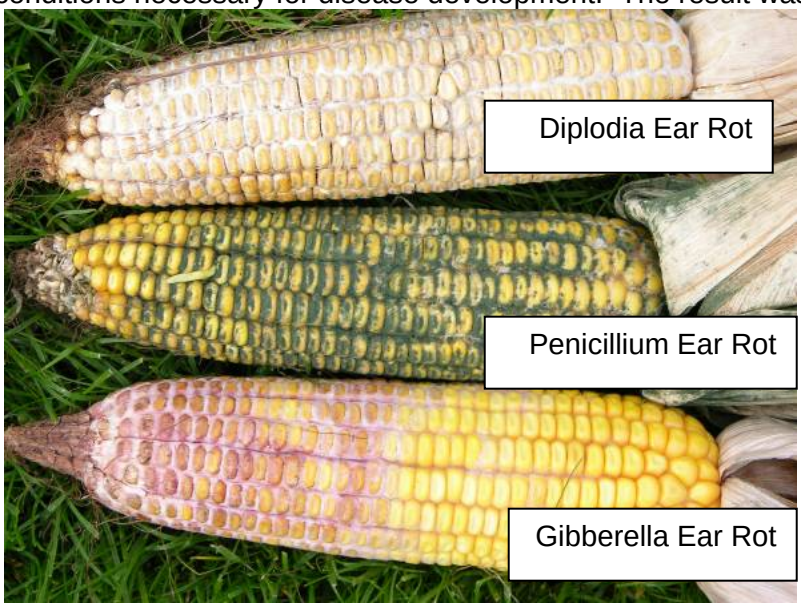
Corn Ear Mould and Vomitoxin (DON) Survey

(2006 Report)

Purpose:

There are various ear molds that occur in Ontario and identification is critical since many of these fungi produce mycotoxins that can have detrimental consequences if feed to livestock and in some cases humans. The persistent wet weather during September, October and November 2006, European corn borer injury, bird damage, poor pollination, and other factors provided the various corn ear rot fungi with the favourable growing conditions necessary for disease development. The result was elevated ear moulds in many fields across the province. Proper ear mould identification is critical since not all of these fungi produce toxins.



A pre-harvest assessment of these ear moulds and their corresponding mycotoxins were necessary since determining the extent of the ear mould problems prior to harvest was critical to managing and minimizing the impact of these diseases through timely harvest and proper drying/storage conditions. In addition, determining the levels of deoxynivalenol (vomitoxin or DON) is important to swine and other livestock producers since DON can have a detrimental affects such as poor weight gain and feed refusal. Increasing awareness amongst livestock producers to the potential problems would allow them to segregate or obtain alternative corn grain.

Therefore, OMAFRA, in conjunction with Dr. Art Schaffsma, (University of Guelph – Ridgetown Campus) surveyed commercial corn fields from across the province during the fall (2006) to determine the occurrence of corn ear moulds and an assessment of vomitoxin (DON) mycotoxin levels that could be associated with these fields. As with all survey data, the information only gives a picture in time but the results do provide a general view of the corn ear mould situation in the province.

Methods and Results:

The survey consisted of collecting twenty corn cobs from 94 commercial corn fields at various times (3 times) throughout the fall. In addition, combine samples were collected from many of these fields. These fields and each ear were assessed for the presence

and severity of mould. In addition, vomitoxin (DON) levels were determined for these fields (Table 1).

As expected the most common ear mould detected in 2006 was ***Gibberella zeae*** (the sexual reproductive stage of *Fusarium graminearium). Gibberella* is the most important corn ear mould in Ontario but the fungus also causes Fusarium head blight in wheat. Infection begins through the silk channel and thus, infection in most cases starts at the ear tip. In severe cases most of the ear may be covered with mould growth. Corn silks are most susceptible 2 to 10 days after initiation. Environmental conditions during pollination and through the fall were ideal for Gibberella infection.

Of the 94 fields tested, 61 or nearly 65% of the fields were at or below 2 ppm DON, 17 the fields (18%) were in the 2 to 6 ppm range, while the remaining 18 fields (19 %) were over 6 ppm (see Table 1).

However, if you look exclusively at the fields sampled in the extreme southwest portion of the province (Chatham-Kent, Middlesex and Elgin counties) 13 of the 34 fields examined had DON levels over 6 ppm. Corn with DON levels in the 2-6 ppm may be utilized effectively but will take some additional management (blending, cleaning, combine adjustment, etc). Fields with more than 6 ppm DON would best be directed away from feeding uses, especially hogs.

The results tend to indicate that there is a significant percentage of the provinces corn that was relatively free of vomitoxin. However, in nearly all parts of the province there are fields that could have high levels of DON and that the chance of this occurring increases significantly in the south-west portions of the province. It is important for producers to access each of their fields individually.

Summary:

OMAFRA, in conjunction with Dr. Art Schaffsma, continue to survey corn fields across the province. 20 corn cobs were selected from these fields and assessed for the percentage of ears that had any visual mould growth as well as tested for vomitoxin (DON) production. As with all survey data it gives you a picture in time but the results do provide a general view of the corn ear mould situation in the province. Although the southwestern counties have consistently shown the highest levels of mycotoxins and DON levels decreases as you go east, ear moulds and DON can be found in all regions of the province.

The production of toxins is a major concern when these ear rots are present but it is not always the case that mould growth equates to high toxin levels and vice versa (high toxin levels can occur with little visible fungal growth or ear rot). For this reason, it is essential to examine individual fields and determine which ear molds and to what extent.

This will allow for the implementation of grain harvest, storage and feeding management options to minimize toxin development and maintain grain quality. Fields with significant mould should have a representative sample collected and tested for toxins, especially Deoxynivalenol (DON) prior to storage and feeding. If necessary feed to less sensitive livestock species such as beef cattle or poultry.

Table 1. Corn ear mould survey, samples taken October 16-25, 2006.
20 representative corn ears taken from each field, scored for visual mould, shelled and tested for vomitoxin (DON).

Area/Counties	Fields with Test Completed	Fields with less than 2 PPM DON		Fields with 2 to 6 PPM DON		Fields with more than 6 PPM DON	
		# of fields	Avg. DON (PPM)	# of fields	Avg. DON (PPM)	# of fields	Avg. DON (PPM)
Area 1 (Prescott and Russell Stormont, Dundas and Glengarry, Lanark, City of Ottawa)	**20**	**20**	**0.2**	**0**		**0**	
Area 2 (Northumberland, Durham)	**5**	**4**	**0.2**	**1**	**3.4**	**0**	
Area 3 (Wellington, Halton Hamilton, Brant)	**12**	**8**	**0.5**	**4**	**3**	**0**	
Area 4 (Bruce, Huron)	**9**	**6**	**0.7**	**3**	**3.1**	**0**	
Area 5 (Oxford, Perth)	**13**	**9**	**0.7**	**2**	**2.7**	**2**	**7.5**
Area 6 (Elgin, Chatham-Kent, Middlesex)	**34**	**14**	**0.7**	**7**	**4.8**	**13**	**11.2**
Totals	**93**	**61**	**0.5**	**17**	**3.4**	**15**	**9.4**

Gibberella ear rot resistant or tolerant commercial corn hybrids can reduce disease and potential mycotoxin production. For next year, check with your seed corn company not only for hydrid ear mould ratings but other stresses such as leaf disease resistance, insect resistance, etc that could increase ear mould problems under favourable conditions. In addition, plan a multiple hybrid on-farm strip trial in the future which compares various hybrids under your specific field conditions.

The importance of collecting a “representative” sample can not be emphasized enough, since 90% of the variability associated with mycotoxin test results comes from incorrect sample collection! The accuracy of a mycotoxin test is dependent often on a little elbow grease and some inconvenience. Although taking a sample from the top of a storage bin, truck or combine may be easy and very convenient, you will most likely not be happy with the results since mycotoxin distribution is rarely distributed evenly in a load of corn.

When it comes to sampling and an accurate mycotoxin test – THE MORE SAMPLES TAKEN THE BETTER!

If the sample is come from a bin, truck, V-box, or other stationary load of corn, a sample probe is recommended. Although 10 probes are recommended, 5 probes will do if necessary. Mix the grouped sample and take a representative sample from this pooled sample. If you are dealing with a moving stream of grain, either use a diverter or randomly collect cupfuls (handfuls will work as well) of grain. Regardless of how the sample is taken, it must be processed quickly! Therefore ship or deliver the sample promptly. The longer the sample sits around the greater potential of an inaccurate results.

Next Steps:

Combine samples continue to be processed.

Report Location:

Report in Croppest (www.omafra.gov.on.ca/croppest).

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Stay tuned for future results and contact
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