

## EAR ROT DISEASE CONCERNS AT HARVEST FOR A CORN GROWER IN ND

Keeping in view of the weather and insurance concerns, growers should keep an eye out for corn ear rots at harvest.

Corn is known to be susceptible to a number of ear- and kernel-rotting fungi that affect the yield, quality, and feeding value of the grain. In North Dakota, ear rot occurrence has been mild to date and losses can vary greatly between years and regions.

### Types of ear rot and their identification:

*Aspergillus*: This ear rot is generally of minor importance before harvest. However, *Aspergillus* infections often follow drought stress, damage done by corn earworms, European corn borers and other insects. *Aspergillus* might also cause serious losses in stored corn, on the ear or shelled. Typical symptom of *Aspergillus* rot is an olive green tan, sooty-black or greenish yellow mold growing on and between the kernels (Figure 1). Damage is most common at or near the tip of the ear. Silk infection is favored by high day and night temperatures.

*Gibberella*: Pinkish mycelia can be seen growing from the tip of the cob, which is a typical identification symptom of this rot. Cool wet weather during silking favors infection (Figure 2).



Figure 1: *Aspergillus* Ear rot (Dr. Don White, U of IL <http://bulletin.ipm.illinois.edu/print.php?id=1413>)



Figure 2: *Gibberella* ear rot (Charles Woloshuk, <http://www.extension.purdue.edu/extmedia/BP/BP-77-W.pdf>)

*Fusarium*: A salmon colored individual kernel is characteristic for this ear rot. Infection is favored by heat and insect stress. The occurrence of this fungi increases when harvest is delayed beyond physiological maturity (Figure 3)

*Penicillium*: Blue-green mold (Figure 4) on and in between kernels is found particularly on ears injured mechanically or by corn earworms and European corn borers. Additionally, colonized kernels are frequently bleached and streaked. Damage usually occurs at the tip of the ear, but may be found on other parts.

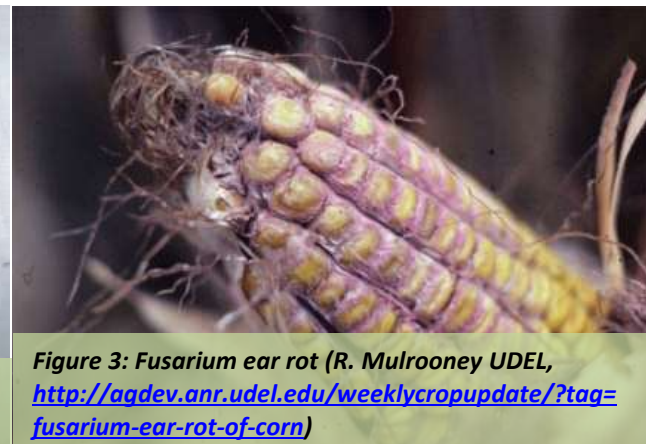


Figure 3: *Fusarium* ear rot (R. Mulrooney UDEL, <http://agdev.anr.udel.edu/weeklycropupdate/?tag=fusarium-ear-rot-of-corn>)



Figure 4: *Penicillium* ear rot: ([https://www.pioneer.com/cmroot/pioneer/US/images/agronomy/crop\\_focus/corn/diseases/penicillium\\_corn\\_ear\\_rot.jpg](https://www.pioneer.com/cmroot/pioneer/US/images/agronomy/crop_focus/corn/diseases/penicillium_corn_ear_rot.jpg))

*Diplodia*: Infection usually starts at the base of the ear or from the stalk into the shank. Characteristics of this ear rot are white fungal growth between kernels, and black specks seen on the cob occasionally. Infection is favored by early dry weather and wet weather late in the growing season (Figure 5).



Figure 5: *Diplodia* ear rot (Charles Woloshuk, <http://www.extension.purdue.edu/extmedia/BP/BP-77-W.pdf>)

*Cladosporium*: Symptoms often appear after an early frost and include the development of dark, greenish black, blotched or streaked kernels scattered over the ear (Figure 6). The black discoloration of the kernels proceeds toward the crown in more or less irregular streaks. The fungus may also invade crowns damaged by growth cracks. Further rotting may occur during storage.



Figure 6: *Cladosporium* ear rot (<http://www.aq.ndsu.edu/cornmold>)

Ear rots can be classified into two groups:

1. Toxin producing ear rots:

*Gibberella*, *Fusarium* (vomitoxin, zearalenone, trichothecene and fumonisin), *Aspergillus* (aflatoxin), and *Penicillium* (ochratoxin)

2. Non-Toxin producing ear rots:

*Diplodia* and *Cladosporium*

**Past History of Ear rot occurrence in ND:**

A preliminary survey on common corn ear rots in 2009 was conducted by Dr. Marcia McMullen and reported that *Cladosporium* was the predominant ear rot followed by *Fusarium*. The toxin levels in *Fusarium* infected ears were generally lower than the FDA acceptance levels (*Personal communication*: Dr. Marcia McMullen, Professor emeritus).

**What should a concerned grower do?**

I would recommend opening up a field and harvesting a strip to make it easy to sample. Walk down the edge of the strip and check for ear rots.

After scouting if you see indications of any ear rots contact your crop insurance agent for instructions. They will probably need to collect an official sample or may indicate to leave a test strip. You need to prove the ear rots/toxin occurred in the field and not in the bin in order to have a legitimate crop insurance claim.

**Best management practices to minimize ear rot/toxin issues:**

Adjust combine to minimize kernel damage and remove fines and debris. Do not allow wet grain to sit in wagons and trucks overnight.

If storing on-farm, run grain through a cleaner or screen before putting in the bin or dryer, if you have access to cleaner immediately dry to 15%, if you are planning long term storage then dry to 13%. As weather permits, cool the grain as quickly as possible. Aerate as needed to keep temperature and moisture in the grain mass equalized.

**Testing:**

North Dakota State University Plant diagnostic lab at Fargo has options for testing these ear rot pathogens. Please refer to the following [NDSU website](http://www.ag.ndsu.edu/cornmold) for further information: <http://www.ag.ndsu.edu/cornmold>

**Toxin levels:**

The mycotoxin risk levels for dairy cattle, expressed on a total ration, dry-matter basis.

- DON (vomitoxin): less than 5 to 6 parts per million
- Fumonisin: less than 25 ppm million
- T-2 toxin (trichothecene): less than 100 to 200 parts per billion
- Zearalenone: less than 300 parts per billion
- Aflatoxin: less than 20 parts per billion

If grain exceeds toxin levels but is below the 300 ppb, it might still be used in livestock feed. Some elevators may have arrangements in place with large feeders and may take the grain and keep it segregated. The FDA action limits for animal feed vary depending on the type of livestock, dairy-20ppb, breeding livestock and poultry-100ppb, finishing swine over 100 lbs-200ppb, and finishing beef cattle-300ppb. Additional information on FDA acceptable toxin levels can be found in the websites:

<http://www.extension.umn.edu/issues/lateharvest/dairy2.html>

<http://www.ncga.com/topics/production/mycotoxins-acceptable-aflatoxin-and-fumonisin-levels-for-feed>

**Utilizing affected grain:**

If it is below FDA levels, it can be sold to local livestock producers, generally at a discounted price. Toxin will not show up in ethanol from infected grain, but will be in the by-products that producers normally sell for livestock or pet feed. Therefore, acceptance by ethanol producers may be reduced and at a discounted price. As last resort, nutrients in the grain can be recycled by land application of contaminated grain. However, this may cause weed issues in the coming year.

[Venkata Chapara](mailto:Venkata.Chapara@ndsu.edu)

Area Extension Specialist/Crop Protection

NCREC, Minot, ND-58701

[venkata.chapara@ndsu.edu](mailto:venkata.chapara@ndsu.edu)