



CORN EAR MOLDS

Basic Questions and Answers

Where may I send corn ears to have the mold fungi identified?

Corn ears or kernels may be sent to the NDSU Plant Diagnostic Lab, (701) 231-7854, for identification of molds for a fee of \$15/sample.

The courier (FedEx, UPS, etc.) address is:

NDSU Plant Diagnostic Laboratory
Dept. of Plant Pathology
306 Walster Hall, NDSU
Fargo, ND 58102

The U.S. Postal Service address for regular mail is:

NDSU Plant Diagnostic Laboratory
NDSU Dept. 7660
P.O. Box 6050
Fargo, ND 58108

Where may I send corn ears for mycotoxin analysis?

Corn with visible molds does not necessarily have mycotoxins present. The presence of mycotoxins can be determined only by laboratory testing. Mycotoxin analysis may be done by the NDSU Veterinary Toxicology Lab on corn ears or grain. A full mycotoxin screen for North Dakota residents is \$90, individual toxin tests cost \$30 and a trichothecene screen for 17 mycotoxins costs \$55. The NDSU Veterinary Toxicology Lab may be reached at: (701)231-8307. Its Web site is: www.vdl.ndsu.edu.

The courier address for submitted samples is:

NDSU Veterinary Diagnostic Laboratory
1523 Centennial Blvd.
Van Es Hall, NDSU
Fargo, ND 58102

The U.S. Postal Service address for regular mail is:

NDSU Veterinary Diagnostic Laboratory
Dept. 7691
P.O. Box 6050
Fargo, ND 58108-6050

Various private labs in the region also may be able to test corn for molds and mycotoxins.

Many states in the Midwest are reporting the occurrence of corn ear molds because of wet conditions that have delayed corn maturity and grain harvest. Corn ear molds also are being observed in North Dakota, although the extent of damage (as of Nov. 10, 2009) is relatively unknown. Corn ear molds are of concern because of their potential to produce mycotoxins, which may affect livestock feeding value. The following provides some answers to frequent questions about corn ear molds.

What Are the Common Ear Molds in N.D.?

Preliminary results in 2009 indicate that the most common mold fungus observed has been *Cladosporium*. This mold causes a dark green to black mold growth frequently seen on the kernel surface, between kernels or into the cob. (See figures from Kasia Kinzer, NDSU plant diagnostician). This fungus is NOT known to produce mycotoxins of concern.

Other ear molds that may occur include: *Gibberella* and *Fusarium* ear rots (often associated with white to pink to red discolorations, and potentially producing mycotoxins such as vomitoxin, zearalenone and fumonisin); *Penicillium* mold (blue-green mold growth potentially producing ochratoxin); *Diplodia* (white to gray mold growth not known to produce mycotoxins); and *Aspergillus* (green mold growth potentially producing aflatoxin, but generally in hot, dry years). Some mold growth may be superficial and not infecting the intact kernels. Excellent information and pictures about these ear molds are available through many university or corn company Web sites such as the Iowa State University site at www.ipm.iastate.edu/ipm/icm/node/1742/print or the Pioneer Corn Hybrid Co. site at www.pioneer.com/CMRoot/Pioneer/usa/agronomy/corn/management/ear_tech.pdf.

Can mold spores cause respiratory problems?

Very abundant mold spores can cause respiratory problems in sensitive livestock and in humans. Farmers and grain handlers should wear respiratory protection, such as an N-95 rated mask, to minimize exposure to mold spores during grain handling.

What are the effects of mycotoxins on livestock?

The U.S. Food and Drug Administration (FDA) has issued advisory levels for various mycotoxins in grain. If mycotoxins are detected, livestock producers should be aware of these advisory levels. For example, the following table provides information on FDA advisory levels for vomitoxin in animal feeds.

Advisory levels for vomitoxin in animal feeds (FDA)

Grain and byproducts intended for	Vomitoxin level (ppm)	Not to exceed % of ration
Ruminating beef, feedlot cattle >4 months	10	50
Chickens	10	50
Swine	5	20
All others	5	40

What effects can molds have on the marketing or price received for corn?

Elevators, ethanol plants and feed mills apply price discounts for both moldy corn and various mycotoxins. Price discounts can vary depending upon the buyer, the mold or mycotoxins levels, and the intended use for the corn. High levels of mold or mycotoxins may result in the buyer refusing to take delivery. Growers need to check with alternative buyers to determine both the base price for the corn, as well as any price discounts that may apply.

What effect do the molds have on ethanol plant purchasing of corn?

The guidelines for moldy grain can vary among ethanol plants. One ethanol plant provided the following guidelines: Corn with moisture above 15 percent will be discounted. The plant also will do a visual inspection for damage before accepting corn. If damage (including broken kernels and moldy kernels) is above 10 percent, the ethanol plant will not accept the corn. Mycotoxins are not destroyed during the ethanol processing; they become concentrated about three-fold in the dried distillers grains (DDGS). If mycotoxin levels in the corn and DDGS become a concern, restrictions on moldy corn could be strengthened.

Do I need to contact my insurance agent prior to harvest if I see corn ear molds in my fields?

Yes. Federal Crop Insurance policies cover losses due to substances that injure human or animal health, such as certain molds and mycotoxins. But samples must be taken before the crop enters on-farm or commercial storage. Testing must be performed to determine the source and level of damage. Growers need to contact their insurance agent to find out the proper collection and reporting requirements.

If moldy corn is dried appropriately, do molds and mycotoxins continue to develop?

No, proper drying (to less than 15 percent moisture content, or MC, for winter storage and 13 percent MC for summer storage) and proper cooling and storage management will not allow further development of corn ear molds or mycotoxins. However, any mycotoxins that formed prior to drying will remain in the corn and will not be destroyed during high-temperature drying or during storage.

What are appropriate harvesting and storing practices to reduce the risk of further mold and mycotoxins development?

Mold growth in standing corn will continue until temperatures drop below about 40 degrees or corn moisture is reduced to about 20 percent. Natural-air and low-temperature drying can be used for spring drying, but initial corn moisture should be less than 20 percent and the airflow rate should be at least 1 cubic foot per minute per bushel. Corn with damaged kernels should be marketed or fed to animals by early summer because of its shorter storage life. A screen cleaner should be incorporated into the handling system to remove fine materials before the corn is placed in the bin. NDSU has provided numerous postharvest tips for the 2009 corn crop, and many guidelines for corn drying and storage may be accessed online at www.ag.ndsu.nodak.edu/abeng/postharvest.htm.

What are the effects of ensiling on mold growth and mycotoxin production?

Most of the mold growth in corn this year (2009) has been on ears. This late mold growth may have little impact on traditional corn silage methods. Producers with corn silage who have concerns about mycotoxins should have the silage tested for mycotoxins prior to feeding. Harvesting the corn as high-moisture grain and storing the grain in a bunker, upright or other silo structure also should slow or arrest mold growth in the corn, provided anaerobic conditions and a low pH environment are maintained. Corn stored in this manner (fermented) should be fed only to ruminant livestock.

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In cooperation with North Dakota Corn Growers Association

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