

BETWEEN THE ROWS

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CORN EAR ROTS, KERNEL MOLD, AFLATOXIN RISKS IN DRY ENVIRONMENTS

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Background

Corn ear rots and kernel molds are present every year. The degree of infestation and which particular mold infects ears and kernels is highly weather dependent. Several ear and kernel molds can begin infection during pollination, but infections can also occur later in the season through ear or kernel damage from insects, birds, hail, or frost.

The stressful growing season raises concern about the presence of aflatoxins. Hot, dry weather increases the chances of *Aspergillus* ear rot caused by *Aspergillus flavus* and *Aspergillus parasiticus*. This ear rot can produce aflatoxin (a type of mycotoxin) in the field or in storage. The most prevalent aflatoxin is carcinogenic, causing the FDA to set guidelines for acceptable levels for differing end uses of the grain (see Table 1). Elevators can reject loads of grain that may contain levels that exceed standards.

Table 1. FDA guidelines for acceptable aflatoxin level in corn based on intended use.

Intended use	Aflatoxin level (ppb)
Milk (Dairy Feed)	None detected
Corn of unknown destination	<20
Corn for young animals	<20
Corn for dairy cattle	<20
Corn for breeding beef cattle, swine, and mature poultry	<100
Corn for finishing swine	<200
Corn for finishing cattle	<300

Prevention or reducing the risk of ear molds/ Aflatoxin production

Corn ear rots and kernel molds typically are present in corn fields in corn residue from previous crops. Spores are carried to silks and kernels by wind and can infect other areas of the ear where damage is present. Feeding insects can create openings for infection and also spread the infection in the ear. Insect control can reduce feeding damage to ears and prevent some infection.

Weather conditions and timing impact infection rate and growth. Reducing corn residue may reduce infection but not prevent its presence. Early detection is one of the best practices to reduce and manage aflatoxin production in grain. Early harvest of fields when ear rots and kernel molds are detected, plus fast drying to less than 15% moisture, will help control infections and can keep mold from continuing to spread in storage.

Prime conditions for *Aspergillus* ear rot

Hot, dry conditions are conducive to some ear rots that can damage grain and cause harvest or handling difficulty. Corn growers affected by stressful growing conditions should inspect fields for the presence of ear or kernel molds before harvest begins. Proper identification of ear rots can help assess the potential risk of grain handling problems, particularly the production of aflatoxin by *Aspergillus* ear rot.

Aspergillus ear rot appears as a gray-green or olive, powdery mold, starting at the tip of the ear and spreading along damage from insects. The prime conditions for the fungus to produce toxins are warm August nights. Infections can begin at silking and can continue through grain moistures down to 15%. Cropping history, tillage practices, planting date, soil type, or hybrid can cause differences in ear mold presence and therefore aflatoxin production.



Ear molds do not occur uniformly throughout a field and can be localized in small areas. A large number of ears will need to be sampled before harvest in order to detect the amount of ear rot or kernel mold that might be present. Growers should sample several ears at 10-30 locations in a field to fairly represent the conditions present.

If *Aspergillus* ear rot is identified, the risk of aflatoxin production is present, but aflatoxin production is not automatic. Report ear mold to your insurance carrier and collect composite grain samples at harvest (5 to 10 pound samples). Grain elevators can screen for potential presence of aflatoxin with a black light test. But this test only identifies a secondary by-product rather than the aflatoxins themselves. So, it is not as reliable an assay compared to an analysis by an approved lab of the Grain Inspection, Packers and Stockyard Administration of the USDA. Approved labs can be found at www.gipsa.usda.

Handling grain infected with Aflatoxin

If grain has aflatoxin levels greater than 20 ppb, special consideration must be given to uses that allow higher levels of concentration. According to FDA guidelines, finishing cattle have the highest acceptable usage concentration.

A pre-harvest sampling is the best way to determine the presence of ear rots or kernel molds. Fields with molds present, particularly *Aspergillus* ear rot, or aflatoxin detected, should be scheduled for harvest early (before 24-26%) and quickly dried to less than 15% moisture to stop any additional production of aflatoxin. Aflatoxin concentration does not decrease in storage but can increase in grain that is not below 15% moisture.

Growers should store grain separate from fields that have significant ear molds present and do not plan any long term storage. Contact your grain merchandiser for market opportunities for this grain. Harvested grain can be cleaned before going into storage to help reduce small broken kernel pieces that may mold more quickly. Clean storage and handling facilities before grain harvest and after movement of suspect grain.

Other common ear rots or kernel molds

Diplodia Ear Rot

- Wet weather during silking and grain fill allows infection to occur and tight husk can promote infection.
- Infection is highly dependent on quantity of infected, unburied corn residue.



Diplodia ear rot

- Appearance of *Diplodia* includes a bleached ear leaf and husks, and a dense white to grayish white mold which starts at the base of the ear and is visibly growing between kernels.
- Diplodia* can cause ear rot, stalk rot and seedling blight.

Gibberella Ear Rot

- Wet weather and cooler temperatures during and after silking favor disease development.
- Infection is from spores from crop residue and moved by wind and rain.



Gibberella ear rot

- Initial infection is characterized by the presence of white mycelium on ear tips, then turning a distinctive reddish-pink color in infected kernels.
- May produce some mycotoxins.

Fusarium Ear Rot

- Most common fungal disease on corn ears, present in most years.
- Infection occurs from corn residue and spreads from spores moved by wind and rain.
- Disease enters mainly through wounds on ears from insect feeding or hail damage.
- Infections typically start at ear tip and can infect individual kernels or groups of kernels. Infected kernels display white streaking on the pericarp (starburst) and often germinate on the cob.
- May produce some mycotoxins.



Fusarium ear rot

Other less common ear rots or kernel molds

Penicillium Ear Rot

- Infection typically occurs during wet and humid conditions prior to harvest, usually following insect or other type of injury.

- Appearance of mold is green to bluish-green in color in between kernels and on the cob.

- Can cause 'blue eye' by invading kernel embryo causing blue coloration.

- May produce mycotoxins.



Penicillium ear rot

Cladosporium Ear Rot



Cladosporium Ear Rot

- Infection occurs on damaged kernels and appears gray to black or very dark green and can have a powdery appearance.
- Can cause black streaks in the kernel.
- A fairly common ear mold, but does not typically cause extensive damage.

Nigrospora Ear Rot

- A dark colored mold not conspicuous until harvest.
- Infected ears are chaffy and have kernels which are loose on the cob.
- Badly infected shanks, bases, and cobs are often shredded at harvest.



Nigrospora Ear Rot

Summary

This stressful growing season appears to have the potential for increase of some ear rots or kernel molds, especially *Aspergillus* ear rot. This can lead to aflatoxin production by the fungus causing harvest and handling problems for the grower. Early detection prior to harvest and special handling and storage when ear rots and kernel molds are present can help reduce the risk of serious damage to the value of the grain.