

How Corn Standability Can Affect Harvest Plans

Stalk lodging, by definition, is breakage of the stalk below the ear. Severely lodged corn leads to increased harvest losses, increased harvest time, increased drying cost, and may result in volunteer corn the following year. Annual yield losses due to stalk lodging in the U.S. range between 5 to 25%. In addition to yield loss, grain quality may also decline as a result of stalk lodging.

There are three main causes of late-season stalk lodging. Severe weather is a major cause. High wind and heavy rain can devastate a corn crop in a matter of minutes. Another major cause is insect feeding such as European corn borer. The third major cause of stalk lodging is stalk rot. Stalk rot decreases the corn plant's ability to resist external stress by weakening the stalk tissue and results in more susceptibility to stalk breakage.

The incidence and severity of stalk rot depends on the susceptibility of the corn product, the presence of the stalk rot organism, and an environment conducive to disease development.

Plant Stress

Predicting the occurrence of stalk rot and stalk lodging is difficult. Although products vary in genetic resistance against stalk rot organisms, a small amount of stalk rot will occur in every product. One field may develop stalk rot while an adjacent one does not. Or part of a field may have severe stalk rot while the rest of the field is free of disease.

Almost any kind of plant stress, occurring at almost any time during the growing season, can predispose the corn plant to invasion by stalk rot fungi. Stress on a plant slows the rate of photosynthesis, which in turn slows the plant growth rate. Stress prior to pollination results in a smaller than normal plant. Stress after pollination, when the plant is fully grown, results in poor kernel set, kernel abortion, and tip dieback.

During grain fill, smaller than normal plants that are under post-pollination stress will produce smaller amounts of sugars in the leaves when compared to healthy, non-stressed corn plants. Since the developing ear usually has priority over the rest of the plant for available sugars, this deprives the lower stalk and roots of sugars and causes the defense mechanisms against stalk rot to break down. Existing stored sugars in the lower stalk and roots are remobilized to the ear. This increases the potential for stalk rot. As the roots begin to die, pathogens can invade the root tissue and the plant wilts because of insufficient water uptake.

Growers can take appropriate preventive management steps to minimize plant stress conditions which create an imbalance between carbohydrate production and remobilization during grain fill.

Factors that Cause Lodging

Factors that can cause environmental stress and increase the potential for stalk lodging in a corn crop include high plant populations, extremes in soil moisture, nutrient deficiencies and/or imbalances, insect damage, cropping sequence, and product susceptibility. These factors can directly or indirectly increase the incidence of lodging by influencing the amount of stalk rot that occurs.

Stalk rot can be caused by several common opportunistic pathogens. Disease development is strongly favored by any stress to the plant, so it is important to manage the crop to minimize potential stress whenever possible. Choose products with resistance to stalk rot diseases. Foliar fungicide applications will not necessarily prevent stalk infection but may protect the plant against foliar diseases. Loss of photosynthetic leaf area from disease may lead to cannibalization of stalk tissue and compromise stalk integrity. The use of tillage to promote degradation of infected residue has had mixed results on stalk rot development.

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Figure 1. Root Lodging in Corn – Late Season

Risk Factors and Stressful Conditions Favoring Stalk Rot Development

- Foliar disease
- Extreme temperatures
- Moisture Stress
- Infected crop residue
- Plant injury
- Cloudy weather
- Loss of leaf area
- Continuous corn
- Unbalance fertility
- Susceptible products

Harvest Management

Growers should start scouting their fields shortly after pollination, checking for any indication of the factors that lead to stalk lodging so they can prepare a harvest order to minimize yield loss. Observations should be made within the field away from outside rows. To estimate how much stalk rot is present, pinch stalks near the ground and up toward the ear on several random plants. A hollow stalk that collapses easily indicates advanced stages of stalk rot. Also, determine the extent of insect feeding. Choose your sampling areas to adequately reflect differences in soil types, soil drainage patterns, corn products, rainfall, and soil fertility levels.

Determine if the lodging factors are only in one area of the field, or if it is spread evenly throughout the field. Is only one field affected, or are all field affected? Once you have determined the extent of the problem, consider the following harvest options:

- Harvest the affected areas first. Do not allow lodged fields to remain unharvested any longer than necessary, provided the grain is physiologically mature.

- Harvest the affected areas slower than usual. A ground speed of 2 mph is usually adequate for harvesting lodged corn. By harvesting at a slow speed, your ability to pick up lodged ears that would otherwise be missed will increase. Gathering-chain speeds and snapping-roll speed would be correspondingly reduced to maintain the normal relationship with ground speed. Combine-snouts and gathering chains should be run as close to the ground as possible to pick up the downed corn.
- Under severe stalk lodging conditions, harvest against the direction of the lodging. If the corn plants are lodged toward the east, come into the field from the east. Harvesting the field from the west will only lodge the plants further, making it almost impossible to pick up the ears. Some growers indicate that they adjust the gathering chains and the rolls inward as closely as possible to adequately grip the rotten stalks with no center core. These stalks collapse to a thickness of approximately 1/8 inch when squeezed.

Post Harvest Considerations

While the culture and harvest management options will help reduce the harvest losses you incur during the current growing season, evaluate why certain fields or areas of fields lodged. Did you make the proper choice for product selection, fertility levels, plant populations, pest control, or cultural practices? Which factors going forward can be changed to avoid the problem in future years?

Sources (verified July 2019)

Purdue University Cooperative Extension Service Agronomy Guide. AY-262

Corn Disease Profile II, Stalk Rot Diseases. UNL Extension Plant Pathology Team, University of Nebraska.

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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