TechUpdate

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Identifying and Managing Stalk Rots

Stalk rots cause damage and yield loss in many corn fields across North America each year. Depending on location, stalk rot organisms may include anthracnose, Gibberella, Diplodia or Fusarium, all of which survive in corn residue and are spread to the next crop by wind and/or rain. Stalk rots can reduce corn yield by killing the plant before physiological maturity. They can also cause plant lodging, increasing harvest losses and impeding harvest progress. If ears from a fallen plant come in contact with the ground for an extended period, grain quality may also be reduced. Each of these four diseases is briefly explained and shown below, to help growers identify them correctly. Identifying disease issues at harvest makes growers better prepared to select hybrids for the coming season.

Pioneer research teams have developed and characterized a wide lineup of products that are recognized by growers for their ability to help protect against stalk diseases. For more information on corn diseases and hybrid options to manage them, contact your local Pioneer sales professional.

ANTHRACNOSE STALK ROT

Anthracnose is the most common stalk rot disease faced by corn growers worldwide, with yield losses reaching as high as 40% as a result of reduced ear size and stalk lodging. Infection is favored by warm temperatures (70-80° F.) and high humidity. Anthracnose has both a leaf and a stalk phase in corn. The infection can spread from leaves to stalk, or the stalk may be infected through the roots or base of the plant, or through insect cavities or other wounds in the stalk.

Shiny black blotches which often coalesce are a distinguishing characteristic of anthracnose stalk rot. Removing the leaves and leaf sheaths from the lower stalk is the best way to inspect for anthracnose. Splitting the stalk reveals degenerated pith tissue, often with only the vascular bundles remaining. Diseased tissue is usually dark gray to brown in color.

GIBBERELLA STALK ROT

Another stalk rot common in most corn growing regions is Gibberella. Wet, cool weather during early ear-fill is conducive to disease development. Infection occurs through the roots or leaf collar of the plant and spreads to the stalk as the plant is weakened by stress. Rotting generally affects the roots, crown and lower internodes. Gibberella stalk rot can best be identified by splitting the stalk. The pith inside is disintegrated and characterized by a pink or reddish color. On the outside of the stalk, small superficial black spots (perithecia) are often evident.

DIPLODIA STALK ROT

Diplodia and Gibberella have a similar disease cycle both thriving in warm, wet weather two to three weeks after pollination. Diplodia stalk rot may first reveal itself when affected plants die suddenly during mid- to late ear-fill. Upon examination, dark brown lesions can be found extending in either direction from the node. Small black spots (pycnidia) may develop just beneath the stalk epidermis near the nodes. The black dots are not easily rubbed off, which distinguishes Diplodia from Gibberella. Diplodia results in rotted stalks that are disintegrated and discolored, allowing the stalk to easily break. The discoloration is brownish in appearance, not pink like Gibberella.

Pycnidia from Diplodia infection on corn stalk.

FUSARIUM STALK ROT

Fusarium infection is favored by warm, wet conditions following stress. It invades through the roots, wounds in the stalk or leaf scars. This disease can colonize any part of the plant and is commonly found on corn ears. The earliest symptoms of Fusarium stalk rot are wilted plants in the field. Infected plants take on a grayish-green hue, then turn tan. Outward symptoms of the disease are indefinite discolored patches on the lower internodes. Stalks feel spongy as the pith disintegrates, leaving vascular strands intact. A whitish-pink to salmon discoloration of the remaining pith and vascular strands may be observed when stalks are split. In addition, roots take on a reddish-pink discoloration.

REDUCING STALK ROTS AND LODGING

Stalk rots cannot be entirely prevented but their effects can be reduced through good management practices. The following practices can help reduce stalk rot, lodging and harvest losses:

Hybrid differences. Hybrids vary in their resistance to leaf diseases, stalk rots, drought stress and stalk lodging. Pioneer Hi-Bred provides ratings for these traits. Growers should select high-yielding hybrids with good disease resistance, standability and stress resistance. Your Pioneer sales professional can help match the right hybrid to your fields and growing conditions.

Checking for stalk rot.

Soil Fertility. Test soils regularly and apply nutrients based on soil test results and yield goals. Be sure potassium levels are adequate, and manage nitrogen to prevent losses and ensure its availability throughout plant uptake.

Crop stress. Crop stress is never eliminated but can be reduced with good crop, soil and water management. Excessive plant populations increase stress and stalk lodging. Poorly spaced or "clumped" plants create a high population micro-environment similar to overplanting. Maintain planter and planter meters properly and do not exceed manufacturer's suggested ground speed. Calibrate planter meters for optimum plant spacing and monitor rates carefully when planting.

Compaction is one of the primary causes of crop stress, and may persist for several years. Avoiding compaction and maintaining soil quality are keys to reducing crop stress. Proper irrigation management is critical to minimizing crop stress in arid regions.

Insects. Manage insects such as corn borer and fall armyworm to prevent plant wounds and stress. Pioneer® brand hybrids with Herculex® XTRA^ insect protection provide in-plant protection from both of these pests, in addition to corn rootworm.

Corn Residue. Stalk rot pathogens overwinter in corn residue. Occurrence and intensity of stalk rots is sometimes related to the amount of inoculum present. A prime example is anthracnose which is prevalent in continuous corn and no-till fields. Rotation to a non-host crop such as soybeans is recommended to reduce corn residue and stalk rot. Disking or otherwise incorporating residue may also be beneficial in some fields. Reduction of stalk rots must be weighed against the advantages of soil conservation and maintaining soil carbon levels when deciding whether to till.

Scouting. Careful scouting and harvesting fields according to crop conditions can help prevent field losses due to stalk rot. Potential lodging and yield loss should be weighed just as heavily as grain moisture in deciding which fields to harvest first. Scouting fields approximately two to three weeks prior to the expected harvest date can identify those with weak stalks and predisposed to lodging. Consider harvesting those fields early.

Weak stalks can be detected by pinching the stalk at the first or second elongated internode above the ground. If the stalk collapses, the plant is in an advanced stage of stalk rot. Another technique is to push the plant sideways about 8-12 inches at ear level. If the stalk crimps near the base or fails to return to the vertical position, stalk rot is indicated. Check 20 plants in five areas of the field. If more than 10-15% of the stalks are rotted, that field should be scheduled for early harvest.

PIONEER RESEARCH FOR STALK ROT RESISTANCE

Pioneer corn breeders screen hybrids for resistance to stalk rot organisms, inoculating hybrids with these pathogens where appropriate to ensure that susceptible genotypes do not escape detection. In addition, Pioneer researchers are working to incorporate genes for resistance to specific stalk rot organisms into Pioneer brand hybrids. Pioneer researchers have characterized and incorporated a native corn gene that provides resistance to *Colletotrichum graminicola*, the fungus that causes anthracnose stalk rot and premature plant death. Using advanced techniques such as gene mapping and molecular breeding, Pioneer is incorporating this gene into elite corn hybrids. Hybrids with this resistance trait are expected to be available to producers in the very near future.

For more information, go to **www.pioneer.com/products**