IOWA STATE UNIVERSITY
Extension and Outreach

Integrated Crop Management

Crop Quality in 2019: Another Unusual Year

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This year continues the chain of growing seasons with extremes and rapid changes beyond our long-term experiences. This made for periods of both stress and favorable crop growth despite the planting dates. Frost, potentially killing in the northern half of Iowa, is expected between October 11-13. USDA data indicate a wide range of maturity due to planting date, but the periods of hot weather scattered through September and early October may have reduced the potential for very high moisture corn and soybean. Variability will be the key issue to manage in 2019 corn and soybeans.

Corn

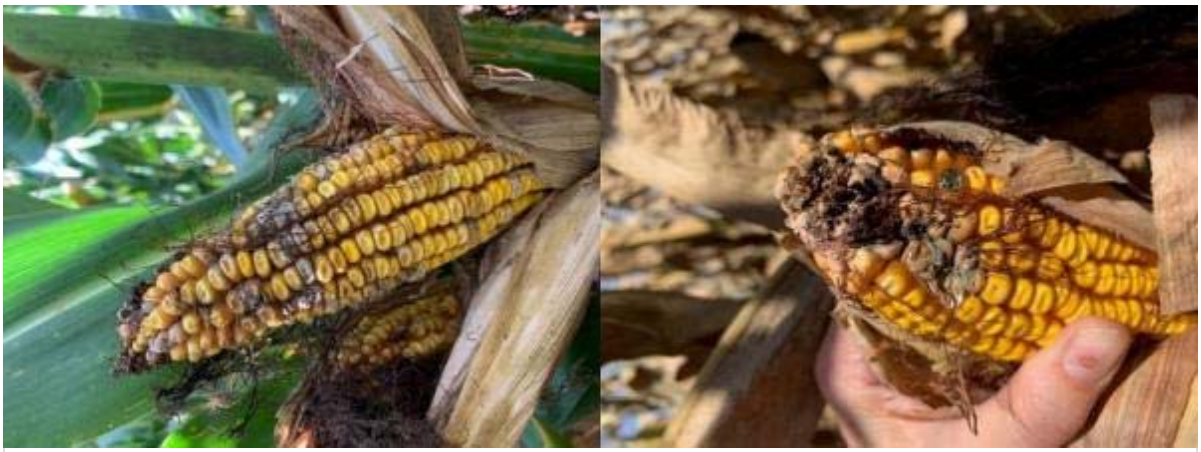
Normal to very late planting guarantees a large range in maturity and harvest moisture. Test weight, which is a good indicator of maturity, will probably average 54-55 lb/bu - less than the long term average of 56-58 lb/bu. Lower test weight means more handling breakage, shorter storage life, and often higher drying costs per unit of water removed. On a weight basis, feed value and digestibility does not decline significantly until test weights fall below the mid 40s. Producers should check the test weights from each field /hybrid). The lightest corn should be sold first.

Test weight should increase about 0.2 lb/bu per percent of moisture removed, increases less than that indicate immaturity. Early death from frost typically creates low test weight grain that does not increase much during drying. The detrimental effect of low test weight is primarily on storage and handling. More fines will be

created in handling, which increase storage issues by restricting airflow. As long as low test weight grain is formulated by weight and not volume, the feed value is not greatly reduced. On a weight basis, ethanol yields should not be affected unless there has been spoilage.

Variable grain quality means more variability in storage. Try to even out moisture going into dryers by not mixing grain from areas with large differences in quality. Dryers will not even out variable input corn. Grain elevators will have more difficulty controlling uniformity because deliveries cannot be controlled.

There have been reports of mold damage in the field, so it is important to scout fields. This year, *Penicillium* ear rot (Fig 1) appears more prevalent than usual in Central Iowa. In addition, *Fusarium* ear rot (Fig 2) is also prevalent. Most ear rots are associated with insect damage to the kernels. Scout fields where insect activity was high. Other molds that have been observed include *Trichoderma, Cladosporium and Gibberella*. The Crop Protection Network has a publication that describes ear rots, their symptoms and signs.



Fusarium on an ear of corn (left) and *Pennicillium* on an ear of corn (right).

Moldy ears also bring a risk of mycotoxins and their negative health effects for consumers and livestock. Not all fungi produce mycotoxins. *Fusarium* ear rot may produce fumonisins in affected grain and Penicillium ear rot poses a risk for ochratoxin A (OTA) production. The United States Food and Drug Administration (FDA) has set guidance levels for the total level of fumonisins in livestock feed which reflect the sensitivity of different species to this group of mycotoxins. The FDA does not currently have limits or guidance for levels of OTA in grain and animal feed. Negative health production impacts have been noted, especially for swine and poultry consuming feed contaminated with OTA. Mycotoxin resources are available through the Iowa Grain Quality Initiative (www.iowagrain.org) and

from the Crop Protection Network (mentioned above).

FDA guidance levels for fumonisin

Class of Animal	Feed Ingredients & portion of the diet	Fumonisin level in ingredients and (finished feed)
Equids and rabbits	Corn and corn by-products not to exceed 20% of the diet	5 ppm (1 ppm)
Swine and catfish	Corn and corn by-products not to exceed 50% of the diet	20 ppm (10 ppm)
Ruminants, Poultry, and mink (all breeding)	Corn and corn by-products not to exceed 50% of the diet	30 ppm (15 ppm)
Ruminants ≥3 months old being raised for slaughter and mink for pelt production	Corn and corn by-products not to exceed 50% of the diet	60 ppm (30 ppm)
Poultry being raised for slaughter	Corn and corn by-products not to exceed 50% of the diet	100 ppm (50 ppm)
All other species or classes of livestock and pet animals	Corn and corn by-products not to exceed 50% of the diet	10 ppm (5 ppm)

At-harvest grain management will be particularly important this year. The Table below shows the generally accepted storage life of corn and soybeans at varying moisture and temperature conditions. At the end of the Allowable Storage time, grain will have lost about 0.5% of weight and will have increases in damaged kernels enough to reduce its grade by one number, which in general would trigger damage discounts in the market as well.

With the expectation of lower test weights even in fully mature grain, these storage times should be reduced. Experiences from previous low test weight, high moisture years suggest that at 52-53 lb/bu, the storage life of corn is about 50% of the numbers in the table.

Maximum storage time (months); corn and soybeans*							
Temperature ° F	Corn, soybeans moisture content						
	13%, 11%	14%, 12%	15%, 13%	16%, 14%	17%, 15%	18%, 16%	24% N/A
40	150	61	29.0	15.0	9.4	6.1	1.3
50	84	34	16.0	8.9	5.3	3.4	0.5
60	47	19	9.2	5.0	3.0	1.9	0.3
70	26	11	5.2	2.8	1.7	1.1	0.2
80	15	6	2.9	1.6	0.9	0.9	0.06
*Based on 0.5% maximum dry matter loss—calculated on the basis of USDA research at Iowa State University. Corresponds to one grade number loss; 2-3% pts of Total Damaged seeds							

Variability plays a big role in storage life, because if there are pockets of wetter (and likely lighter) grain, those pockets will behave as wetter grain would, not the dry average. This is not a good year to hold wet grain before drying, even for short periods. A load of 24% corn left on a truck for a day could lose half its storage life in that day, more if it were immature and low test weight. Additionally, from a mycotoxin perspective, fumonisin levels can increase in the time between harvest and drying; minimizing wet-holding time is critical to quality and safety maintenance.

The key at-harvest activities are cooling as fast as possible, and drying as rapidly as drying systems will allow. The air dewpoint is a good measure of how cold grain can be made with given air conditions. Low dewpoint days are very valuable in getting warmer grain out of the field or out of dryers down to safer temperatures in the 40s.

Grain with field mold already present is particularly vulnerable to further spoilage if drying is not done quickly. Grain in bin dryers that use intermediate heat levels (90-120F) can experience further mold development and potentially mycotoxin increases if filled beyond what can be dried in 1-2 days.

The ability to take grain temperatures in bins will be very important this year. There are carbon dioxide testers that have promise in detecting mold growth without having cables in the bin. We will talk more about carbon dioxide testing in future articles.

Finally, always remove the center core from bins, as quickly after harvest as possible. This takes out fines and foreign material that are sure to be storage issues later in the year. Air diverts around the foreign material, which prevents cooling.

Mycotoxins are often higher in fines and broken/damaged kernels, so a secondary impact of removing this core may be improved quality and fewer mycotoxin issues in the remaining grain.

Soybeans

Expect more wet soybeans (>13% moisture) this year, because we did not have the usual week of warm, low humidity weather that often took soybeans to 10% moisture or below. However, the sporadic periods of warm weather probably prevented the very wet soybeans that had been expected. The exception to this could be with very late planted fields or with large rains or snows that keep fields and plants wet. Find more detailed information about drying soybeans in PM 1636. In general try to dry soybeans with air or low heat dryers, there is significant fire risk when drying soybeans in continuous flow dryers, or high heat bin dryers. Bin stirring machines will remove hulls and filter them to the bottom.

Frost before maturity (plant and pod still green) will reduce yield and will result in green, high moisture soybeans. Green soybeans are a problem for processors because they have to refine the oil more intensively to remove the chlorophyll that creates greenness. Significant oil losses result. In handling, most moisture meters, except the newer 150 mhz meters used by many elevators, will read mixtures containing green or immature oblong soybeans at 1-2% lower moisture than they actually are. The best action to take with frost damaged beans is to aerate them for several weeks before marketing. Moisture will fall, and the greenness will become less intense, sometimes to the point of not classifying as damage. For more information on frost damaged crops look at PM 1635.

Soybeans this year are shorter, and have less closure of the rows. This has led to more late season weed emergence which in turn will result in an increased potential for foreign material. In the market. Podding lower in the canopy will mean more dirt as foreign material as growers attempt to recover as much as possible. Foreign material is a percentage basis weight reduction for soybeans, which is not a real penalty other than increased shipping cost of the FM. In storage however, the whole pods will typically roll to the edge, and the fine material will stay in the center. As with corn, remove the center core as soon after harvest as possible. One strategy is to heap the bin, then remove enough to return the surface to level.

Expect lower protein than normal in 2019. September rains added pods to late planted soybeans but their development time will be short. Typically protein is low when crop development is slow or incomplete. Oil content may increase to partially

offset the loss in protein.

Category: Crop Production Grain Handling and Storage

Crops:

Corn Soybean

Tags: harvest toxin test weight

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