AGRONOMIC Spotlight

Technology Development & Agronomy by MONSANTO

Causes of Corn Stalk Lodging and Management

- Lodging can complicate corn harvest and may lead to yield loss and problems with grain storage.
- Ear drooping and stalk lodging may be caused by different factors including: high winds, stalk cannibalization, and stalk rots.
- Understanding some of the contributing factors and how to most effectively manage the harvest and storage of lodged corn may assist in harvest and planning for next season.

Stalk Cannibalization and Ear Drooping

Corn ears normally remain erect until after physiological maturity (black layer) when the shanks eventually collapse and the ears droop down (Figure 1). Recently ears have begun to droop in drought-stressed fields that have not reached physiological maturity. Drooping ears suggest a loss of turgidity in the shank due to stress combined with cannibalization. In a response to stress, corn plants will remobilize or move sugars from the stalk and leaves to fill the kernels. This process is referred to as stalk cannibalization and causes disintegration of the pith cells. The weakened stalks are susceptible to physiological stalk lodging and stalk rots.

Stalk Rots

Weak stalks are more susceptible to stalk rots which, depending on the season, can lead to a 5 to 20% loss of yield potential.[1] Stalk rot of corn tends to be a complex of several disease-causing fungi. It is common for multiple causal organisms to be isolated from a single disease sample. Fields where stalk rot is developing should be identified and targeted for early harvest to minimize grain losses.

Stalk rots are favored by good growing conditions early in the season, followed by stress after pollination. Stresses can include a lack of moisture, nitrogen deficiency, foliar disease, hail damage, and prolonged cool, cloudy weather conditions. Extended periods of dry or wet weather prior to pollination, followed by abrupt changes including the stresses mentioned above, for several weeks after silking favor the development of most stalk rots. The following are common stalk rots found in corn.

Anthracnose

Symptoms usually occur just before the plant matures. Sometimes a portion of the plant above the ear dies prematurely (top dieback). More often, the entire plant is killed and several nodes are rotted. Late in the season a shiny black discoloration develops in blotches or streaks on the stalk surface, especially on lower internodes (Figure 2). Internal stalk tissue may become dark and soft, starting at the nodes. Lodging typically occurs higher on the stalk than with other stalk rots.

Diplodia

Symptoms usually occur just before the plant matures. Sometimes a portion of the plant above the ear dies prematurely (top dieback). More often, the entire plant is killed and several nodes are rotted. Late in the season a shiny black discoloration develops in blotches or streaks on the stalk surface, especially on lower internodes. Internal stalk tissue may become dark and soft, starting at the nodes. Lodging typically occurs higher on the stalk than with other stalk rots (Figure 3).

Figure 1. Drooping corn ears on plants that need several more days until physiological maturity.

Fusarium

Infection commonly leads to rotting of roots, crown, and lower internodes. Stalks prematurely dry down and are susceptible to breakage. When stalks are split, a whitish-pink Gibberella to salmon discoloration may be visible. Disintegration of internal stalk tissues begins at the nodes.

Figure 2. Anthracnose stalk rot with typical symptoms of shiny, dark black blotches commonly seen on stalks.

Gibberella Stalk Rot

Affected plants may wilt with leaves turning a dull gray-green. The lower stalk softens and becomes straw colored as plants die. Pith tissue disintegrates, leaving only vascular strands intact. The inside of a rotted stalk has a pink to red discoloration. Small, dark fungal bodies called perithecia form on the surface of the lower stalk. These perithecia are superficial and can be easily scraped off.

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Scouting

Fields should be scouted after pollination for visual symptoms of stalk rot such as discoloration on stalks or early drydown. Different corn products and fields with different management practices should be evaluated separately.

When scouting, walk a zigzag pattern through the field and test stalk firmness by squeezing or pinching each stalk a couple of nodes above ground level. Healthy stalks are firm and cannot be compressed. If a stalk feels soft, it is rotted and likely prone to lodging. Check at least 100 plants per field. If more than10 to 15% of the stalks in a field are rotted, significant lodging is possible.[2]

A second method for determining potential stalk lodging is to randomly select 10 plants in a row and push each stalk 45 degrees (or about 5 to 8 inches) from upright. Repeat at 10 different locations within a field. If more than 10 to 15% of the stalks lodge or feel spongy, then the field should be slated for early harvest.[3,4]

Harvesting Tips

Fields with considerable lodging should be harvested early to help minimize the risk of further lodging and ear rots. Although drying cost is a concern when harvesting grain, this expense will likely be a better option compared to potential yield loss due to increased lodging and ear rots later. The following are some harvesting tips to protect yield potential:

- Corn reels can improve harvest efficiency.
- Harvest against the angle of the lodged corn to help maximize lift into the header.
- Harvesting when dew is present can minimize fluff.
- Combine should be adjusted to help minimize broken kernels and excess fines as they can lead to spoilage.
- Avoid over-threshing.
- Follow the combine manufacturer's manual for cylinder adjustments, speed, and clearance settings. Always refer to the manufacturer's manual before performing any maintenance.

Grain Storage Tips

Once the grain is harvested, there is still a risk for loss. The following are some tips to help minimize grain storage losses:

- Wet corn in wagons or trucks should not be stored longer than 6 hours.
- Dry wet grain or put it in a holding bin for drying using forced air to keep it cool.
- Storing wet grain without aeration for 1 to 2 days can decrease storage life by 2 to 3 months.
- Mold growth can begin within 24 hours and accelerates rapidly if high-moisture corn is left in a wet bin too long.

Figure 3. Corn field lodging due to Diplodia stalk rot. (Symptoms include dark gray discoloration on stalk and the presence of pycnidia.

- Check moisture content of every load and reset dryer controls based on changing moisture levels.
- Dry corn to 16% within 24 hours and cool to the outside air temperature within 48 hours.[5]
- Aerate to help corn attain a uniform temperature and to avoid "hot spots".
- Use stir augers to maintain airflow.
- Plan to check stored corn frequently this year. Stored corn should be inspected every 1 to 2 weeks in the fall and spring and once every 2 to 4 weeks after conditions in the bin have stabilized during the winter months.[5]

Summary

Take the time to scout fields, regardless of when they were planted. Identify which fields may develop lodging issues and target these for an early harvest to help prevent potential harvest losses. When selecting corn products for next season it is important to note that ratings for stalk strength, lodging and different diseases vary by product which can be influenced by genetic background, fertility levels and management practices.

Sources: [1]Corn stalk rots. Dec, 1995. University of Illinois Extension. RPD No. 200.
[2]Munkvold, G. 2002. Time to start scouting for corn stalk rot. Integrated Crop Management. Iowa State University Extension. [Online] http://www.ipm.iastate.edu. (Verified 9/3/13).
[3]Vincelli, P. and D. E. Hershman, Corn stalk rots. PPA-26. University of Kentucky. [Online] http://www.ca.uky.edu. (Verified 9/3/13).
[4]Corn stalk rots. Univ. of Illinois Extension. RPD No. 200. December 1995.(verified 9/3/13)
[5]McNeill, S. and M. Montross, Corn harvesting, handling, drying, and storage. www.ca.uky.edu. (verified 9/3/13).
Additional sources: Compendium of corn diseases. APS Press.

For additional agronomic information, please contact your local representative