Corn Diseases and their Effect on Silage

- The feeding quality and tonnage of corn silage can be reduced by various corn diseases.
- Ear rots can reduce grain quality and depending on disease, mycotoxins may be produced that can be harmful to livestock.
- Stalk rots can reduce nutrient and water flow to the developing ear.
- Foliar diseases can destroy leaf tissue and lead to a potential reduction in plant sugar creation.

Effect on Feeding Quality and Tonnage

The feeding quality and tonnage of corn silage can be reduced by various corn diseases. Infection potential for each disease depends greatly on environmental conditions and the resistance level of a particular corn product.

Ear rots can reduce grain quality and depending on the disease, mycotoxins may be produced that can be harmful to livestock. Infected silage should be analyzed to determine the significance of any mycotoxin.

Stalk rots, because of the loss of vascular tissue, can reduce nutrient and water flow to the developing ear. As a result, kernel weight and size may be reduced. Stalk lodging is generally not a concern when the plants are chopped; however, chopping efficiency can be reduced if lodging occurs.

Foliar diseases can destroy leaf tissue and lead to a potential reduction in plant sugar creation, which can ultimately affect stalk quality and ear fill. Photosynthesis requires healthy leaf tissue to maximize sugar production.

Ear Rots

Overall silage quality and grain content can be reduced by the affects of ear rots. Depending on the disease, environmental conditions, and damage to the ear (insects and hail), the silage can be contaminated with mycotoxins. Silage containing mycotoxins is rarely fatal; however, reduced growth rate, lower feed conversion, lower reproductive rate, reduced resistance to infectious diseases, and a reduction in the efficacy of vaccinations can be commonly observed.

Common ear rots that can infect corn include Gibberella (Fusarium graminearum) (Figure 1), Fusarium (Fusarium verticilliodes, F. subglutinans, F. proliferatum) (Figure 2), Diplodia (Stenocarpella maydis) and Aspergillus flavus. Mycotoxins that can potentially develop after ear rot infection include fumonisins, aflatoxin, zearalenone, and vomitoxin. Associated with high heat and drought are fumonisins that are produced by several Fusarium species and Aspergillus flavus, which can produce aflatoxin. Even though Aspergillus flavus may be present, aflatoxins may fail to be produced. Common smut (Ustilago zeae) has a tendency to appear under droughty conditions and can reduce grain quality.

 Cooler, moist conditions are favorable for the development of zearalenone and vomitoxin, which are produced by other Fusarium species, i.e., Fusarium graminearum (asexual stage), which is also known as Gibberella zeae (sexual stage). Silage suspected to be infected by Gibberella, Fusarium, and Aspergillus flavus should be analyzed for potential mycotoxins.

Stalk Rots

Stalk rots, such as, Gibberella, Fusarium, Diplodia, Anthracnose (Colletotrichum graminicola), and Pythium (Pythium aphanidermatum), can cause lodging and potentially reduce grain fill and dry matter by destroying vascular tissues. Severe foliar disease levels can lead to stalk rot development if leaves are unable to produce a sufficient amount of photosynthesis to fill ears and maintain roots and stalks.

Foliar Diseases

Gray leaf spot (GLS) (Cercospora zeae-maydis) can develop when prolonged periods of high relative humidity (90% or greater) and warm temperatures (70 - 90°F) are present. Long lasting fogs or heavy dews are particularly favorable for infection. Due to an extended latent period, initial symptoms of GLS typically develop 2 to 4 weeks after infection. Immature lesions appear as small, brown or tan spots on the leaf surface surrounded by a yellow halo and may resemble lesions caused by other pathogens such as eye spot, anthracnose leaf blight, or common rust. As the lesions mature, they elongate and develop into distinct symptoms, which are characterized by rectangular, brown to gray necrotic regions that run parallel to the leaf, spanning the spaces between the major leaf veins. Tufts of fuzzy, gray fungal spores are produced on the underside of leaves beneath mature lesions, which give GLS its name.

The use of corn products with improved resistance is the most effective strategy to preserve yield potential, especially in fields with a high probability of GLS occurrence. Controlling this disease with fungicides depends on the potential severity of GLS, the stage of crop development, and any harvest restrictions associated with the fungicide to be used.

Northern corn leaf blight (NCLB) (Exserohilum turcicum) infection can occur and become severe when water remains on leaf surfaces or in leaf whorls for 6 to 18 hours and the air temperature ranges between 65 to 80°F. Grayish elliptical lesions begin to appear on the leaves within two weeks after infection and gradually turn tan colored and cigar shaped (Figure 3).
The best form of NCLB management is planting seed products with above average resistance. Fungicides are not considered to be cost effective for silage production.3

**Eyespot (Aureobasidium zeae)** is more prevalent in north central and northeastern states, but is becoming more common in the Midwest. Free moisture on the leaves from any source provides a conducive environment for infection. Symptoms or lesions can begin to appear within 9 to 10 days after infection. Initial circular lesions are about 1/16 inch in diameter, water soaked, and usually appear on the lower leaves first. Lesions become chlorotic and necrotic as they increase in size to about 1/8 inch in diameter. The lesions have a tan center with a darker brown or purple margin and a surrounding yellow halo, which is visible when the leaf is held up to the light.

Resistant seed products should be used if the disease was prevalent in a prior year, reduced tillage is practiced, and continuous corn is the cropping sequence. Fungicide applications may be beneficial if a prior infected field is in continuous corn, a susceptible product is planted, reduced tillage is the management practice, and weather conditions are favorable for development.

**Goss’s wilt (Clavibacter michiganensis subsp. nebraskensis)** is a persistent and economically significant disease that occurs throughout the Great Plains and much of the Midwest. It occurs as either a vascular wilt or leaf blight and development is favored by mild temperatures. Bacteria from infected residue can be moved onto plants by splashing rain or irrigation. Wounds from hail, strong wind, or blowing sand provide an entry point for the bacteria. Systemic infection may occur prior to the V6 growth stage or early in the season. Severe wilting and plant death can occur on less resistant seed products.

Leaf blight symptoms usually appear mid-season as long, gray-green to black, water-soaked streaks extending along leaf veins. Small, dark, water-soaked flecks, referred to as “freckles”, often occur inside larger lesions and at edges of lesions where symptoms are advancing. Leaf freckles are luminous when lighted from behind, such as when the sun is used as backlighting (Figure 4). Bacterial infected cells may ooze a substance that appears as a shelly-like sheen on leaf surfaces as the ooze dries. As lesions mature, large areas of tan to brown dead leaf tissues are apparent.

**Common rust (Puccinia sorghi Schwein) overwinters in the southern United States and Mexico and moves northward in late spring and early summer when fungal spores are wind blown into the Corn Belt. Disease development is favored by moist conditions caused by rainfall, dew, or high relative humidity (95% or greater), and moderate temperatures between 60° and 77°F. The spores in contact with leaves germinate and infect after 3 to 6 hours in moisture. Symptoms may appear first on youngest leaves as light yellow spots about the size of a pinhead. In about 7 days these chlorotic flecks develop into reddish brown pustules. Common rust pustules are found on the upper and lower leaf surfaces while the pustules for southern corn rust are mostly found on the upper leaf surface. Pustules rupture the leaf epidermis and contain small, cinnamon-brown, powdery spores. The pustules become darker brown to black later in the season. Pustules are often found in bands or patches, indicating that infection occurred while the leaf was in the whorl.**

If infection occurs late in the season, the potential for economic yield loss is low. However, if infection occurs early in the season, when plants are at early vegetative growth stages (V3 to V7) and weather conditions are favorable for disease development, the potential for economic yield loss increases. Late-planted corn may be more susceptible because of the plant stage when spores arrive from overwintering locations.

Corn products differ in their level of resistance to common rust; therefore, disease development may be different for each product. Fungicides can be most effective for common rust control if initial applications are made while there are only a few pustules present per leaf and weather is favorable for rust development. If significant levels of common rust are present on the lower leaves prior to silking and the forecast is for cool, humid or wet conditions, a fungicide application may be beneficial.

**Fungicides**

Always read and follow pesticide label directions. Harvest restrictions must be followed per the fungicide label. Strobilurin and triazole fungicides, including Headline AMP®, fungicide, are labeled in corn for protection against NCLB, eyespot, GLS, and common rust. Fungicide use should be determined by the potential for disease development and potential for an economic loss of silage tonnage and quality because of these diseases. Studies from the Universities of Wisconsin and Minnesota indicated no economic advantage for using a foliar fungicide for silage corn.4 However, each situation is different and depending on when infection occurs, an application may be justified. Regular disease scouting should begin at emergence to keep abreast of disease and other agronomic factors.

**Sources:**


For additional agronomic information, please contact your local seed representative.

Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible. Always read and follow pesticide label directions. Dekalb and Design® and Dekalb® are registered trademarks of Monsanto Technology LLC. Leaf Design® is a registered trademark of Monsanto Company. Headline AMP® is a registered trademark of BASF Corporation. All other trademarks are the property of their respective owners. ©2014 Monsanto Company. 06262014LGM