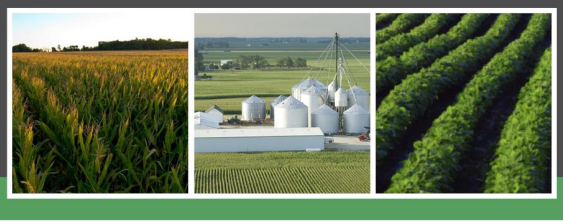

Agronomic Spotlight

Fusarium Ear Rot Causing Fumonisin Contamination in Corn

Topic: Fusarium ear rot is a corn disease caused primarily by the fungus Fusarium verticillioides and other species of Fusarium. Fusarium can begin during or after flowering and is most problematic when warm wet weather conditions persist. Effect: Fusarium ear rot pathogen can produce a mycotoxin called fumonisin, which at high enough levels can be toxic to animals, livestock, and humans. Action: Due to health risks associated with fumonisin, grain must be tested to determine fumonisin levels. Management practices can be implemented to help reduce the risk of fusarium in future corn crops.

Infected kernels have a white-to-pink cottony mold which are scattered around the ear (Figure 1). Infected kernels may have white streaks that are arranged in a starburst pattern (Figure 2). The mold can produce a mycotoxin called fumonisins.

If fusarium is suspected, scout fields at physiological maturity (R6 growth stage) to determine the severity of fusarium ear rot.[1] If the ear rot is widespread, harvest as early as possible to reduce the level of fumonisin contamination and ear rot damage to kernels.

Grain must be tested to determine the level of fumonisin as toxin levels are not synonymous with visible ear rot symptomology. Fumonisin does not occur uniformly in bulk corn, and grain handlers should sample in several areas of a load or bin. Contact your grain testing laboratory for specific sampling and handling instructions. A chemical test can be performed at a certified laboratory to detect and quantify potential fumonisin accumulation in a sample. There are a variety of commercial laboratories and quick-test kits for mycotoxin analysis: Romer Labs (www.romerlabs.com) and Neogen (www.neogen.com) sell test strips for fumonisin analysis.[1]

Figure 1. Fusarium ear rot on corn ear at harvest.

Figure 2. Fusarium ear rot. Corn kernels exhibiting starburst pattern.

Table 1. United States FDA guidelines for fumonisins in animal feed.

Animal	Levels in Corn & Corn By-products (ppm)	Feed Factor[1]	Levels in Finished Feeds
Horse	5	0.2	1
Swine	20	0.5	10
Breeding ruminants, breeding poultry	30	0.5	15
Ruminants raised for slaughter[2]	60	0.5	30
Poultry	100	0.5	50
Pets	10	0.5	5

[1] Fraction of corn or corn by-product mixed into the total ration. [2]Animals older than 3 months raised for slaughter. Source: Mycotoxins- Acceptable Aflatoxin and Fumonisin Levels for Feed. National Corn Growers Association.

A farmer with contaminated grain has some options; however, contaminated grain cannot cross state lines and discounted prices are likely. Due to health risks associated with fumonisin, the United States Food and Drug Administration (FDA) has guidelines for the maximum amounts of fumonisin allowed in livestock feed (Tables 1). Horses and pigs are more susceptible to fumonisin poisoning than cattle and poultry.

IMPACT

Drying and Storage. Once corn dries down to 17% moisture, ear rot caused by F. verticilliodes should cease. Dry grain to below 15% for storage. Once dry, fusarium fungus should not spread and fumonisin levels should not increase.

The most common stresses leading to fusarium ear rot include excessive heat and wet conditions. In the southern United States, higher insect populations and temperatures make fumonisin contamination a greater concern.

Corn product selection is an important step in managing fusarium outbreaks in corn. Products with larger, tighter fitting husks, insect resistance traits, and drought tolerance can help reduce the potential production of mycotoxins. Other factors that may influence production are: maturity, flowering time, and days to maturity. Contact your local agronomist to select the best locally-adapted corn products with proven disease tolerance or resistance. Corn products with insect resistant traits may have lower levels of fumonisins as insect feeding can create additional pathways for the disease to infect the kernels.

Fungicide seed treatments can help protect young plants and reduce the build up of fusarium pathogens in the soil. Optimize soil fertility to aid in plant health and improve residue decomposition.[5] Avoid high levels of nitrogen and low levels of potassium.

The pathogen F. verticillioides survives on crop residue, and tillage operations can be used to help reduce pathogen populations. Fall tillage buries infected crop residue forcing the fungal pathogens to compete with microorganisms in the soil. Soil microorganisms will also attack fungal pathogens to reduce populations. When infected crop residue is completely buried pathogens will have the least chance of survival; however, tillage operations that only partially bury residue, such as chopping, disking, or chiseling, are still beneficial for pathogen reduction.[4] If tillage is not an option, rotation to a non-host crop can help reduce the occurrence of fungal levels in a field.

If a corn field is suspected to have high levels of fumonisin, testing must be completed by elevators, grain exchange, or approved independent laboratory facilities.[2] Farmers must adhere to steps established by the United States Department of Agriculture's Risk Management Agency if fumonisin or other mycotoxins are detected above the FDA guidance levels.[3]

Farmers that suspect fumonisin contamination should:

1. Inform crop insurance provider of suspected issue prior to harvest, storage, or destruction of the field.
2. Insurance adjuster must collect samples prior to grain entering storage. Adjusters must collect samples from a standing crop.
3. Only Approved Insurance Provider (AIP) Testing Facilities can complete analysis of corn samples.

Farmers with questions regarding handling protocol should contact their insurance provider.

Sources
[1]Woloshuk, C. and Wise, K. Fusarium ear rot. September 2014. Purdue Extension. BP-86-W.
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[3]Loss adjustment manual standard handbook. United States Department of Agriculture. FCIC-25010(10-2016).
[4]Munkvold, G.P. 2015. Tillage alternatives for corn disease management. Iowa State University. Integrated Crop Management News. 10-23-2000.
[5]Plant disease. 1995. Univerisity of Illinois Extension. RPD No. 200