IMPACTS OF THE 2004 GROWING SEASON ON SILAGE QUALITY

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Most farmers and agronomists were happy to put the 2004 growing season behind them! The season can best be characterized as wet during May and June, cool during July and August, and ideal during September. Spring planting conditions were good through early May after which conditions were cooler and wetter than the 30-yr average. The north and eastern areas of Wisconsin had record rainfall during May and early June often delaying planting. Many acres in eastern Wisconsin were not planted until July. Accumulation of growing degree units was below average. Plant emergence and stands were above average. Insect and disease pressure was not significant. Corn development was behind average due to cool growing conditions, but development caught up somewhat during September. A killing frost did not occur until early-October, but in some areas light frost occurred in late August. Both corn silage and grain harvest were delayed due to slow development caused by cool temperatures during the growing season.

Yields in the UW corn silage trials were quite variable by location, but in general performed better than the 10-yr average (Table 1). Yields were above average in southwestern Wisconsin, with Lancaster the highest yielding site. The plots at Fond du Lac were variable due to wet field conditions after planting. Valders was 28% above its 10-yr average. *In vitro* dry matter digestibility and NDFD (neutral detergent fiber digestibility) was typical of previous UW trials (Lauer et al., 2004), although much variability occurred between sites with northeastern Wisconsin sites tending to have higher quality values.

Table 1. Summary of the 2004 UW corn hybrid performance trials for silage yield (T/A) conducted at nine locations in Wisconsin. N = number of hybrids tested.

	1994-2003		2004		
Location	N	Yield	N	Yield	Percent yield change
Arlington	491	9.4	52	9.7	2
Lancaster	491	7.9	52	10.1	27
Fond du Lac	476	8.5	57	7.7	-10
Galesville	477	8.6	61	9.1	6
Chippewa Falls	104	7.5	51	8.1	8
Marshfield	486	6.8	52	7.1	5
Valders	491	6.6	52	8.5	28
Rhinelander	42	6.3	27	6.4	2
Spooner	84	6.6	54	7.9	19

Data collected during 2004 from the Arlington and Marshfield Agricultural Research Stations show that by the end of May accumulated precipitation was above the 30-yr average (Figure 1). By the first part of September total precipitation was equal to the 30-yr average. No days at either location had maximum temperatures above 90F, and rarely were daily maximum temperatures above the 30-yr average. Growing degree units (GDUs) begin to lag

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behind the 30-yr average by early June. Towards the end of August a scare occurred when the minimum temperature was 35 F on August 21.

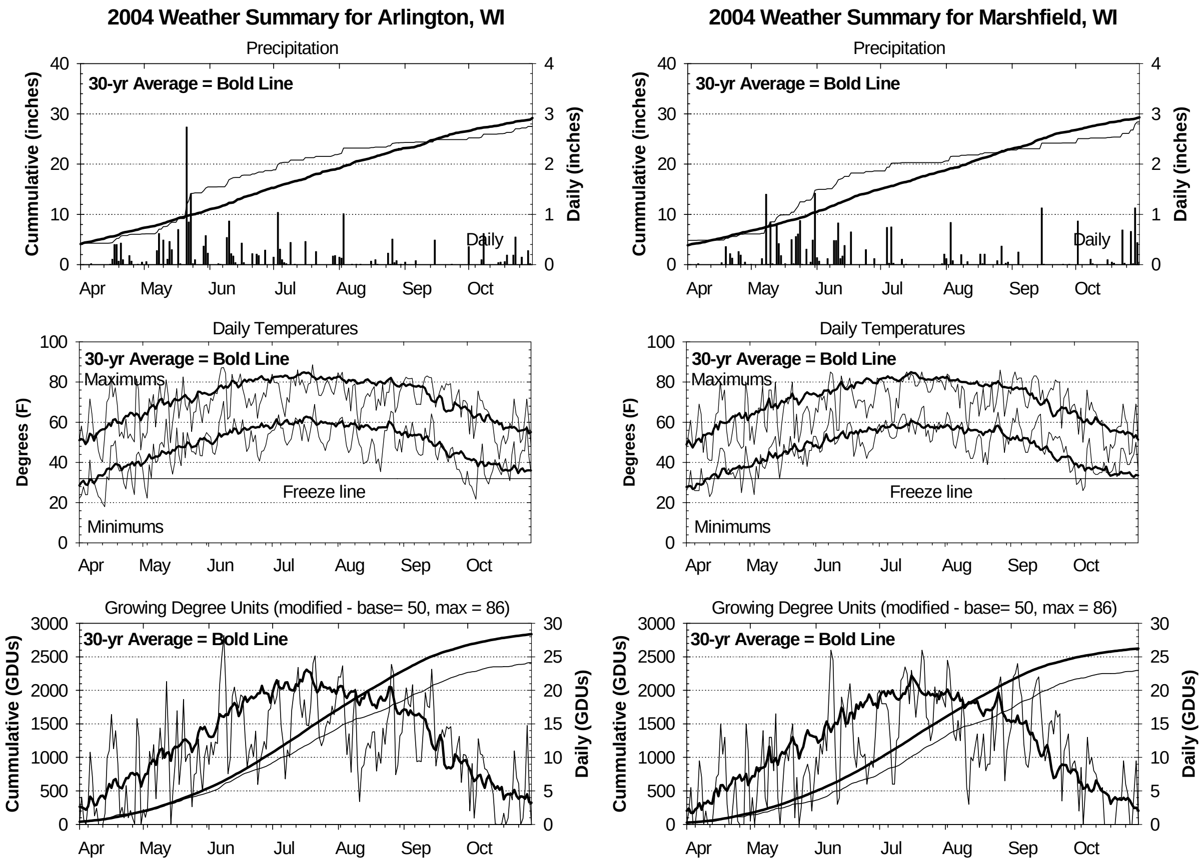

Figure 1. Precipitation, Daily Temperatures and Growing Degree Unit (GDU) accumulation between April and October during 2004 at Arlington and Marshfield, WI. Weather data were obtained from Bill Bland (AWON, UW-Soils), Mike Bertram (UW-ARS) and the Midwest Region Climatological Center.

Corn forage is unique among forages. Like most other forages, optimum quality occurs just prior to flowering (Figure 2E). Like other forages, quality decreases as harvest is delayed after flowering due to decreasing stover digestibility (Figure 2C). Unlike other forages, as corn nears maturity, quality improves due to greater starch content in corn grain (Figure 2D). By maturity forage yield (Figure 2A), milk per ton (Figure 2E), and milk per acre (Figure 2F) are maximized. Harvest timing is dependent upon optimum moisture content (Figure 2B) for the storage structures.

Table 2 describes what is known in the literature for the response of corn silage to climatic effects and cultural practices. Temperature effects at different growth stages under well watered conditions have shown that high temperatures before tassel emergence increase forage yield, but later during grain filling greatly influences the rate of dry matter production. Higher temperatures tend to reduce digestibility due to increased cell wall content and decreased cell wall digestibility of the stover. Greater light intensity has the same effect on forage yield, particularly the grain fraction, and also the nutritive value of the stover by decreasing sell wall contents.

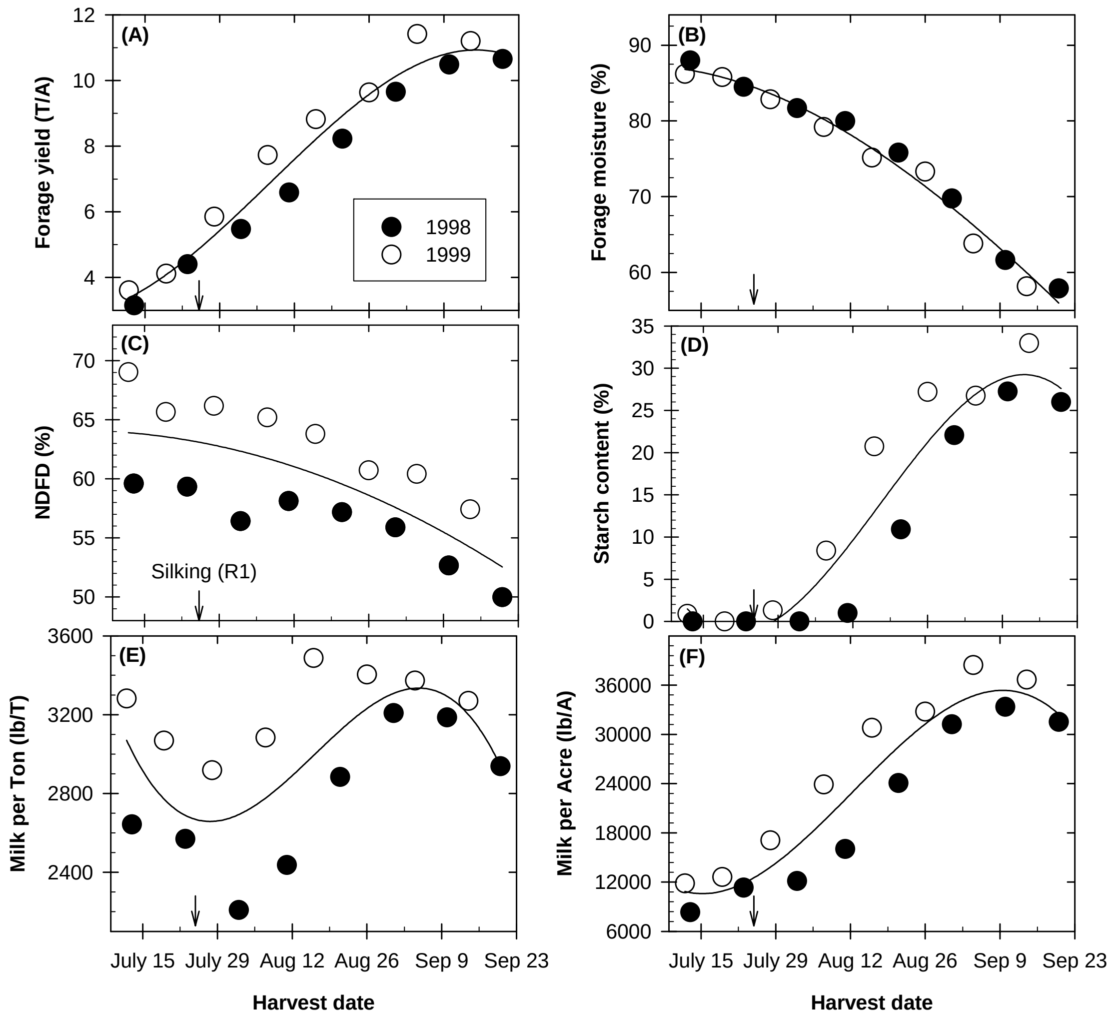

Figure 2. Forage yield, moisture, NDFD, starch content, milk per ton, and milk per acre of corn harvested at Arlington during 1998 and 1999. The arrow indicates the average silking date of July 25. Derived from Darby and Lauer (2002).

These developmental relationships are important as we attempt to describe the impact of the 2004 growing season on corn silage quality. The dominant climatic effect and cultural practice change during 2004 were cooler temperatures and delayed planting. Both decrease corn silage yield. But, little effect on silage yield was observed this year in the UW corn trials (Table 1) because sites were planted early. Only the Fond du Lac site was impacted and that was due to soil water ponding. Most farmers would have seen reduced forage yield given these conditions.

Delayed planting can increase or decrease NDFD (Table 2). Cooler temperatures improve NDFD. At silking, NDFD is greatest, and decreases as the crop approaches maturity (Figure 2C). Many fields in Wisconsin had delayed planting dates and when combined with cooler temperatures effectively delayed development with harvest “earlier” developmentally resulting in higher NDFD, especially in northeastern Wisconsin.

Table 2. The yield and quality response of silage corn to climatic effects and cultural practices.

Factor	Forage yield	Dry matter digestibility	NDF	NDFD
Increasing temperature	+	-	+	-
Increasing light intensity	+	+	-	±
Increasing stand density	+	-	+	±
Delayed planting date	-	-	+	±
Delayed harvest date	-	-	+	-
Increasing N rate	+	-	+	±

Source: (Struik, 1983) and (Deinum and Struik, 1989) as modified by (Coors and Lauer, 2001).

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