AGRONOMY SPOTLIGHT

Identifying the Causes of Harvest-time Ear Diseases through Ear Rots and Kernel Moisture Content

The presence of ear rots and kernel moisture content greater than 15% is not a good combination because diseased kernels can reduce test weight, grain quality, and ultimately, yield potential. Some ear rots require hot, dry weather and others are associated with moist to wet and cooler conditions. Wounds created by insects, mechanical damage, and hail can provide openings for pathogen entrance into the kernel.

If ear rots are found during routine scouting, identification of the causal agent is important for marketing and storage purposes, and infected fields should become a harvest priority. Identification is important because ear rot diseases such as Aspergillus and Gibberella can produce mycotoxins that are harmful and potentially deadly to humans and livestock. Infected grain should be tested by a toxicology lab to determine if mycotoxins are present.

Best management practices (BMPs) for ear rot management should begin prior to planting because little can be done to protect ears after infection except harvesting at higher moisture content and drying grain to below 14% within 48 hours. Strategies that help minimize crop stress can help reduce the potential for ear rot development.

Factors that can help reduce crop stress include:

- Soil test and fertilize accordingly.
- If available, irrigate to help reduce drought conditions.
- Use insect-protected corn products (particularly for European corn borer, earworm, and western bean cutworm).
- Use foliar disease-resistant corn products.
- Use fungicides to help manage foliar diseases.
- Avoid continuous corn.
- Utilize tillage to manage infected residue.

DEKALB and Design® and DEKALB® are registered trademarks of Bayer Group.

Identifying the Causes of Harvest-time Ear Diseases through Ear Rots and Kernel Moisture Content

The following are general descriptions of ear and kernel molds. Those in red have the potential to produce poisonous mycotoxins.

Aspergillus

(Aspergillus species - can produce poisonous mycotoxins):

Gray-green or light-green powdery mold starting at the ear tip. Favored by hot (above 90° F), dry conditions and after damage to silks or kernels from insects, hail, birds, or other factors. Considered to be more of a grain storage mold because of its ability to grow at 15% moisture content. Capable of producing an aflatoxin which is toxic to livestock and humans.

Cladosporium

(Cladosporium herbarum):

Gray to black or very-dark-green powdery mold that may appear in streaks scattered across the ear. The mold can be rubbed off the kernel surface. Infects kernels damaged by insects, hail, frost, and other factors. The disease is favored by wet weather during grain fill; however, it is more common in hot, dry years. It can grow at temperatures greater than 90° F and grain moisture content as low as 16%.

Diplodia

(Stenocarpella maydis):

White to gray mold that can cause the entire ear to appear brown Infection can begin at the ear base and move toward the tip, growing between kernels. Infection can also start at the tip of the ear, especially following insect or bird damage. Pycnidia, or fruiting bodies, can form on husks and at the base of kernels causing ears to be “mummified” or completely covered in white mycelial growth which causes kernels to be stuck to husks and cobs. Cobs can also be infected via the ear shank, causing yield loss due to poorly developed ears and/or kernels. Occurs most often in reduced tillage and continuous corn systems. Favored by warm, dry conditions prior to silking followed by wet conditions after silking. Diplodia is not known to produce mycotoxins; however, there has been some association with diplodiosis (lack of voluntary muscle coordination and/or weakness or partial paralysis) in cattle and sheep.[1]

DEKALB and Design® and DEKALB® are registered trademarks of Bayer Group.

Identifying the Causes of Harvest-time Ear Diseases through Ear Rots and Kernel Moisture Content

Fusarium

(Fusarium species- can produce poisonous mycotoxins):

White to pink mold infecting random kernels around the ear and/or causes a starburst pattern on kernel caps. Infection may occur from late vegetative growth stages to three weeks after midsilk. Entry points for infection include kernel growth cracks and damage from insects, hail, mechanical, and other injurious factors. Warm, wet weather after silking favors development. Fumonisin toxin, which is toxic to livestock (particularly horses), can be produced.

Gibberella

(Gibberella zeae - can produce poisonous mycotoxins):

Coloration is often bright pink but varies from red to white and usually begins at the ear tip and progresses toward the base. Ears become "mummified" because the pink or white mycelial growth completely covers the ear and causes kernels to be stuck to husks and cobs. Favorable conditions include cool (average daily temperatures below 72° F) temperatures and seven or more days of rain within a period of three weeks after silking. Potential mycotoxins include vomitoxin or deoxynivalenol (DON) and zearalenone, which are deadly to livestock.

Nigrospora ear or cob rot

(Nigrospora sphaerica, synonym N. oryzae):

Kernel tips and cob pith can be covered with very small, jet-black spore masses (top). Kernels appear bleached and often have whitish streaks starting at the tips and extending toward the crowns and may have a gray mold growth. Infected ears are easily broken into small pieces during harvest because of rotted pith (bottom). Infection usually starts at the ear butt. Often associated with premature plant death from frost, hail, drought, and leaf, stalk, and root diseases. May appear more often in low fertility situations.

Top: Nigrospora infected ear with black spores in pith

Bottom: Shredded cob associated with Nigrospora ear rot. Picture courtesy of Don White, University of Illinois.

DEKALB and Design® and DEKALB® are registered trademarks of Bayer Group.

Identifying the Causes of Harvest-time Ear Diseases through Ear Rots and Kernel Moisture Content

Penicillium or "Blue Eye"
(Penicillium spp.):

Powdery blue-green mold growing between kernels, usually at the tip of the ear. Infection generally occurs on kernels damaged by hail, insects, frost, or other factors. Capable of infecting non-injured kernels with moisture content of 14%.

Photo courtesy of Tamara Jackson-Ziems, University of Nebraska.

Trichoderma
(Trichoderma viride):

Dark-greenish mold grows on and between husks and kernels and sprouting can occur when infection is severe. Favored by excessive rain and insect, hail, or mechanical damage to the ear.

Sources (verified September 17, 2020)

[1]Kellerman, T.S., Rabie, C.J., van der Westhuizen, G.C., Kriek, N.P., and Prozesky, L. 1985. Induction of diplodiosis, a neuromycotoxicosis, in domestic ruminants with cultures of indigenous and exotic isolates of Diplodia maydis. PubMed.gov. US National Laboratory of Medicine. National Institutes of Health. NCBI. https://pubmed.ncbi.nlm.nih.gov/.

Thomison, P., Lohnes, D., Geyer, A., and Thomison, M. Troubleshooting abnormal corn ears. The Ohio State University. https:// https://u.osu.edu/.

Robertson, A. 2004. Corn ear rots. Iowa State University. Integrated Crop Management Newsletter. IC-492(21). https://www.ipm.iastate.edu/

Jackson, T. and Ziems, A. 2009. Corn ear rots and grain molds. CropWatch. University of Nebraska-Lincoln. http://cropwatch.unl.edu.

Munkvold, G.P. 2002. Corn ear molds and mycotoxins. Integrated Crop Management News. 1712. IC-488(22). Iowa State University. http://lib.dr.iastate.edu.

Paul, P. and Mill, D. 2009. Corn ear rot: Which one is it? Ohio State University. C.O.R.N. Newsletter 2009-35. https://agcrops.osu.edu.

Corn ear and kernel rots. 1991. Integrated Pest Management. RPD No. 205. University of Illinois. http://ipm.illinois.edu.

Legal Statements

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. Bayer is a registered trademark of Bayer Group. ©2020 Bayer Group. All rights reserved. 7002_S2_CA

DEKALB and Design® and DEKALB® are registered trademarks of Bayer Group.