Grain Drydown in the Field After Maturation

R.L. (Bob) Nielsen  
Agronomy Dept., Purdue Univ.  
West Lafayette, IN 47907-1150  
Email address: rnielsen@purdue.edu

- Early grain maturation usually means faster in-field grain drydown.
- Later grain maturation usually means slower in-field grain drydown.

The delayed planting of the 2002 Indiana corn crop is, as expected, resulting in a crop that is maturing later than average (Indiana Ag. Statistics Service, 2002). Besides the obvious ramification of a later harvest for late-planted fields, the rate of grain drydown in those fields will likely also be slower simply because it will be occurring in a time frame that is relatively cool compared to that of earlier-maturing corn.

On the other hand, some drought-stressed fields of corn have shut down prematurely as the effects of the lengthy drought period finally overwhelm the crop’s ability to mature normally. Grain drydown in these fields has occurred more rapidly during the recent warmer than normal days of early September.

Grain moisture content continually decreases as the kernel develops (blister stage ~ 85% moisture, milk stage ~ 80%, dough stage ~ 70%, dent stage ~ 55%, physiological maturity ~ 30%). Loss of grain moisture occurs partially through the plant (cob and ear shank), partially through the husk leaves and partially through the exposed end of the ear.

Hybrid variability for the rate of grain moisture loss during post-maturity drydown and the resulting grain moisture content at harvest are of great interest to grower and seed industry alike. Growers desire hybrids with superior yielding ability (maximum gross income) that also dry very quickly in the fall (minimum drying or grain shrinkage costs). For an excellent discussion on grain weight shrinkage, see Hicks and Cloud (1991).

The seed industry also uses grain moisture loss data to rate hybrids for relative maturity. Many seed companies assign relative hybrid maturity ratings on the basis of relative harvest moisture differences among a group of hybrids. Two hybrids that differ in one 'day' of relative maturity will typically vary by about one half percentage point of grain moisture content if planted and harvested on the same days. Relative hybrid maturity ratings are most consistent within, not among, seed companies.

Certain hybrid characteristics interact to influence grain moisture loss rates. The relative importance of each trait varies throughout the duration of the field drydown process.
• Husk Leaf Number. The fewer the number of husk leaves, the more rapid the grain moisture loss.
• 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.
• Cob Diameter. The narrower the cob diameter, the more rapid the grain moisture loss.
• Kernel Pericarp Thickness. The thinner the pericarp, the more rapid the grain moisture loss.

Grain moisture loss in the field occurs at a nearly linear rate within a range of grain moisture content beginning at about 40 percent and ending at 15 to 20 percent, then tapers off to little or no additional moisture loss after that. Figure 1 illustrates changes in grain moisture content over time for an adapted medium maturity hybrid grown in Indiana in 1992 (unusually cool fall) and 1994 (more typical fall temperatures).

As you might expect, the exact rates of grain moisture loss in the field are closely related to air temperature during the dry down period. The warmer the drydown period, the faster the grain will dry. In fact, there is a close relationship between the average rates of grain moisture loss per day and the average daily heat unit accumulation during grain drydown (Fig. 2).

Bear in mind that grain moisture loss for any particular day may be quite high or low depending on the exact temperature, humidity, sunshine, or rain conditions that day. It is not unheard of for grain moisture to decline more than one percentage point per day for a period of days when conditions are warm, sunny and dry. By the same token, there may be zero drydown on cool, rainy days.

Since heat unit accumulations are closely related to calendar date, there is also a close relationship between the average rates of grain moisture loss per day during the drydown period and the date when the grain nears physiological maturity (approximately 30% moisture content). Average daily drydown rates will range from about 0.8 percentage point per day for grain that nears maturity in late August to about 0.4 percentage point per day for grain that nears maturity in mid- to late September (Fig 3).

Given the range of corn planting dates and crop stresses throughout Indiana in 2002, grain drydown rates this fall will likely vary dramatically from field to field or region to region. The temptation to harvest late maturing fields as late as possible to maximize the
amount of in-field grain drying should be avoided this year because of the risk of developing stalk rots and the consequent stalk lodging that could occur in stressed fields.

**Related Articles:**

Hicks, D. and H. Cloud. 1991. Calculating Grain Weight Shrinkage in Corn Due to Mechanical Drying. NCH-61. [http://www.agcom.purdue.edu/AgCom/Pubs/NCH/NCH-61.html](http://www.agcom.purdue.edu/AgCom/Pubs/NCH/NCH-61.html) [URL Verified 9/11/02].


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