Crop Quality Issues from the Drought of 2012

Charles R. Hurburgh Jr.
Iowa State University, tatry@iastate.edu

Alison E. Robertson
Iowa State University, alisonr@iastate.edu

Connie L. Hardy
Iowa State University, chardy@iastate.edu

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Abstract
As we approach harvest, the impact of the drought on grain quality is becoming clearer. Corn in many areas to the west and east of Iowa reached maturity earlier. Most of Iowa's corn will be past black layer by Labor Day weekend. Soybeans have stopped and started with late rains, but expect pod count and seed size to be pretty well set by Labor Day as well. Regardless of crop and quality issue, please talk to your crop insurance company before harvest. Some quality issues are covered; others are not. Quality issues are resolved in crop insurance by deducting an additional percentage of actual production before calculating the settlement.

Keywords
Agricultural and Biosystems Engineering, Plant Pathology and Microbiology

Disciplines
Agricultural Science | Agriculture | Bioresource and Agricultural Engineering | Plant Pathology
Crop Quality Issues from the Drought of 2012

By Charles Hurburgh, Department of Ag and Biosystems Engineering, Alison Robertson, Department of Plant Pathology, and Connie Hardy, Value Added Agriculture

As we approach harvest, the impact of the drought on grain quality is becoming clearer. Corn in many areas to the west and east of Iowa reached maturity earlier. Most of Iowa’s corn will be past black layer by Labor Day weekend. Soybeans have stopped and started with late rains, but expect pod count and seed size to be pretty well set by Labor Day as well. Regardless of crop and quality issue, please talk to your crop insurance company before harvest. Some quality issues are covered; others are not. Quality issues are resolved in crop insurance by deducting an additional percentage of actual production before calculating the settlement.

**Corn**

The primary corn quality issues are low test weight/small kernels, significant mold pressure of all kinds in the many acres of downed corn and a general potential for aflatoxin at some level. Stalk strength is poor so expect more downed corn if we get wind or storms in September.

**Test weight-kernel size**

The drought-retarded grain fill makes kernels less dense and, therefore, lower in test weight. Low test weight from drought is not the same as low test weight from frost or wet weather (remember 2009) in that protein and oil levels will likely be average or even above. This is good news for feeding. Historically, test weights down to 45 lbs/bu have not had lower energy per unit of weight. The small kernels may partially offset the lighter density of each kernel because more small seeds fit in the test weight volume cup than larger seeds.

As always, low test weight grain will break to a greater degree in handling and will have shorter storage life at a given moisture. If test weights are 52 lb/bu and lower, cut these numbers in half as in 2009.
Table 1.

Do not hold this year’s crop at moistures above 17 percent. Even if it is necessary or advantageous to harvest early, dry immediately. The 2012 corn should not be put on top of or blended with older corn if you expect to store the corn.

**Downed corn**

Storms in August put corn on the ground in several areas of Iowa. The downed stalks will be in humid, high mold situations. Studies from the 2009 crop showed that, aside from toxin risks, mold damage can reduce feed energy values by 5 percent or more. This year the toxin risks are also high. This corn should be taken out of the field and dried as soon as possible.

Corn laying on the ground can have more toxin risks than just the aflatoxin, for which there is general potential. This corn should be tested for the series of mycotoxins of most concern – aflatoxin, vomitoxin, fumonisins and zearalenone. Testing laboratories are listed on the [Iowa Grain Quality Initiative](http://www.extension.iastate.edu/CropNews/2012/0827hurgurghrobertson.htm) website; the [Iowa State University Veterinary Diagnostic Lab](http://www.extension.iastate.edu/CropNews/2012/0827hurgurghrobertson.htm) will also test samples for mycotoxins.

**Aflatoxin**

Aflatoxin, a toxic secondary metabolite of Aspergillus flavus, is possible this year because of the hot, dry weather persisting from pollination through grain fill. The [Aug. 2 issue of the ICM Newsletter](http://www.extension.iastate.edu/CropNews/2012/0827hurgurghrobertson.htm) explained the biology and conditions required for aflatoxin. Now is the time to be scouting fields for the presence of the fungus. Schedule affected fields for first harvest.

Aflatoxin will be adjusted in the field, not after the crop has gone into the bin. It is important to harvest and sample the insurance check strips as close to field harvest as possible. With the forecasts for more hot weather (above 90°F) this week, the toxin levels in standing strips can increase. Aflatoxin testing has a 25-50 percent sampling error; only a USDA approved third-party lab can determine aflatoxin in crop insurance samples.

If you receive a crop insurance settlement for aflatoxin, the corn must be directed, with documented proof, to an approved feed use. Corn settled for aflatoxin should not be offered back to the general market without notice; the new food safety legislation creates significant liability if a downstream issue can be traced back to a production source.
Table 2.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn for breeding beef/swine/poultry</td>
<td>100 ppb</td>
</tr>
<tr>
<td>Corn for finishing swine &gt;100 lb.</td>
<td>200 ppb</td>
</tr>
<tr>
<td>Corn for finishing cattle</td>
<td>300 ppb</td>
</tr>
</tbody>
</table>

The general tolerance for aflatoxin in interstate commerce is 20 parts per billion. Aflatoxin is classified as an adulterant in U.S. Food and Drug regulations.

The most sensitive industries for aflatoxin are dairy (because of pass through to milk), pet food (pets are very sensitive to aflatoxin) and ethanol/processing plants (the toxin concentrates by a factor of three in the feed co-products).

Expect grain buyers, both elevators and processors, to be monitoring for aflatoxin. If the overall level of aflatoxin in a region does not approach the 20ppb limit, then the buyer may elect to test composite samples of all loads in a period (half-day, day, etc) to verify that, on average, the grain is acceptable. If the composites show a regional or local issue, then individual load testing may be needed. This is time consuming and costly. A future issue of the ICM Newsletter will discuss testing options. If you feed your own corn, a test would be a worthwhile investment.

Aflatoxin is not removed by drying or freezing, but does not usually increase in storage. A flavus is not a strong storage mold; it is quickly crowded out by others. Storage at 18 percent moisture and above, with temperatures above 70F, could cause an increase in aflatoxin, but normal grain cooling and drying practices will be effective in controlling further production. Natural air, stirred and other bin drying methods will work if the wet grain is not held warm awaiting drying. Evaporative cooling (check the dewpoint temperatures) normally keeps air drying systems cool enough. Do not fill heated air bin systems full so that wet grain is “held” at higher moistures and temperatures. Below 70F and below 18 percent moisture are the targets.

**Soybeans**

Soybeans are not susceptible to field-induced mold toxins. The primary soybean quality impact of the drought will be small and, perhaps, flat and shriveled soybeans. In the drought of 1988, shriveled and wrinkled (shrinkled) soybeans occurred. A definition was created by USDA-GIPSA, as shown below.

![Soybean Image](http://www.extension.iastate.edu/CropNews/2012/0827hurgurghrobertson.htm)
Image 1.

These soybeans do not fall through the small foreign material screen and are not considered splits. Price discounting will be at the discretion of the buyer, if at all. Shrinkled soybeans have a reasonably good protein and oil profile, but do not crack into pieces as required for efficient oil production at solvent extraction soybean plants. Soybean protein content overall may be low because dry weather does not favor nitrogen fixation.

Future issues will describe testing procedures for aflatoxin and will provide updates on grain management conditions as they develop.

Charles Hurburgh is a professor in the Department of Ag and Biosystems Engineering. He can be reached at 515-294-8629 or e-mail tatry@iastate.edu. Alison Robertson is an assistant professor of plant pathology with research and extension responsibilities in field crop diseases. She can be reached at 515-294-6708 or e-mail alisonr@iastate.edu. Connie Hardy is an extension specialist in the Value Added Agriculture Program. She specializes in food science aspects of business development, and can be reached at 515-294-8519 or chardy@iastate.edu.