



Ear Rot of Corn Caused by *Stenocarpella maydis* (= *Diplodia maydis*)

Paul Vincelli, Extension Plant Pathologist

Stenocarpella ear rot, formerly known as Diplodia ear rot, is by no means a new disease of field corn. However, many producers have recently encountered the disease for the first time. During the 1950s and early 1960s, Stenocarpella ear rot was the most common ear rot disease of corn in the Corn Belt. Until recently, the disease generally was much less important, possibly because inclusion of soybeans into crop rotations since the mid-1960s may have helped reduce levels of *inoculum* (infectious spores).

There is some indication that Stenocarpella ear rot is again increasing in severity, at least in localized areas of the commonwealth. All available evidence indicates that this increase is related to the growing use of conservation tillage practices for corn production. This statement is not intended as a condemnation of the important practice of conservation tillage; however, corn producers and those in the corn industry must recognize that certain diseases can be more important under conservation tillage, particularly when crop rotation is not practiced.

Symptoms

This ear rot appears as a white, cottony fungal growth between kernels, almost always progressing from the ear shank upward and from the cob outward (Figure 1). Occasionally, infections progress downward from the tip of the cob. Severely affected ears can be obvious from a distance, as the husks turn brown and dry down well before the rest of

the plant, although producers may not discover the disease until combining. In most cases, no symptoms appear on the leaves of infected plants.

Disease Cycle

Stenocarpella ear rot is caused by *Stenocarpella maydis*, the same fungus that causes Stenocarpella stalk rot. For decades, this fungus was known as *Diplodia maydis*. Scientists now recognize that the proper name for this fungus is *Stenocarpella maydis*. Another related fungus, *Stenocarpella macrospora*, has been found in at least one instance in this region of the United States causing a similar ear rot during warm, humid weather. *S. macrospora* also produces brown spots and streaks on leaves.

S. maydis survives between seasons in residue of corn stalks, cobs, and fallen kernels. Spores of the fungus are produced in fruiting structures called pycnidia, which are produced on infested corn residues. During wet weather, the microscopic spores ooze out of these fruiting structures, where they are spread by rainsplash. When plants are silking, spores that are splashed up to the ear leaf and then deposited by rainwater around the ear shank have an opportunity to infect. These spores can germinate and penetrate the ear shank, growing up into the cob and outward into the kernels.

Ears are most susceptible to infection within a week or two of mid-silk (50 percent of plants with silks). Research

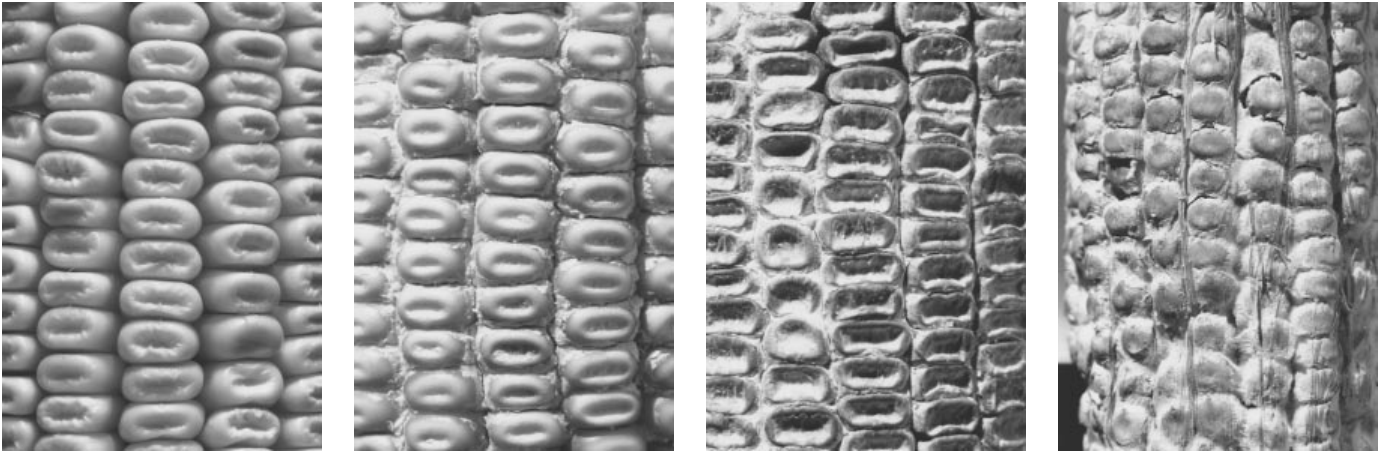


Figure 1. A close-up of healthy corn is shown at the far left, with increasing levels of damage from *Stenocarpella* ear rot in the remaining pictures. Note how kernel size is reduced in the most affected ear at the far right.

to date indicates that susceptibility of ears steadily declines after that, although some ears can still be infected as long as four weeks after mid silk. Wet weather and moderate temperatures during silking allow infection to occur if spores are present. Dry weather before silking followed by warm, rainy weather during silking sometimes enhances the disease, perhaps by preventing spore release until the plants are silking. Damage from bird feeding and insect injury can increase the severity of certain ear rots, such as *Aspergillus* ear rot and *Fusarium* kernel rot. However, field observations suggest no association between bird damage or insect injury and *Stenocarpella* ear rot.

S. maydis is common at low levels in Kentucky corn fields. Corn is the only host of *S. maydis*, so inoculum levels usually are highest in fields of continuous corn; they decline when rotated to other crops. Highest-risk corn fields are those under conservation tillage with little or no rotation to other crops. This heightened risk is caused by infested corn residue left on the soil surface. This residue can produce large amounts of spores that can be splashed to the next crop. Producers can greatly reduce the spore potential by rotating to other crops or burying the residue through tillage. In research conducted in South Africa, survival of pycnidia and incidence of *Stenocarpella* ear rot were consistently higher under conservation tillage systems.

Damage

The incidence of affected ears in a field can range from 1 percent to 2 percent to as high as 75 percent to 80 percent. The fungus can consume the ear by the blister stage and prevent the ear from producing harvestable grain. More commonly, fungal growth occurs in ears during the milk, dough, and dent stages. The infection causes less damage if the ear is more developed when the fungus grows outward from the cob. Fungal growth can continue even after black layer (physiological maturity), although its growth is probably somewhat slower in mature kernels.

Stenocarpella ear rot can affect yield of harvested grain if infection occurs early enough to trim kernel and ear size. Severely affected ears can have test weight losses as high as 35 percent. Feeding and milling qualities of the grain may also be affected.

Management

Producers growing no-till corn who find more than 2 percent to 3 percent of ears with *Stenocarpella* ear rot should consider the following management suggestions:

Preplant Practices

Crop Rotation

Rotation away from corn is the best management approach at this time. Rotation deprives the fungus of a food base and causes it to starve. No crop in Kentucky other than corn is susceptible to *S. maydis*, so any crop represents a suitable alternative for managing *Stenocarpella* ear rot. Any rotation

away from corn, even for one year, helps to reduce buildup of inoculum and allows infested corn residues to begin to decompose. In fields with moderate to high levels of *Stenocarpella*-infested residues, rotations of two to three years may be required to reduce inoculum to acceptable levels. Recognize that repeatedly sowing a rotation crop to control *Stenocarpella* ear rot may create a different set of pest and disease problems. For example, if soybeans are sown for several years to reduce inoculum levels of *S. maydis*, growers should monitor the preplant population of soybean cyst nematode every year.

Tillage

Research to date indicates that the level of *Stenocarpella* ear rot is proportional to the amount of infested corn residue on the soil surface, if weather conditions during silking allow the disease to develop. Tillage practices that partially or completely bury corn residue can provide substantial disease control by greatly reducing spore levels in the field. However, because of soil erosion concerns, many growers may not wish to exercise this option and may even be restricted from doing so by their soil conservation plan. Deep tillage is not a guarantee against the disease since some infested residue may remain on the soil surface. For many farmers, rotation may be the preferred option for dealing with fields where *Stenocarpella* ear rot is a significant problem.

Hybrid Selection

No corn hybrid currently on the market has a high level of resistance to *Stenocarpella* ear rot. The disease can develop to some extent in any corn hybrid if spore levels are high and weather conditions during silking favor infection. However, hybrids do differ somewhat in their level of susceptibility to the fungus. The problem for producers is that little information currently is available on hybrid susceptibility to *Stenocarpella* ear rot. Several corn seed companies now have active breeding programs to develop hybrids with resistance to this disease. However, these breeding programs do not currently have enough data to reliably predict varietal performance in the presence of the disease.

While all hybrids tested thus far are susceptible to some degree, certain hybrids are probably too susceptible for use in an infested field. Monitor the level of *Stenocarpella* ear rot among the hybrids grown in your area, and avoid hybrids that have repeatedly suffered very high levels of ear rot (50 percent or more of the ears diseased).

Producers can often learn much about a corn hybrid from observations in commercial fields and from inspections of strip trials, where hybrids are planted in strips running the length of the field. However, use caution in judging the susceptibility of a hybrid from one such observation, regardless of the difference in incidence of *Stenocarpella* ear rot among hybrids. Spore levels may differ from field to field and even within a field. Furthermore, spore levels and weather conditions that promote infection vary from week to week. Corn plants are most susceptible around silking. Unless the corn hybrids being compared flowered at about the same time

and were exposed to the same spore levels, comparing the disease level among hybrids in a strip trial or in different fields may be misleading. Current research at the University of Kentucky suggests that it is very difficult to make meaningful comparisons among hybrids under field conditions, even using rigorous methods of experimental design. Such comparisons are even more difficult when evaluating the level of *Stenocarpella* ear rot among single hybrid strips within a field or among different fields.

To lessen the risk from this disease, consider planting several hybrids with differing maturities so that they won't all be silking simultaneously. Thus, even if an outbreak of *Stenocarpella* occurs, some fields may escape the disease.

Note that resistance of a corn hybrid to *Stenocarpella stalk* rot does not mean the hybrid has resistance to *Stenocarpella ear* rot. These two traits are inherited independently.

Other practices

Breaking up corn residue following harvest will help promote decomposition and reduce spore levels in that field in the future. The more thoroughly the residue is broken up and shredded, the more quickly it will decompose. There is no research on whether a bushhog or flail mower will work better to reduce spore levels of *S. maydis*.

Harvest and Postharvest

Fields with significant levels of *Stenocarpella* ear rot should be harvested as soon as possible and dried with heat to below 15.5 percent moisture (below 13 percent for storage through the following summer). To avoid contamination of the whole bin, store dried, affected corn separately from healthy corn. Also, maintain a storage facility free of leaks, aerate the grain regularly, and check regularly for hotspots, musty odors, or other signs of deteriorating grain. *Stenocarpella*-affected corn may not store well, so market that grain as soon as possible.

Stenocarpella-affected corn in the United States does not appear to contain mycotoxins and is not regarded as a feeding risk to livestock. Laboratory confirmation is recommended if you are uncertain about the identity of an ear rot since several ear rot diseases of corn can be associated with high levels of mycotoxins. The nutritive value of *Stenocarpella*-affected corn may be reduced, and some animals refuse the feed. It may be possible to overcome palatability problems by blending it with adequate amounts of normal corn.

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