks with irregular or wavy margins that may extend the length of the leaf. These streaks soon dry and become brown. Infected plants may produce premature bleached and dead tassels. Internal stem discoloration seen in cross section of stem. Reduced yield due to reduced photosynthetic areas.	Bacteria over-winter in corn flea beetles; sometimes in kernels; dispersed by insects and, rarely, by seed.	Use resistant or tolerant hybrids and varieties. Early applications of insecticide to control vector on susceptible varieties. Occurrence of Stewart's wilt in NY has decreased substantially since these control measures became available.
<b>Northern corn leaf blight (aka northern leaf blight)</b>  <i>Exserohilum turcicum</i> (syn. <i>Setosphaeria turcica</i> )	Foliage, occasionally ears	Moderate temp. (18-27°C) and heavy dews; several races occur (1, 2, & 3), but only 1 and 2 identified in New York	Long elliptical (cigar shaped) grayish-green or tan lesions 2.5-15 cm long. First on lower leaves, progressing upward on the plant. Severe leaf infection causes coalescing of lesions and gray appearance like frost or drought injury. Infection during early stage of growth may cause heavy loss in ear fill. When severe, plants are killed prematurely.	On/in infected plant debris. Harbored by some weeds (ex. (Johnsongrass, sudangrass, etc.)	Because of race situation, use resistant hybrids; most resistant to race 0 but not race 1; spraying with fungicides may be necessary; eradicate weed hosts and plant debris.
<b>Common rust</b>  <i>Puccinia sorghi</i>	May occur on most plant parts but mainly on leaves	Favored by moderate temp., frequent heavy dews and high nitrogen	Develops soon after silking; oval pustules containing reddish-orange spores occur on both leaf surfaces; premature leaf senescence reduces yields and quality due to sugar drop.	Urediniospores cause reinfection; pustules turn black in fall with winter teliospores, which infect <i>Oxalis</i> (wood sorrel) weed host; primary inoculum blown into north from southern locations.	White varieties generally more susceptible but some yellow hybrids equally susceptible; choose tolerant varieties and consider fungicide sprays.

Disease and causal agent	Plant parts affected	Conditions favorable for the disease	Symptoms and effect of the disease	Survival and spread	Control
<b>Common smut</b>  <i>Ustilago maydis</i>	Seedling infection rare because of warm temp. requirement; foliage, ears, stems, and tassels are affected	Rain and humid weather for initial infection, then dry, sunny weather; high N levels.	First indication as leaf infection (small bumps) occurs in leaf whorl stage; large, fleshy galls covered by silvery-white membrane ruptures to expose black mass of spores; reduced yield and difficulty in handling for processing corn is a problem.	Spores survive in soil; crop rotation of questionable value; windblown spores from debris lodge in nodes and growing tips.	Steady growth of corn reduces amount of smut; excess nitrogen and mechanical injuries increases prevalence; choose resistant or tolerant varieties; removal of galls before rupturing beneficial in gardens
<b>Eyespot</b>  <i>Aureobasidium zeae</i> (syn. <i>Kabatella zeae</i> )	Leaves and leaf sheathes, outer husks, kernels (when severe)	Cool, humid weather	Small translucent, round to oval lesions, 1-4mm in diameter with yellowish halos that may fuse to form large necrotic areas; for field corn rapid drying of foliage reduces grain yield and silage quality.	Overwinters in corn debris; dispersed by wind and splashing rain.	Use less susceptible or tolerant hybrids and varieties; use rotation or plowing or both.
<b>Gray leaf spot</b>  <i>Cercospora zeae-maydis</i>	Affects foliage some time after anthesis	Prolonged periods of dew, fog and cloudy weather.	Appears as rectangular lesions, which become tan and then gray in color. The sharp parallel edges and opacity of mature lesions are diagnostic.	Corn is the only known host. Common when corn follows corn and diseased crop residues remain on the soil surface.	Hybrids differ in their susceptibility. Fall burial of crop residues and crop rotations are important.
<b>Anthracnose leaf blight</b>  <i>Colletotrichum graminicola</i> (syn. <i>Glomerella graminicola</i> )	Seedling and foliage; may also cause severe root & stalk rot (field corn)	High temp. & extended humid periods of cloudy weather; free water necessary for spore dispersion and germination.	Small, oval to elongated water-soaked spots on leaves; the lesions are semi-transparent; spots enlarge, become tan at center with reddish-brown or yellow-orange border; diseased leaves wither and die within a few days; fruiting bodies may develop in the lesion with dark setae.	On corn debris and seeds and other grass hosts; spores dispersed by wind and splashing rain or seeds.	Use resistant hybrids and varieties; rotation important; plow down crop residue and strive for balanced soil fertility.
<b>Carbonum leaf spot</b>  <b>(pka northern corn leaf spot)</b>  <i>Bipolaris carbonum</i> (syn. <i>Cochliobolus carbonum</i> )	Foliage & ears	Moderate temperature & high relative humidity; sporulates abundantly in damp weather	Race 1: Oval to circular tan spots with concentric zones.  Race 2: Oblong, chocolate-colored spots; rare; both races readily attack ears causing a black felty mold over the kernels.  Race 3: Narrow linear lesions up to 15-20 cm long; lesions are grayish-tan, surrounded by a light to darkly pigmented border (current dominant race in NY).  Race 4: Similar to race 2, but with concentric zones of sporulation.  Race 0: Produces small flecks on immature leaves and is not considered to be important.	On many grasses and weeds; on/in seeds; dispersed by wind and seeds.	Use resistant hybrids and varieties.

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<b>Downy mildew</b> <b>(Crazy top)</b> <i>Sclerophthora macrospora</i>	All corn types including sorghum; fungus infects systemically at seedling stage, but symptoms most obvious at top of plant because of malformed stalks, shortened internodes and tops	Soilborne fungus requires soil moisture at the seedling stage for infection to occur.	Symptoms vary but consist first of excessive tillering, rolling and twisting of upper leaves; most characteristic symptom is proliferation of the tassel leading to a leaf structure and suggestive of herbicide injury; this phyllody may also appear in the ears.	The fungus infects by motile zoospores, which encyst on the roots and produce germ tubes. Fungus overwinters by oospores; infection requires flooded soils soon after planting or before plants reach the 4 to 5 leaf stage.	Provide adequate soil drainage or avoid plating in low, wet areas; crop rotation and clean plowing are only slightly effective control measures.
<b>Head smut</b> <i>Sphacelotheca reiliana</i>	All types of corn, also sorghum and sudangrass, from seedling to ears and tassels	High concentration of teliospores, soil temp. of 21-28°C, and moderate to low soil moisture favors seedling infection; low nitrogen levels heavy soils, slow to dry out in Spring; causes crusting and impedes emergence	Seedling infection through rootlets or coleoptile from spores on seed or in soil, followed by systemic distribution; first symptoms when tassels emerge with each sorus covered by grayish-white periderm which ruptures to reveal dusty, black teliospores; if on tassels, then almost always on ears and may cause multiple ears at same or successive nodes; ears completely converted into fungal sori with only vascular strands remaining	Seedborne spores provide initial inoculum, soilborne teliospores thereafter remain viable even through digestive tract of animals.	Use resistant or tolerant varieties; seed treatments with fungicides to prevent introduction; requires long rotations once teliospores occur in soil.
<b>Southern leaf blight</b> <i>Bipolaris maydis</i> (syn. <i>Cochliobolus heterostrophus</i> )	Foliage, stalks, ears and cobs	Warm (20-32°C) and damp	<u>Race 0:</u> Elongated tan lesions between veins, with buff-to-brown borders; only on leaves.  <u>Race T:</u> Tan, spindle-shaped or elliptical lesions with yellow-green or chlorotic halos, which turn dark reddish-brown border. On leaves, stalks, ears, and cobs border (this race is no longer important)	On/in infected plant debris. Dispersed by wind and/or splashing rain.	Use resistant hybrids and varieties. Plow down crop debris. Use fungicides also labeled for northern corn leaf blight.
<b>Barley yellow dwarf luteovirus (BYDV)</b> and <b>Cereal yellow dwarf polerovirus (CYDV)</b>	Leaves display color symptoms; plants and ears are stunted if plants are infected early	Depends on the survival of specific aphid vectors for both viruses plus occurrence in grain crops (barley, oats, wheat) and wild grasses	Prominent yellow or purple coloration of leaves occurs with either BYDV or CYDV depending on the particular variety infected. Early infection results in shortened plants and ears, and blanking of the tips of ears	Transmitted by aphids in a persistent manner. Requires 24-48 hours for acquisition (can be as short as 15-30 min.) and then hours to circulate throughout the aphid before aphid can retransmit the virus	Avoid planting corn next to overwintered small grains or grass fields. Insecticides can be used to reduce secondary virus spread within the crop.

Disease and causal agent	Plant parts affected	Conditions favorable for the disease	Symptoms and effect of the disease	Survival and spread	Control
<b>Maize dwarf mosaic potyvirus (MDMV)</b>	Leaves, leaf-sheath and ear (flag) leaves and on husk; ears show poor tip fill and blanking of butt	Moderate summer temp. (18-27°C) favor high aphid populations and increase spread of inoculum	Near the base of the youngest leaves, irregular, light and dark green mottle and mosaic patterns appear that may develop into narrow, light green or yellowish streak along the veins; plants slightly stunted and reduction in ear size and seed set may occur; symptoms may disappear later and young leaves become yellow	In many grass & weed hosts (ex. Johnsongrass); seedborne but rare and low %; carried and transmitted by over 20 aphid species, sometimes from distant sources; virus occurs in most areas of New York	Use tolerant or resistant hybrids and varieties; plant early; spray insecticide to control aphids and slow spread
<b>Goss's bacterial wilt and blight</b>  <i>Clavibacter michiganensis</i> subsp. <i>nebraskensis</i>	Leaves, husks, and stalks	27°C is optimal. Bacteria need wounds from sandblasting, hail or other injury to infect	Long streaks with wavy (irregular) margins; initially water-soaked, then gray, tan to light yellow. Dark green to black irregular spots (freckles) form in streaks. Dried bacterial exudate is common. Leaves dry up when severe. Vascular discoloration and decay of stalk cavity occurs in plants infected systemically. Plants can be killed	Spread by splashing water and wind; infested residue; green foxtail and shattercane are hosts; seedborne but transmitted at too low frequency to likely be important	Partially resistant hybrids; rotate; remove or bury crop residue immediately after harvest
<b>Tar spot</b>  <i>Phyllachora maydis</i>	Leaves, leaf-sheath and husks	Moderate summer temp. (16-27°C), leaf wetness of at least 7 h at night, and greater than 75% RH.	Small black, glossy stromata (pathogen fruiting bodies) resembling spots of tar form in foliage and are visible on both surfaces. They can be within brown, elliptic, necrotic spots ('fisheye lesions'). Extensive necrosis leads to leaf blight, premature senescence, and plant death	Spores dispersed by water and wind potentially long distances; infested residue; no weed hosts	Rotate; irrigate during day when afterwards leaves will dry before night; remove or bury crop residue immediately after harvest

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