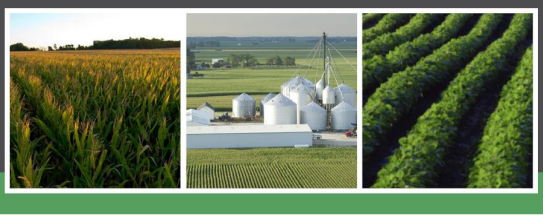

Agronomic Spotlight

Corn Maturity, Drydown, and GDU Accumulation Greater than 115 RM

- Physiological maturity for corn occurs when kernels are around 30% moisture content.
- A cool growing season in combination with late planting can push harvest later into the fall.
- Delayed maturation can result in a less than desirable grain moisture content at harvest time that may require additional expense for bin drying.

Corn Maturity, Drydown, and GDU Accumulation

Corn kernels are around 30% moisture content when physiological maturity or black layer occurs (Figure 1). Several factors influence field drydown after maturity. Kernel moisture content decreases faster with warm, dry weather and may decrease slowly in a wet and cool environment. Fuller season corn products, that require more growing degree units (GDUs) to mature, will likely be slower drying as the fall progresses within an area. Crop maturity can be hastened by dry weather conditions, which usually results in a loss of potential yield because plant death occurs before the kernels gain their full weight and size.

Figure 1. Black layer at kernel tip.

Typical drying rates after black layer occur at about 0.6% per day until grain reaches 15% moisture.[1] In southern regions, drying rates as high as 1% moisture per day were measured under ideal drying conditions. About 30 GDUs per point of moisture are required to dry corn from black layer to 25% moisture content.[2] Purdue University studies showed that a loss of 0.5% moisture content occurs when the mean accumulation of GDUs is 12 per day, and 0.75% moisture content is lost when the mean accumulation of GDUs is 22 per day respectively (Table 1).

Corn products differ from one another in drydown rates. Plant characteristics that can influence drydown rate include:[3]

- **Number and Thickness of Husk Leaves.** Fewer husk leaves and thinner leaves can lead to faster moisture loss.
- **Husk Dieback.** Earlier dieback of husk leaves can lead to more rapid grain drying.
- **Ear Tip Exposure.** Exposed ear tips may provide for quicker grain moisture loss.
- **Husk Tightness.** Husks that are loose and open may help increase grain drying.
- **Ear Angle.** Drooping ears tend to lose moisture more quickly. Upright ears can capture moisture from rainfall.
- **Kernel Pericarp Properties.** Thinner pericarps (outer layer covering a corn kernel) have been associated with faster field drying rates.

Table 1. Average rate of grain moisture content loss in relation to growing degree unit (GDU) accumulation*

Mean Daily GDU Accumulation During Drydown	% Grain Moisture Content Loss per Day
12	0.5
17	0.6
22	0.75

*Three corn products planted in late April to early May, 1991-1994 in west central Indiana (Purdue University Agronomy Research Center). Source: Nielsen, B. 2001. Post-maturity grain drydown in the field. Agronomy Tips. Pest & Crop. Purdue University. http://extension.entm.purdue.edu.

Results of Late Planting and Cool Weather

Late-planted corn can result in taller plants, smaller diameter stalks, pollination when temperatures are hotter, and delayed maturation. Delayed maturation can result in a less than desirable grain moisture content well into the harvest season. Cooler fall temperatures decrease the rate that kernels lose moisture content.

Calculating Harvest Timing

The maturity of most corn products is based on the amount of GDUs required to reach black layer. Based on planting date, growing season temperatures, and the GDU maturity date for a product, an approximate calendar maturity date can be calculated for a corn product. This information can be used to help schedule harvesting, marketing of grain, and determining if extra fuel may be required for bin drying.

Some universities provide corn maturity calculators. By entering a location, planting date and the GDU to silk or black layer a maturity date is then estimated. The University of Missouri offers a calculator at the following site:

http://plantsci.missouri.edu/grains/corn/calculator/

A growing degree day calculator can also be found on The Weather Channel® website, weather.com for all locations. The accumulated growing degree days can be compared to the amount needed for the corn product planted.

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http://www.yourweekendview.com/outlook/agriculture/growing-degreedays/

Web sources verified 8/8/2014. 140811105655

Table 2. Growing degree days (GDD) required for different corn growth reproductive stages of a 2700 GDD corn product.	
Development Stage	GDD
Silks emerging/pollen shedding (plant at full height)	1400
Kernels in blister stage	1660
Kernels in dough stage	1925
Kernels denting	2190
Kernels dented	2450
Physiological maturity	2700
Source: Neild, R.E. and Newman, J.E. NCH-40 Growing season characteristics and requirements in the corn belt. The National Corn Handbook. Purdue University.	

Figure 2. Husk covered ear (L) and drooping, open husk (R).

Field Drying and Combine Losses

Field losses can increase as drydown occurs in the field. Combine losses are least when corn is at 26% moisture and increases as the grain dries. Losses may be as high as 10 to 15% when grain is harvested at 15% moisture. When corn moisture is low, ears may fall to the ground prior to making it into the combine or losses can occur from corn shelling in the header area. Combine condition and proper adjustments can greatly influence harvest efficiency. Always refer to the manufacturer's manual before performing any maintenance.

In the southern regions, it is recommended to begin harvest as corn fields drydown to 18 to 20% moisture content. Harvest date may vary depending on the environmental conditions and the potential for fungal, insect, or wildlife damage.

Sources

[1] Willcutt, H. Harvesting, drying and storing corn. Pub 2285. Mississippi State University. http://msucares.com/

[2] Geyer, A. and Thomison, P. 2006. Corn drydown. C.O.R.N. Newsletter 2006-28. The Ohio State University.

[3] Nielsen, R.L. 2011. Field drydown of mature corn grain. Corny News Network. Purdue University. http://www.agry.purdue.edu/