

# An IPM Scouting Guide for Common Problems of Sweet Corn in Kentucky







**Cover photo:** Spined soldier bug nymph on corn ear. This beneficial stink bug attacks and feeds on other insects.

# An IPM Scouting Guide for Common Problems of Sweet Corn in Kentucky

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In terms of acreage, sweet corn is the largest commercial vegetable crop grown in Kentucky. Integrated Pest Management (IPM) programs have played an important role in its production and have enabled growers to improve quality and minimize input costs. IPM uses a combination of biological, cultural, physical, and chemical methods to reduce and/or manage pest populations. **These strategies are employed in such a way as to minimize environmental risks, economic costs, and health hazards.** Pests are “managed” but not necessarily eliminated in order to reduce their negative impact on the crop.

The first and possibly most important step in managing a pest, disease, or other disorder is to properly identify the problem. Once the problem is correctly identified, a world of information becomes available through the Cooperative Extension Service and the Internet. Essential to the IPM approach is frequent scouting and monitoring diseases, insects, weeds, and abiotic (nonliving) disorders in order to identify potential problems before they result in serious losses. This guide covers the common abiotic and biotic (living) problems that occur on sweet corn in Kentucky.

Please contact your local Cooperative Extension agent should you need additional assistance or encounter a problem not included here. Additional information on sweet corn production, fertility, and pest management may also be found in the University of Kentucky publication *Vegetable Production Guide for Commercial Growers* (ID-36), available from your county extension office or online at <http://www.ca.uky.edu/agc/pubs/id/id36/id36.htm>.



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# Physiological, Nutritional, and Other Disorders



1a



1b

Foliar (a) and seedling (b) symptoms of nitrogen deficiency.

**1. Nitrogen deficiency** is often the most limiting factor in crop production. More nitrogen is required than any other nutrient. Nitrogen is a mobile nutrient, and as such, deficiencies tend to show up on older leaves first, as they will migrate to actively growing areas of the plant to support growth. These deficiencies tend to show up as a pale green or yellowing of older leaves and will often appear as a V-shaped yellowing from the tip of the leaf inward.

**Management**—Sweet corn is a heavy nitrogen feeder, requiring approximately 150 pounds of nitrogen per acre. Put out at least 80-100 pounds of nitrogen per acre preplant and apply the remaining as a side-dressing when plants are about knee high.

**2. Zinc deficiency** is significant because zinc is an important micronutrient for sweet corn production. Zinc deficiencies will appear as whitish

striping down the leaves of a corn plant. Typically the striping will appear on the outer parts of the leaves with the midvein remaining green. In addition, internode length (distance between leaves on a stalk) typically will be shortened in zinc-deficient plants. Although some soils are truly zinc deficient in Kentucky, zinc deficiency is most often observed in high pH soils (> 6.5) and in very early planting of sweet corn, when soils are coldest. Zinc will be less available in high-



2a



2b

Whole-plant (a) and foliar (b) symptoms of zinc deficiency.



Phosphorous deficiency in corn seedlings (a) and at whorl stage (b).

er pH soils, and cool soil conditions often reduce zinc uptake by plants. When growing early or with plasticulture, sweet corn zinc deficiencies are often observed.

**Management**—Although the University of Kentucky Soil Testing Laboratory tests for zinc in a routine soil test, the influence of environmental factors (temperature) make it difficult to predict a yield response from the addition of zinc for a particular growing season. If the soil is zinc deficient, zinc can be broadcast at up to 30 pounds per acre (90 pounds of zinc sulfate) or banded at 6 pounds per acre (17 pounds of zinc sulfate). Broadcast applications should last for several years. When sweet corn is transplanted into plastic, 4-6 pounds of zinc sulfate is often mixed into the setter water of water wheel transplanters.

**3. Phosphorous deficiency** typically appears as a purpling or reddening of leaves, affecting older leaves first. Phosphorous is important for proper kernel and ear development. Often phosphorous deficiencies appear in soils with an acidic (<6.0) pH. At low pH, phosphorous will bind to other elements in the soil, causing it to become immobile and therefore unavailable to the plant.

**Management**—Phosphorous is included in routine soil tests and should be adjusted based on test results. Generally, all phosphorous is applied preplant for sweet corn production.

**4. Uneven plant stand** is often seen in direct-seeded crops. The unevenness can be due to numerous factors, but many times soil compaction is the culprit.

**Management**—Avoid soil compaction: don't till wet soil or work in it, and avoid planting in roadways. Soil tilth can be improved by increasing organic matter through cover cropping or conservation tillage.

**5. Poor ear fill** will result in misshapen, unmarketable ears. There are many causes of poor ear fill. Poor pollination can result in cob tissue near the tip of an ear with no kernels. Severe drought stress during development can also result in short, misshapen ears as well as "skips" in kernels.

**Management**—Plant corn at proper spacing and in blocks to ensure adequate available pollen. Avoid drought-stressing corn from silking through ear development.



Uneven plant stands due to soil compaction.



Uneven ear fill.



Drought stress.



Wind damage.

**6. Drought stress**, when severe, can result in poor kernel development, inadequate ear fill, and poor quality corn.

**Management**—Sweet corn requires significant amounts of water during silking and ear development. Typically irrigate at least 1 inch of water per week during critical times. Both drip and overhead irrigation are effective for sweet corn production. Use tensiometers to monitor moisture status on coarser soils.

**7. Wind damage/lodging** can result from exposure to high winds. Sweet corn can experience “root lodge” (falling over at the roots) or suffer stalk breakage (the stalk snaps). Corn that undergoes root lodging may recover and stand

back up with minimal yield loss, particularly if the corn is young, though mature plants may have a crook-necked appearance. Corn that has snapped at the stalk can be completely lost if the breakage is below the developing ear. Transplanted corn is more susceptible to lodging and wind damage.

**8. Frost and freeze damage** can affect sweet corn. Unless corn is planted very early, as is the case with plasticulture sweet corn, most risk of frost damage occurs in fall on late-planted crops. Although sweet corn ears are often chilled for storage, a heavy freeze or frost prior to full development can cause damage.

**9. Tillering/suckering** can occur in sweet corn, with “tillers” or suckers often developing at the base. These tillers/suckers are more prominent when corn is exposed to extremely favorable growing conditions or when the main stem has broken near the ground. The development of suckers is also variety dependent. Sweet corn transplanted into plastic mulch tends to develop large numbers of suckers due to the favorable growing environment. Certain diseases and insects may also cause tillering.

**Management**—Although suckers were commonly removed in the past, research has shown that they do not reduce yield and need not be removed. The effect of large numbers of suckers in the plasticulture sweet corn has not been fully researched, however.



Frost damage.



Excessive tillering.

# Insect Pests



Wireworm attacking a corn seedling.



White grub feeding of corn roots.

## Soil-Associated Insect Pests

**10. Wireworms** (*Melanotus* sp.) can be especially destructive to sweet corn, particularly following certain rotations or in some fields that have a history of problems. Most wireworm larvae are hard, chestnut brown, smooth, and varying from ½ to 1½ inches in length when grown. Some species are soft and white or yellowish in color. There are many different species of wireworms that attack cultivated crops, but their biologies are similar. They overwinter in the ground as larval and adult stages. In the early spring the adults, called click beetles, become active. Many wireworm species have extended life cycles lasting two or more years, so past problems can be a measure of future problems. Wireworms attacking sweet corn reduce plant populations, since they feed on the seeds prior to germination or just after germination. The plant stand may continue to deteriorate, as wireworms can bore into the side of the crown and kill the growing point after emergence. They continue to feed upon the small roots of many plants throughout the season.

**Management**—Wireworms are most often a problem in fields that have been in sod for many years, particularly bluegrass sod. Soil insecticides and/or seed treatments are recommended at planting for corn where the risk of wireworm damage is high. In fields with a history of problems, wait to plant until soil temperatures are sufficient to promote quick germination and

growth, as this will limit wireworm losses. Certain species of wireworms are abundant only in poorly drained soils. The proper draining of such soils will prevent damage by these species. With wireworms, there is no effective rescue treatment once symptoms of damage are observed.

**11. White grubs** (*Phyllophaga* sp., *Cyclocephala* sp., *Popillia japonica*) can be destructive insect pests of sweet corn in Kentucky. Young plants are damaged when the grubs graze on the grass roots just below the soil surface. The root injury reduces the corn's ability to take up water and nutrients and withstand stress of hot, dry weather. Several species of white grubs, with life cycles ranging from one to three years, can attack sweet corn. All of these grubs have stout,

grayish-to-white bodies with brown heads. Depending upon the species, the mature grub ranges in size from 3/8 to 2 inches long. Most species are curled into a C-shape when at rest. **Management**—As with wireworms, white grubs can be more of a problem in certain rotations, particularly following sod. When white grubs are abundant, applying a soil insecticide may be the only way to avoid serious damage. Seed treatments may not provide sufficient control where grub numbers are high at planting.

**12. Black cutworms** (*Agrotis ipsilon*) are occasional pests of sweet corn and can cause considerable stand loss in localized areas of a field. Black cutworms are active on corn from plant emergence through mid-June. They are more likely to be found in fields with a history of cutworm damage, those planted under reduced or no-tillage practices, or those with poor drainage. Late planting; low, damp areas of the field that drain poorly; fall or spring weed growth; and the amount of surface residue influence the potential for cutworm infestations. The cutworms are light gray to nearly black with a faint, narrow stripe down the middle of the back. The skin appears to be greasy and contain tiny granules. Larvae can reach 1¾ inches long when full grown and will be coiled in a compact "C" when uncovered. Cutworms are active at night, feeding on leaves when small and on cutting plants as they grow. Symptoms are cut, wilted, or missing plants. Infestations usually develop on early-season weed growth.



A black cutworm attacking corn seedling (a). Adult black cutworm moth (b).



Corn rootworm larvae and characteristic damage to roots.

**Management**—Early land preparation and good weed control will help reduce cutworm problems. It is important to watch the field closely for cut plants. Early detection means an insecticide can be applied before serious damage occurs. Seed treatments can help reduce the number of cut plants.

**13. Corn rootworm larvae** (*Diabrotica virgifera virgifera*, *Diabrotica barberi*) can destroy corn roots during the month of June. The western corn rootworm is the most common of the rootworms attacking corn in Kentucky and is a pest here only of continuous corn, in contrast to states to our north. That may change in years to come. Eggs are laid in midsummer and remain dormant until the following spring, when they begin to hatch in late May. The small larvae move a short distance in the soil to feed on corn roots. Only one generation occurs per year.

**Management**—Rotation is still the most effective method of corn rootworm management in Kentucky. Soil-applied insecticides are also available for rootworm management.

**14. Corn root aphids** (*Aphis maidiradicis*) are small, wingless aphids that feed on the roots. They are a rare but serious pest of corn, light bluish-green to grayish green in color with a fine



Corn root aphids.

coating of wax. The corn root aphid is found in association with the cornfield ant and is dependent on it. This aphid's feeding removes nutrients from the roots, which results in stunting and yellowing of the plants and in some instances reduction in plant stands. It feeds on weeds including dock and plantain. The aphid can be a problem in fields with continuous corn and reduced tillage.

**Management**—Crop rotation tillage plays an important role in corn root aphid management.

**15. The lesser cornstalk borer** (*Elasmopalpus lignosellus*) is an uncommon pest of sweet corn that can feed on a number of crop plants, but economic problems are usually associated with



Lesser cornstalk borer on seedling.

hot, droughty conditions and late planting. Larvae are bluish green with yellowish white stripes on their backs. They form silken tubes at the base of the plant that incorporate bits of soil. The larvae wiggle violently when removed from the tubes. Lesser cornstalk borer can bore into the side of the crown and attack the growing point, resulting in a deadheart.

**Management**—Monitor young seedlings carefully during hot, dry conditions, especially with late-planted corn. Foliar sprays directed at the base of the plants will help reduce plant loss.



## Seedling Insect Pests

**16. The corn flea beetle** (*Chaetocnema pulicaria*) is small, black, hard-bodied insect that hops or flies quickly when disturbed. These pests overwinter as adults and become active in the early spring. Flea beetles attack young corn



Corn flea beetle.

plants as soon as the first true leaf appears. They produce small feeding streaks, also called “windowpane” scarring, on the leaves. Dur-

ing wet, cold periods in the spring when corn is growing slowly, damage from this pest can be severe, but only rarely will this damage actually kill plants. The real concern from flea beetles is Stewart’s wilt, a bacterial disease of corn. The pathogen is carried inside the flea beetle, and young plants become infected as the beetles feed. Damage from Stewart’s wilt is far more severe than any leaf injury caused by the beetles.

**Management**—Wilt-resistant sweet corn varieties should be selected to prevent losses, particularly following mild winters. Chemical control of the beetle should not be the only protection program for Stewart’s wilt. Seed treatments provide good control during early plant stages. Foliar insecticides sprays may be needed in rare situations.

**17. Stink bug** (*Euschistus* sp., *Acrosternum* sp.) damage to sweet corn is sporadic, even within damaged fields. Damaged plants are often grouped together in a row. Stink bugs feed on plants with their piercing, sucking mouthparts and inject digestive enzymes. This damage can result in injury to the growing point, tillering, and twisted leaves that fail to emerge from the whorl (buggy whipping). While there are other potential causes for these symptoms, stinks bug often leave a series of holes across the leaves that have yellow, irregular borders. Damage to young plants becomes evident several days after feeding occurs.

**Management**—Monitor for stink bugs and their damage while plants are less than 12 inches tall, particularly after mild winters. If necessary, foliar sprays directed toward the base of the plant can help reduce stink bug damage.



Brown stink bug feeding at base of plant (a). Tillering (b) and buggy whipping (c) due to stink bug feeding. Characteristic dissolved holes across leaf due to stink bug feeding (d).



## Foliar, Stalk, and Ear Insect Pests

**18. The European corn borer** (*Ostrinia nubilalis*) is one of the most common pests of sweet corn in Kentucky. This pest feeds on leaves, stalks, and tassels. An ear of the plant can have up to three generations per year. The larva is cream colored with a dark head, a faint gray stripe on its back, and numerous small, dark spots on the body. It is about 1 inch long when

full grown. The first generation occurs from early June to early July and is most damaging to early-planted corn. Damage is primarily due to borer tunneling in leaf midribs and the stalk. Treatment applied after borers have entered the plant will not be effective. On tasseled corn, the second-generation borers are dispersed over the plant and protected behind leaf sheaths and in axils. In this situation, plant coverage with the foliar spray is very important.



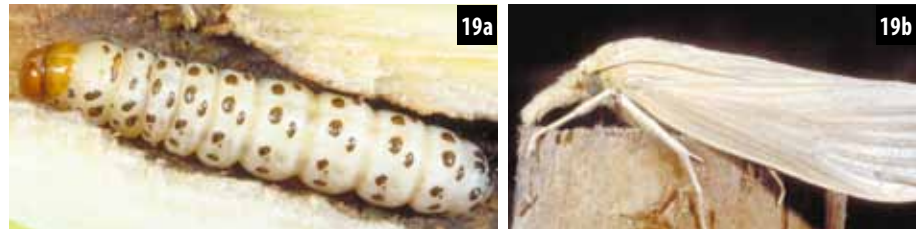
European corn borer larva (a) and adult (b).

**Management**—Inspect plants carefully from late July through August. Consider an insecticide application if live borers are found on 25% of the plants. Sprays for corn earworm during silking generally control this pest. Bt sweet corn is very effective against this pest. Pheromone traps can be used to monitor adult activity.

**19. Southwestern corn borer** (*Diatraea grandiosella*) is a pest in sweet corn that is very similar in biology and damage to the European corn borer. Generally, southwestern corn borer moth flights are two or three weeks after those of European corn borer. This pest is generally restricted to the western half of the state.

**Management**—Same as for the European corn borer. A very effective pheromone trap can be used to monitor moth activity.

**20. The corn earworm** (*Helioverpa zea*) is the most serious sweet corn pest because it feeds directly on the tip of the ear. Once worms are inside the ear, control is impossible. Earworms are variable in color, but they have a brown head without markings and numerous microscopic spines covering their body, giving it a sandpa-



Southwestern corn borer larva (a) and adult (b).

per-like feel. Female moths search out fresh silks on which to lay single eggs. Egg laying ceases when silks dry. Following hatch, the small larvae often eat the eggshell before beginning to feed on the silk and entering the ear. Corn earworms generally complete their development in 14 to 16 days. Full-grown worms leave the ear and pupate in the soil. Later-planted sweet corn is subject to intense earworm egg laying.

**Management**—Select sweet corn hybrids with good tip coverage and tight husks to limit earworm damage to the ear. Bt sweet corn can provide up to 90% control of corn earworm. To protect ears while the silks are fresh, use pheromone traps to monitor moth activity and determine frequency of sprays. Initial sprays for corn earworm should be timed to protect the ear

when most ears show silk emergence. Later plantings will require more intensive earworm management. Corn earworm resistance to pyrethroid sprays may be an issue in certain areas/times of the year. Planting early can help organic growers avoid corn earworm.

**21. Fall armyworm** (*Spodoptera frugiperda*) is an occasional pest of sweet corn and can be difficult to control. This pest does not overwinter in Kentucky and reinvades from the south each summer. Late-planted fields are more likely to become infested, as this pest will concentrate on egg laying on corn that has not yet silked. Fall armyworm causes serious feeding damage to leaves as well as direct injury to the ear. Like European corn borer, fall armyworm can only be effec-



Corn earworm damage (a), color variation among larvae (b), adult moth (c).



Fall armyworm larva.

tively controlled while the larvae are small. Fall armyworm larvae (pictured on previous page) vary from light tan to black and have three light yellow stripes down the back. They have a wider dark stripe and a wavy, yellow-red blotched stripe on each side and an inverted, light-colored "Y" on the head.

**Management**—Treatments should be applied before the larvae bury deep into the whorl to avoid damage. Late-season sprays for corn earworm usually provide effective control of fall armyworm. Bt sweet corn provides only partial control of fall armyworm.

**22. Japanese beetle** (*Popillia japonica*) is highly attracted to fresh silks and can be an occasional pest, particularly in border rows. Silk feeding by Japanese beetle can interfere with pollination of the ear as well as expose the tip of the ear to birds and sap beetles. Damage to the ear tip by Japanese beetle may also increase the risk of ear rots.

**Management**—Sprays for corn earworm usually provide excellent control of Japanese beetle. Select varieties with excellent ear-tip coverage. Monitor Bt sweet corn and spray for Japanese beetle as necessary.

**23. Sap beetles** (*Glischrochilus quadrisignatus*, *Carpophilus lugubris*), also known as picnic beetles, are primarily scavenging insects that feed on overripe or damaged fruits and vegetables and other decaying plant matter. Usually they are attracted to ear tips damaged as a result of corn earworm or Japanese beetle feeding. However, the beetles may enter undamaged ears anytime from early silk to maturity. Sap beetles are about 3/16 to 1/4 inch long and brown to black. The wing covers may have orange markings. Light-colored larvae may be found in some ear tips along with adults.

**Management**—Control other insect pests that attack the ear, such as corn earworm and Japanese beetle. Select varieties with long husks and good tip coverage. Plow or disk early plantings as soon as harvest is complete.

**24. Corn rootworm adult** (*Diabrotica virgifera virgifera*, *Diabrotica barberi*) is primarily a problem where corn is grown continuously in the same fields. Rootworm beetles begin to emerge



Japanese beetles on ear silks.

from the soil in July and feed on ear silks, pollen, and the upper surface of leaves. When numerous, they can clip silks and interfere with pollination. The ¼-inch beetle is green with black margins. The female has three black stripes; the male's wings are mostly black.

**Management**—Crop rotation and sprays for corn earworm usually control this pest. Corn rootworm may be more of a problem with reduced sprays programs for Bt sweet corn.

**25. Corn leaf aphid** (*Rhopalosiphum maidis*) is very common in whorl-stage corn in Kentucky. It rarely causes yield loss but can be a contaminant in sweet corn. Infestations are more common in late-planted corn. Corn is most susceptible to yield loss by aphids while in the whorl stage. If large numbers are present three weeks before tassel emergence, physiological damage and some yield loss may occur. Excessive honeydew on the tassels may limit pollen shed, and it has



Corn leaf aphids infesting flag leaf of sweet corn.



The picnic beetle (a), sap beetle (b), and sap beetle larvae (c).



Female (a) and male (b) corn rootworm beetle.

been associated with barren corn, although this connection is uncommon. Corn leaf aphids vary from blue-green to gray and are small (1/8 inch or less) with a dark pair of tubes (cornicles) that project toward the rear.

**Management**—Monitor for corn leaf aphid twice prior to tasseling. Consider treating for corn leaf aphids if an average of 15 or more aphids (10 with stressed plants) per whorl are found three weeks before tassel emergence or 30 or more aphids (15 with stressed plants) per whorl are found one week later.

# Diseases



Common corn rust.

## Diseases Caused by Fungi and Fungus-like Organisms

**26. Common rust** (*Puccinia sorghi*) is found frequently in Kentucky during periods of moderate temperatures and high humidity/rainfall. Numerous pustules, brown in color, can be found on upper and lower leaf surfaces. Infections often take place in the whorl, resulting in aggregation of pustules in bands. Pustules may turn black as they mature and leaves age; leaves tend to turn yellow and later necrotic as the disease progresses.

**Management**—Resistant varieties and fungicides (use fungicides on later plantings if disease is seen on early plantings or if disease is observed at the whorl stage).

**27. Common smut** (*Ustilago maydis*) is generally a minor problem, but it can cause serious damage if injury occurs to actively growing (young) plant tissue. Mechanical injury (machinery, hail) and insect feeding can increase the likelihood of infection. Although all plant parts may be affected, symptoms are seen most often on ears and tassels. On ears, galls first appear as greenish or white enlargements. As the galls mature, their contents darken and evolve into masses of spores that can be seen when the galls rupture; they will serve as the overwintering stage of the causal agent.

**Management**—Removal of infected material prior to maturation of galls, insect control, minimizing injury to plants, crop rotation, and resistant varieties.



Common smut on ear.

**28. Crazy top** (*Sclerophthora macrospora*), also called downy mildew, causes distortion and proliferation of tassels (the symptom for which the disease is named), excessive tillering, rolling of upper leaves, and occasional narrowing of leaves. Infections occur mainly on seedlings and are systemic. The disease is most likely to occur if soils are saturated before plants reach the growth stage of four to five leaves, which favors germination of soilborne, overwintering spores (oospores).

**Management**—Adequate soil drainage and resistant varieties.



Crazy top of corn.



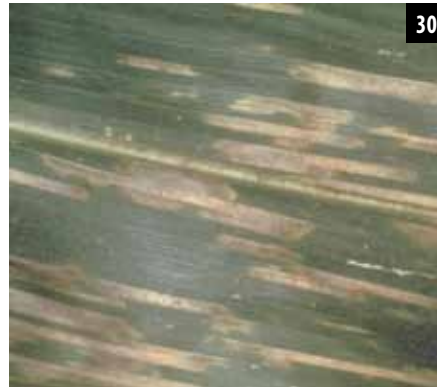
Damping off of corn seedling.

**29. Damping-off** (*Pythium* spp., primarily) is characterized by soft rot of seed before germination or death of seedlings pre- and post-emergence. On emerged plants, a soft and water-soaked necrosis will occur just above the soil line and will extend to roots belowground. Plants wilt rapidly and die.

**Management**—Soil moisture (drainage, irrigation) management, plant into warm soils (60 °F and above), and fungicide-treated seed.

**30. Gray leaf spot** (*Cercospora zea-maydis*) tends to be most active in the period just before tasseling and beyond. Early symptoms include yellow lesions with a faint halo. Older lesions have a distinct rectangular shape; lesions tend to be narrow and between 3 and 4 inches in length. Lesion color changes from brown to tan-gray as spore production begins. The causal agent survives in crop debris and its effect can be severe in poorly rotated fields. High humidity is required for infection and spread of disease.

**Management**—Crop rotation, resistant varieties, incorporation of corn residues, and fungicides.



Gray leaf spot.

**31. Northern corn leaf blight** (*Exserohilum turcicum*) lesions are large (1 to 6 inches) and tend to be cigar-shaped. Color varies from tan to brown; older lesions may darken in the center as spores are produced. Symptoms are found mostly on leaves, but husks may be affected in severe outbreaks. High lesion numbers will lead to severe blighting and death of foliage. The disease is most active after silking during periods of moderate temperatures and high moisture.

**Management**—Crop rotation, incorporation of corn residues, resistant varieties, and fungicides (on later plantings if disease is found on earlier plantings or if disease is active before silking).

**32. Southern corn leaf blight** (*Cochliobolus heterostrophus*) lesions are variable in size, depending on the race of the pathogen present and also the variety. Lesions caused by race 0 are elongated and restricted by veins,  $\frac{3}{4}$  to 2 inches in length, and tan-colored; a darkened border may be present. Lesions caused by the T race are small, circular to oval in size, and have a reddish brown border. In severe outbreaks, blighting and



Northern corn leaf blight.

death of foliage are common and husks will be damaged as well. The disease is most active after silking during periods of moderate-to-warm temperatures and high moisture.

**Management**—Crop rotation, incorporation of corn residues, resistant varieties, and fungicides (on later plantings if disease is found on earlier plantings or if disease is active before silking).

**33. Southern rust** (*Puccinia polysora*) is found in late summer in some years during periods of moderate-to-warm temperatures and high humidity/rainfall. Numerous pustules can be found on upper leaf surfaces, while sporulation on lower surfaces is fairly sparse. Pustules range in color from yellow-orange to cinnamon brown. Leaves tend to turn yellow and later necrotic as the disease progresses; other plant parts may also be affected.

**Management**—Resistant varieties and fungicides (on later plantings if disease is seen on early plantings or if disease is observed at the whorl stage).



Southern corn leaf blight.



Southern rust.



34a



34b

Foliar symptoms of Stewart's wilt of corn (a, b).

## Diseases Caused by Bacteria

**34. Stewart's wilt** (*Pantoea* [*Erwinia*] *stewartii*) shows its first symptom in seedlings as streaking (pale green to yellow in color) that appears between and parallel to leaf veins and later turns necrotic; streaks can run the entire length of affected leaves (Fig. 34a). Seedlings can be infected systemically and also will show stunting (Fig. 34b); necrosis may be present in the stalk near the soil line. In older plants, leaf streaking (followed by necrosis) is the main symptom observed. The causal agent is transmitted to sweet corn by overwintered adult corn flea beetles, and this transmission can occur in a short period after seedlings emerge. Survival of flea beetles is greatly diminished if average winter (December through February) temperatures are 27 °F and the risk from Stewart's wilt is minimal; however, if average winter temperatures exceed 30 °F, disease risk will be moderate to high. **Management**—Resistant varieties (most important consideration) and insecticides (seed treatments or in-furrow applications) to kill flea beetles before they transmit the Stewart's wilt pathogen.

## Diseases Caused by Viruses

**35. Maize chlorotic dwarf** (maize chlorotic dwarf virus, or MCDV) has variable symptoms on sweet corn, including reddening or yellowing of leaves, twisting and tearing of foliage, and stunting / shortening of internodes on older plants. Faint yellow stripes (veinbanding) may be seen in leaves during the whorl stage. The pathogen can overwinter in several grasses, of which Johnsongrass is the major host. Several species of leafhopper transmit the virus from overwintering hosts to sweet corn. **Management**—Resistant varieties (primary choice) and management of Johnsongrass.

**36. Maize dwarf mosaic** (maize dwarf mosaic virus or MDMV) has variable symptoms on sweet corn depending on plant age and variety. Early symptoms include chlorotic spots or streaks interspersed with healthy, green tissue. Leaves may become yellow or stunted later on; dwarfing (stunting) may be seen in susceptible varieties. Dwarfing of ears may also be seen in some cases. The pathogen can overwinter in several grasses, of which Johnsongrass is the major host. A number of aphid species transmit the virus from overwintering hosts to sweet corn. **Management**—Resistant varieties (primary choice) and management of Johnsongrass.



35

Maize chlorotic dwarf symptoms.



36

Maize dwarf mosaic symptoms.

# Herbicide Injury



Leaf spotting due to Paraquat (Gramoxone) injury.

**37. Paraquat** (Gramoxone) is a widely used nonselective contact kill herbicide that is used in burn-down applications or as a post-emergence directed spray to rows. Common injury symptoms include a white "burn" spot where the herbicide has made contact with the plant.

**Management**—For post-emergence applications, use a shielded sprayer and avoid spraying when plants are less than 10 inches tall.

**38. EPTC** (Eradicane) is a thiocarbamate herbicide that inhibits seedling development and is used for pre-emergent control of annual grasses and broadleaves in corn. In the germinating seedling it affects lipid and protein biosynthesis.

**Management**—Use a safener and avoid applying prior to heavy rains, which could leach the safener.



EPTC (Eradicane) injury.

## For More Information

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Specific pest management and crop production information can be found in the following University of Kentucky publications, available at county extension offices as well as on the Internet.

### Entomology fact sheets

Sweet Corn Pests (ENTFACT-302)

<http://www.ca.uky.edu/entomology/entfacts/ef302.asp>

Corn Earworm Management in Sweet Corn (ENTFACT-318)

<http://www.ca.uky.edu/entomology/entfacts/ef318.asp>

Stink Bug Damage to Corn (ENTFACT-305)

<http://www.ca.uky.edu/entomology/entfacts/ef305.asp>

Seedcorn Maggots (ENTFACT-309)

<http://www.ca.uky.edu/entomology/entfacts/ef309.asp>

Predicting European Corn Borer Development (ENTFACT-106)

<http://www.ca.uky.edu/entomology/entfacts/ef106.asp>

Two-Spotted Spider Mites (ENTFACT-310)

<http://www.ca.uky.edu/entomology/entfacts/ef310.asp>