

## FACTORS THAT PROMOTE CORN DISEASES

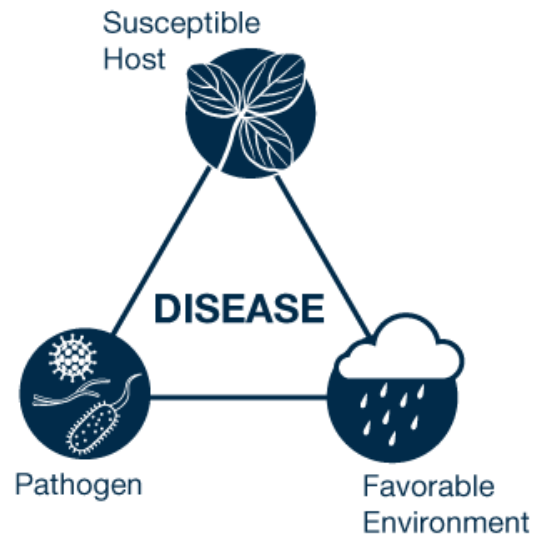
Corn diseases can and do happen each year and are a major factor limiting corn production. All parts of the plant may be affected – the ears, leaves, stalks, and roots at various stages of development. Corn diseases can cause leaf spots or blights, wilts, or premature death of the plant. They can also cause harvest and storage losses and affect grain quality.

There are multiple categories of plant pathogens that can be damaging to plants, including seed and seedling diseases, foliar diseases, stalk rots, ear rots, nematodes, and viral and bacterial diseases. For diseases to occur, three ingredients must coincide: a pathogen, a susceptible host, and favorable environmental conditions. This is known as the disease triangle (Figure 1). The amount of time spent in conditions favorable for specific diseases results in the overall amount of disease.

The key to managing diseases in corn is eliminating one of these factors. Many management techniques depend on the specific disease, so it is important to accurately identify the pathogen before making management decisions.

### Seed and Seedling Diseases

Seed and seedling diseases (Figure 2) occur wherever corn grows and are usually favored by wetness and cool soil temperatures (around 50°F). Fungi that cause seedling blights may be in seed, soil, or both. Seedborne pathogens are not as prevalent as they once were due to modern seed corn processing methods. Most seed corn is treated with fungicides, which further reduce losses. Disease-free seed with confirmed high germination rates planted into a well-prepared seedbed with warm, moist soil (above 55°F) is least likely to have disease problems.



**Figure 1. Disease triangle. Disease only occurs when the pathogen is present with a susceptible host and the environment favors disease. The amount of time spent in conditions favorable for specific diseases results in the overall amount of disease.**



**Figure 2. Pythium infection on different growth stages of corn seedlings.**

## Foliar Diseases

The prevalence of foliar diseases varies from field to field and year to year depending on environmental conditions, tillage practices, crop rotation, and corn product susceptibility. In general, moderate temperatures and moisture (rain or heavy dew) usually favor leaf diseases. More than one pathogen may be present on the same plant (Figure 3). Foliar diseases are usually most problematic after tasseling and during grain fill, although Anthracnose and bacterial leaf blight can occur earlier.

Control measures include selection of tolerant corn products, tillage to reduce overwintering spores in debris, crop rotation, and timely application of foliar fungicides.



**Figure 3. Symptoms of gray leaf spot (GLS) and northern corn leaf blight (NCLB) on the same leaf.**

## Stalk Rot Diseases

Late-season stalk rots are common and can be extremely detrimental to yield. In most cases these diseases become established later in the season, with the greatest losses being harvest losses (Figure 4). Several different fungi and bacteria cause stalk rots as part of a complex of microorganisms that decompose dead plant material in the soil. They survive from one growing season to the next in soil or infested corn residue.

Stalk rot becomes a problem when plants are stressed during the grain filling stages of development. Drought conditions, extended periods of cloudy weather, temperature stress, hail damage, insect damage, nutrient deficiency, leaf loss from foliar diseases, and other stresses can be associated with an increase in stalk rot.

Stalk rots are complex and cannot be completely controlled. Select corn products with good stalk health and lodging characteristics, maintain weed and insect control, practice proper fertility, plant at proper populations for that corn product, and minimize overall stresses in corn plants during reproductive and grain fill growth stages.



**Figure 4. Corn stalk lodging in the fall due to cannibalization and stalk rots.**

## Ear Rots

Several fungi cause corn ear and kernel rot diseases that can reduce yield potential, feed quality, and grain value (Figure 5). Most of the ear rots are more prevalent when rainfall is above normal from silking to harvest. One exception is *Aspergillus flavus*, which is favored by drought stress during pollination and warm temperatures as kernels mature. For all ear rots, damage tends to be more severe on ears with insect, bird, or hail damage. In general, ears are well covered by husks tend to have less rot than upright ears with open husks. However, *Gibberella* ear rot seems more severe on ears with tight husks. Some of these fungi, in particular *Penicillium*, *Fusarium*, and *Aspergillus*, can also cause extensive damage to grain if it is not stored at the proper moisture content and temperature.

Corn product selection is the primary management option for ear rots. There are labeled fungicides for ear rots, however, timing of application is critical, and it is difficult to get adequate coverage in the ear region of



**Figure 5. Ear rot fungi, such as *Gibberella*, can reduce yield potential, feed quality, and grain value.**

the plant. Early detection of ear rots allows harvest to be prioritized in affected fields and helps reduce the amount of grain affected by the growth of the pathogen.

## Nematodes

Nematodes attack corn roots, thereby limiting their development and restricting uptake of water and nutrients. Nematodes can often be overlooked. The symptoms of nematodes include stunting, yellowing, and root damage (Figure 6). Some symptoms are quite distinctive, but most are not, making diagnosis challenging. Symptoms tend to occur in patches elongated in the direction of tillage.

Corn plants are rarely killed by nematodes. Symptoms of nematode feeding are most noticeable when environmental conditions cause plant stress. Nematodes can cause yield loss without exhibiting above-ground symptoms. Soil and root samples must be taken and submitted to a testing facility. Treatment recommendations can be made after test results confirm nematode species and population density. Management options vary by species but include crop rotation, minimizing plant stresses, seed treatments, and nematicides.



**Figure 6. Nematode damage to corn plants pulled from the same field. Nematode damage is rarely uniform across a field.**

Photo by J. Bond, Southern Illinois University}

## Sources

Sweets, L.E. and Wright, S. 2008. Integrated pest management: corn diseases. IPM1001. Plant Protection programs. University of Missouri Extension. <http://extension.missouri.edu>.

Stuckey, R.E., Niblack, T.L., Nyvall, R.F., Krausz, J.P., and Horne, C.W. 2008. National corn handbook: corn disease management. NCH-4. Wisconsin Corn Agronomy. <http://corn.agronomy.wisc.edu>.

Chilvers, M. July 19, 2017. Corn disease management decisions. Michigan State University Extension. <http://canr.msu.edu>.

Legal Statements

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

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