Agronomic Spotlight

# Corn Diseases Affect Silage Quality

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

## Feed Quality and Tonnage

Corn silage tonage and feeding quality can be reduced by various corn diseases. Infection potential for each disease depends 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.

Because they may cause a of loss of vascular tissue, stalk rots 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.

## 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.

## Ear Rots

Common ear rots that can infect corn include Gibberella (Fusarium graminearum) (Figure 1), Fusarium (Fusarium verticilliodes, F. subglutinans, F. proliferatum) (Figure 2), Diplodia (Stenocrpella maydis) and Aspergillus flavus. Mycotoxins that can potentially develop after ear rot infection include fumonisins, aflatoxin, zearalenone, and vomitoxin.[2] Associated with high heat and rought 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.

Figure 1. Giberrella ear rot.

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.


Figure 2. Fusarium ear rot.

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.[1]

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## Viral Diseases

**Maize Dwarf Mosaic Virus (MDMV) and Maize Chlorotic Dwarf Virus (MCDV)** are usually found together. Both viruses overwinter in rhizomes of Johnsongrass and are spread to corn by various insects. A combination of careful field ovservations and laboratory tests is the best way to diagnose these virus diseases.

Symptoms of MDMV include irregular, light and dark green mottled or mosaic patterns in the leaves. The disease may cause plant stunting and reduced grain production. MCDV often causes shortening of the upper internodes, yellowing of the youngest leaves, and reddening of leaf margins. Severely affected plants may produce little or no grain. MDMV is transmitted from host plants to corn by several aphid species. Because the aphids can pick up the virus and spread it to corn within only 15 to 60 seconds, insecticides are generally considered ineffective in controlling this disease. MCDV is transmitted by several leafhopper species. Late planted corn is most susceptible to both viruse diseases. Controlling Johnsongrass, earlier corn planting, and selection of virus-tolerant corn products are recommended for helping prevent disease infection.[3]

## Bacterial Foliar Diseases

**Stewart's wilt** has two phases, the seedling phase and the leaf blight phase that usually occurs after tasseling. The disease is vectored to corn by the feeding of corn flea beetles. Evidence of feeding appears as white streaks on leaves as the tissue is scraped away. Infected young plants develop white to yellowish streaks on the lower leaves (Figure 3) and can wilt and die if the base of the stalk becomes rotted.

Figure 3. Plants showing Stewart's wilt leaf symptoms.

The leaf blight phase is characterized by long, water soaked lesions extending the length of the leaf. Lesions eventually turn necrotic. The lesions can resemble those of Goss's wilt; therefore, a laboratory confirmation may be required. To help in the diagnosis of Stewart's wilt, flea beetles should be present or the plants should display evidence of flea beetle feeding. Stewart's wilt does not occur in the absence of flea beetles. Yield loss is generally not a significant factor with Stewart's wilt because of seed product tolerance; however, other stalk rots can develop if leaf area and photosynthetic carbohydrate production is reduced. These rots can reduce yield potential.

Corn flea beetles overwinter as adults and emerge in the early spring coinciding with corn emergence. The beetles may harbor Stewart's wilt bacteria throughout the winter or may acquire the bacteria by feeding on infected plants in the spring. During the past century, average winter temperature was used as a forecast tool to predict the potential risk of Stewart's wilt development because the survival of the beetle is dependent on winter temperatures. If the mean monthly winter temperature (December + January + February) is greater than 32 °F, flea beetle survival and disease risk is high, but if the mean temperature is less than 27 °F, corn flea beetle survival and Stewart's wilt risk is low. The widespread use of neonicotinoid seed-treatment insecticides in the past decade, has substantially reduced flea beetle populations, even following relatively warm winters. Consequently, the occurrence of Stewart's wilt has been lower than expected based on winter temperature forecasts.

For more information on the effects of foliar fungal diseases on silage quality, please refer to the spotlight: Improve Silage Quality by Managing Foliar Fungal Diseases.

**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 midseason as long, gray-green to black, water soaked streaks extending along leaf veins (Figure 4). 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 shellac-like sheen on leaf surfaces as the ooze dries. As lesions mature, large areas of tan to brown dead leaf tissues are apparent.

Figure 4. Goss's wilt.

## Fungicides

**ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS**. Harvest restrictions must be followed per the fungicide label. Strobilurin and triazole fungicides 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

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