

Development of Growth Model and Grain Dry Down for Corn in North Dakota, 2007

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We have several good models available to us for the growth and development of several crops as well as for many crop diseases and pests. However, we do not have a good model for corn development and dry down in North Dakota. This study is one site in a larger effort to generate data in North Dakota to develop a good model for corn development and grain dry down. The study was conducted at the Carrington Research Extension Center, Carrington, ND. The soil was a Heimdal-Emerick loam with 3.1 % organic matter and 6.8 pH, with spring wheat as the previous crop. The study was composed of six hybrids consisting of three maturity groupings (two hybrids per maturity group): Early 80-81 day Relative Maturity (RM), Mid 84-85 day RM and Late 89-90 day RM. The trial was planted May 5 and plant growth stage was recorded approximately every other day until pollination had occurred. The center two rows of the six-row plots were harvested for yield. The two rows adjacent to the center two rows were sampled weekly beginning September 7 until harvest to determine grain moisture content and dry down over time. The trial was harvested October 25.

Maturity had a significant impact on all parameters measured. As one would expect, the Late hybrids had a significantly higher yield and consistently higher grain moisture content each week during the eight-week dry down period than the Early and Mid hybrids. The Early and Mid hybrids yielded similarly and had similar dry down as well (Table 1). The grain picked up moisture on the October 12 and October 19 harvests due to rainfall that fell during the period between October 5 and October 19.

Table 1. Effect of maturity on corn yield, TW, and grain dry down.

Maturity	RM days	TW lb/bu	Yield bu/acre	Grain Dry Down (% Moisture)							
				7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	25-Oct
Early	80-81	58	132	49.1	43.9	34.9	26.5	19.6	25	24.3	19.1
Mid	84-85	59.1	131	52.2	45.2	34.9	25.4	22.5	26.1	28	21.4
Late	89-91	57.6	145	47.1	46.4	40.9	30.1	27	30.5	32	27
Mean		58.2	136	49.5	45.1	36.9	27.3	23	27.2	28.1	22.5
C.V.%		2.8	6.7	9.5	9.4	8.2	8.9	9	11.9	11.9	14.9
LSD _{0.05}		2	11.4	2.5	4.3	2.8	2.5	3	4.2	4.2	4.2

Hybrid also had a significant impact on yield, TW, and dry down. As you can see in Table 2, there are better performing hybrids in each maturity group. DKC40-08 had a significantly higher yield than DKC29-97, PH39H83 and PH39D80. Also, DKC29-97, DKC35-18, and PH38G16 had a significantly higher yield than PH39H83 and PH39D80. For TW DKC29-97, DKC35-18, PH39D80 and PH38G16 had a significantly higher TW than DKC40-08. Among hybrids there were a lot of individual differences across dates for dry down. However, the overall trend was for the Late hybrids to be wetter across all dates than the Mid hybrids which in turn were wetter than the Early hybrids.

Table 2. Effect of hybrid on corn yield, TW, and grain dry down.

Hybrid	Maturity	RM	TW	Yield	Grain Dry Down (% Moisture)							
					days	lb/bu	bu/acre	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct
DKC29-97	Early	80	59	137.3	45.9	44.1	34.7	26.1	17.4	25.7	23.2	19
PH39H83	Early	81	57	126.6	52.3	43.6	35.1	26.9	21.7	24.2	25.3	19.2
DKC35-18	Mid	85	59	141.2	47.3	45.3	33.3	25.9	24	22.8	31	22.5
PH39D80	Mid	84	59	120.8	46.9	45.1	36.4	24.8	20.9	29.3	25.1	20.4
DKC40-08	Late	90	56	147.5	57.4	48	45	33.3	28.2	31.4	34.7	26.8
PH38G16	Late	89	59	142.4	46.9	44.7	36.7	26.9	25.8	29.5	29.3	27.2
Mean			58	136	49.5	45.1	36.9	27.3	23	27.2	28.1	22.5
C.V.%			2.3	3.6	4.9	5.2	1.4	2.4	2.3	7.5	7.5	16.5
LSD _{0.05}			2.4	8.9	4.5	3.5	0.7	1	1.1	3.8	3.8	6.8

This year, which was an unusual year, with the lack of a killing frost until the end of October, allowed the late hybrids to mature. However, the lack of a normal killing frost and precipitation during the dry-down period delayed grain dry down to an extent. The hybrids DKC29-97, PH39H83, and PH39D80 achieved favorable moistures for combining on the October 5 harvest date. It wasn't until the October 25 date when the all the Early and Mid hybrids achieved favorable moistures for combining, which greatly reduced drying costs. The Late hybrids did not reach favorable moistures of approximately 20% for combining during the entire dry-down period and therefore, will incur a higher drying cost than the other hybrids.