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

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Several good models are available to project the growth and development of several crops as well as for many crop diseases and pests. However, a good model for corn development and dry down in North Dakota does not exist. This study is one site within a larger project to generate data in North Dakota to develop a 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 Emrick loam with 3.1% organic matter, pH of 6.5 and spring wheat as the previous crop. The study was composed of six hybrids of three maturity groupings (two hybrids per maturity group): 'Early', 79-day Relative Maturity (RM); 'Mid', 82-85 day RM; and 'Late', 88-93 day RM. The trial was planted May 5 and plant growth stage was recorded approximately every other day until pollination 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 29 until harvest to determine grain moisture content and dry down over time. The trial was harvested November 19.

The data reported here will focus on the dry down phase of corn plant development. Hybrid maturity had an impact on all parameters measured. As one may expect, the 'Late' hybrids expressed a significantly higher grain moisture content as compared to the 'Early' and 'Mid' hybrids throughout the eight-week dry-down period except at harvest. The 'Early' and 'Mid' hybrids generally had similar moisture contents during the dry-down period. There were no significant differences in yield among maturity groups (Table 1). All corn hybrids picked up moisture on the Nov. 7 and Nov. 14 sample dates due to precipitation and relative humidity during the period between Oct. 31 and Nov. 14.

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

Maturity	Relative Maturity	Test Weight	Yield	Dry Down (% Moisture)								
	days	lb/bu	bu/acre	29-Sep	3-Oct	10-Oct	17-Oct	24-Oct	31-Oct	7-Nov	14-Nov	19-Nov
Early	79	56.2	100.3	39.5	34.7	34.6	32.9	27.5	20.3	24.2	26	24.7
Mid	82-85	54.3	92.6	40.6	33	31.4	29.8	22.7	18.7	24.1	25.8	25.1
Late	88-93	50.7	106.4	48.8	40.1	43.9	41.4	38.5	30.3	34	35.1	32.2
Mean		53.7	99.8	43	35.9	36.6	34.7	29.6	23.1	27.4	28.9	27.3
C.V.		2.5	14.4	6	4.8	7.3	9	7.4	12.1	8.1	9.5	17.2
$LSD_{0.05}$		2.2	NS	3.2	2.1	3.3	3.9	2.7	3.5	2.8	3.4	7.7

Planting Date = May 9; Harvest Date = November 19; Previous Crop = Spring Wheat

Data from previous years support the trend for higher grain moisture content in the 'Late' hybrids compared to 'Early' and 'Mid' hybrids across the dry-down sampling period. Yields in previous years with more favorable growing seasons for corn production have shown a trend of increasing yield with increasing maturity. However, one must consider yield as well as rate of grain dry down when selecting hybrids to determine the most economically advantageous hybrids for your farm. Further research and interpretation will review hybrid relative maturity impact on other phases of crop development in addition to dry down.

Corn harvest from the growth model and grain dry down trial.