



Zach Fore
DuPont Pioneer
Field Agronomist

Corn Dry Down Rates

Grain moisture content at harvest affects drying costs and harvest efficiency. Kernel moisture content decreases as the kernel develops through the blister stage (~ 85% moisture), milk stage (~ 80% moisture), dough stage (~ 70% moisture), dent stage (~ 55% moisture), and finally physiological maturity (~ 30% moisture). Prior to physiological maturity, decreases in kernel moisture occur from a combination of actual water loss (evaporation) from the kernel plus the continued accumulation of kernel dry matter through the grain filling process. After physiological maturity, percent kernel moisture continues to decrease due to direct water loss from the kernel.

Here are a few key points to keep in mind regarding corn grain dry down rates:

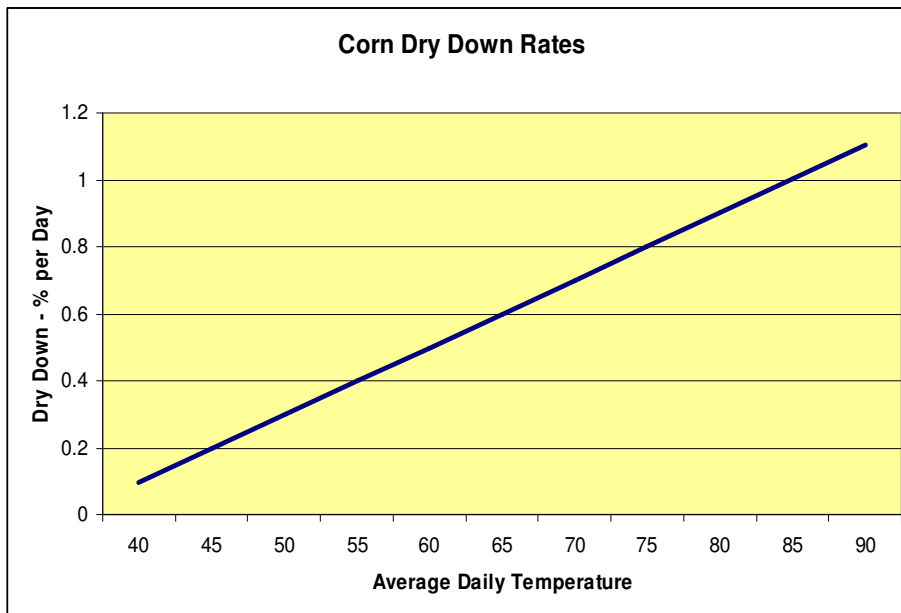
- Weather conditions (temperature, wind, and relative humidity) are the major influence on in-field grain dry down.
- Plant characteristics can also influence in-field grain dry down.
- Early grain maturation usually means faster in-field grain dry down.
- Later grain maturation usually means slower in-field grain dry down.

Weather & Timing of Grain Maturation

Corn grain dry down rates are primarily influenced by temperature. Research in Indiana determined the dry down rate as affected by temperature to be characterized by this formula:

$$\text{Dry down rate} = (\text{Average Daily Temperature} \times 0.0202) - 0.7133$$

The following graph shows dry down rates as affected by temperature. As the chart at left indicates, at an average daily temperature of 85 F corn grain would dry down about 1% per day. At an average daily temperature of 60 F corn grain would dry down about 0.5% per day. Factors such as wind and relative humidity will affect these dry down rates – dry down rates at a given temperature will be greater under windy, low humidity conditions.

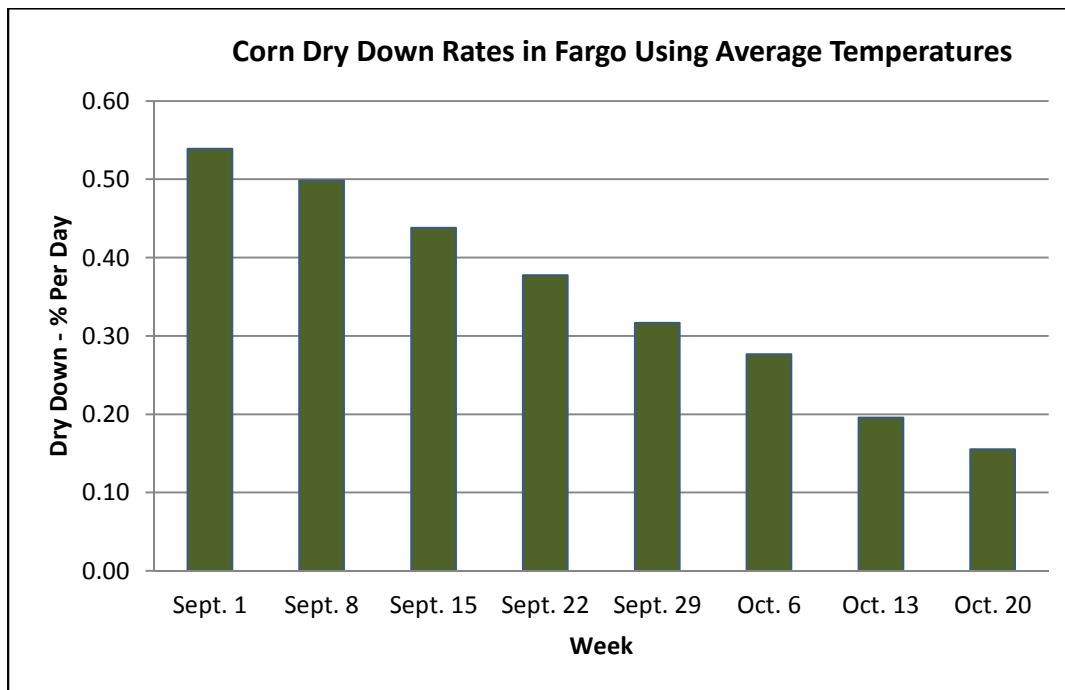


Dry Down Rates at Fargo, ND

Temperature and humidity vary by location, so dry down rates will also vary by location. Here is an example using Fargo, ND as the location. The table at right shows average weekly temperatures for September and October in Fargo, ND.

Average Temperatures Fargo	
Week of:	Weekly Average Temp
1-Sep	62
8-Sep	60
15-Sep	57
22-Sep	54
1-Oct	51
8-Oct	49
15-Oct	45
22-Oct	43

These average temperatures would result in the estimated corn grain dry down rates after physiological maturity of about 14 points in Sept. and about 7 points in Oct. Daily dry down rates for Fargo are given in the following graph:



Hybrid Variability for Field Drying

The seed industry uses grain moisture content data to assign relative hybrid maturity ratings on the basis of relative moisture differences among hybrids at harvest. Two hybrids that differ by one "day" of relative maturity will typically vary by about one half percentage point of grain moisture content (an average daily loss of moisture) if planted and harvested on the same days. Recognize that relative hybrid maturity ratings are most consistent within, but not between, seed companies. When weather conditions are not favorable for rapid grain dry down, then hybrid characteristics that influence the rate of grain drying become more important. Researchers have identified the following traits or characteristics as ones most likely to influence grain drying in the field. The relative importance of each trait varies throughout the duration of the field dry down process and is most influential when weather conditions are not conducive for rapid grain drying.

- **Husk Leaf Number.** The fewer the number of husk leaves, the more rapid the grain moisture loss. In fact, modern hybrids have fewer husk leaves than those commonly grown years ago.
- **Husk Leaf Thickness.** The thinner the husk leaves, the more rapid the grain moisture loss.
- **Husk Leaf Senescence.** The sooner the husk leaves senesce (die), the more rapid the grain moisture loss.
- **Husk Coverage of the Ear.** The less the husk covers the tip of the ear, the more rapid the grain moisture loss.
- **Husk Tightness.** The looser the husk covers the ear, the more rapid the grain moisture loss.
- **Ear Declination.** The sooner the ears drop from an upright position after grain maturation to a downward position, the more rapid the grain moisture loss. In particular, husks of upright ears can "capture" rainfall.
- **Kernel Pericarp Characteristics.** The pericarp is the outermost layer of a corn kernel (botanically; the ovary wall). Thinner or simply more permeable pericarp layers have been associated with faster drying rates in the field.

Source: Some information in this article was obtained from: 'Field Drydown of Mature Corn Grain', Dr. R.L. Nielson, Purdue University, Aug. 15, 2005. URL: <http://www.kingcorn.org/news/articles.05/GrainDrying-0815.html>

The DuPont Oval Logo is a registered trademark of DuPont. PIONEER® brand products are provided subject to the terms and conditions of purchase which are part of the labeling and purchase documents. ®,™,SM Trademarks and service marks of Pioneer. © 2013 PHIL.