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Silage Corn Performance, 2003; Cache and Davis Counties, Utah

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This report summarizes performance of irrigated silage corn hybrids on farms in Cache and Davis counties in 2003. Sites were at 4236-4430 ft elevation and had long-term averages of 2880-3300 corn growing degree days (GDD, 50/86° F) per year (Tables 1-2). Hybrids from breeding programs and seed marketers were seeded with farm planters on May 7-19 at a target rate of 32,000 seeds/ac. Furrow-irrigated plots were six rows wide at 30-in row spacing by 970-1245 ft long in two (Davis) or three (Cache) randomized complete blocks. Nutrient and pesticide applications and previous crops are indicated in Tables 1-2. Soil fertility levels were within recommended ranges.



Hybrids had relative maturity (RM) ratings of 103-120 days and included some with Roundup Ready[®], Bt, and leafy (Hyland and Wolf River Valley) traits. Plots were harvested with silage choppers on September 5-23 to target whole-plant

moisture concentrations of 65-70%. Weights were obtained with trucks and commercial scales. Samples were dried at 55°

C (131° F) for forage quality determinations and at 105° C (221° F) for dry matter (DM) determination. Plot weights were expressed as tons/ac of oven-dry and 70%-moisture silage. Forage crude protein (CP) and starch concentrations were determined via near-infrared reflectance spectroscopy (NIRS). Neutral detergent fiber (NDF), in vitro true DM digestibility (IVTDMD), and neutral detergent fiber digestibility (NDFD) levels were determined via wet chemistry procedures including fermentation in rumen fluid. The University of Wisconsin MILK2000 spreadsheet (www.wisc.edu/dysci/uwex/nutritn/nutritn.htm) was used to calculate energy and potential milk production levels from forage quality constituents for two replicates of each hybrid.

Hybrids ranked in decreasing order of forage production and quality (Tables 1-2) may be compared in terms of the least significant difference (LSD). This is the minimum difference required between entries in a column for significance at a given level of confidence. Values of LSD are shown for 5 and 30% probabilities that observed differences among entries are merely due to chance, rather than to variety effects. For example, in Table 1a, DM yields of the top seven hybrids are not different at the 5% probability level, because they vary by less than the LSD of 0.72 ton/ac. Yields of the first- and eighth-ranked hybrids are different at the 5% level because they vary by more than the LSD. At 30% probability that yield variations are due to chance, smaller differences become significant. The coefficient of variation (CV) describes variability among replications of the same hybrid; values below 10% suggest good precision for detecting entry differences.

Forage production at 70% moisture differed by 4.2-5.5 tons/ac among hybrids, depending on location. Differences were not strongly associated with varying population densities and RM ratings. In a few cases, harvest moisture concentrations exceeded 70%, which can lead to energy loss via seepage of soluble dry matter and impaired silage fermentation. Moisture concentrations were otherwise appropriate for excellent silage fermentation. Excessive moisture at harvest can be avoided by selecting hybrids that perform well at shorter RM ratings and permit adequate grain filling and field drying prior to harvest.

Although forage quality often did not differ among hybrids at Benson, quality rankings were different than those for forage production. At Hooper, hybrids that were highest-ranked for TDN had some combination of low NDF, high NDF digestibility, and high starch, which all contribute to energy density. Differences in rankings for DM production and nutritional value point to the need to clearly define end-use requirements that hybrids should fulfill.

Table 1a. 2003 silage corn production at Benson (Cache Co.), UT (John & Bart Allen).

Planted May 19, harvested Sept. 23. Elevation 4430 ft, 2880 corn GDD, Kidman fine sandy loam. Applications: 100 lb N/ac and heavy manure; Steadfast® and Distinct® herbicides; and Lorsban™ granular insecticide at planting. Previous crop: corn.

Brand	Hybrid	Relative maturity	Population density	Silage moisture	Silage yield	
					DM (105 C)	70% moist.
		days	plants/ac	% fresh wt.	ton/ac	
HYTEST	HT7615RR	109	30513	69.9	8.21	27.36
Grand Valley	SX 1445	115	30978	73.1	8.13	27.10
Grand Valley	SX 8709	109	30668	70.8	7.98	26.62
DEKALB	C60-09	110	32372	70.3	7.76	25.88
Croplan Genetics	721	113	28887	71.5	7.74	25.81
Hyland	HL S067	108	30358	68.0	7.71	25.70
Croplan Genetics	DS107RR	105	31442	72.9	7.59	25.29
HYTEST	TNT-106RR	106	24550	71.7	7.46	24.88
Wolf River Valley	2103L	103	29196	65.4	7.40	24.65
DEKALB	C57-84	107	29119	67.4	7.39	24.63
Asgrow	RX741RR	111	30978	72.5	7.38	24.60
DEKALB	C60-17	110	31752	64.9	7.23	24.08
Grand Valley	GVX8959RR	104	29739	66.1	6.97	23.24
Hyland	HL S058	105	27416	71.5	6.96	23.21
Mean		108	29855	69.7	7.56	25.22
Significance of F test (P)			0.16 ^a	<0.01	0.02	0.02
LSD (0.05)			NS ^a	1.9	0.72	2.39
LSD (0.30)			NS	1.0	0.37	1.23
CV (%)			9.3	1.6	5.7	5.6

^aNo significant differences among hybrids.

Table 1b. 2003 silage corn forage quality at Benson, UT, ranked by TDN.

Brand	Hybrid	NDFD ^a				TDN, 1x	MILK2000 outputs ^b		
		CP	NDF	48 hr	Starch		NEL, 3x	Milk per	
		% DM	% NDF	% DM	% DM	Mcal/lb	Ton DM	ac	
DEKALB	C57-84	8.7	42.8	58.8	35.0	70.8	0.74	3502	25285
Croplan Genetics	721	8.5	50.6	65.2	28.0	70.6	0.73	3540	26310
DEKALB	C60-09	8.6	44.1	59.0	34.2	70.6	0.73	3486	26778
DEKALB	C60-17	8.0	42.8	58.8	37.0	70.2	0.73	3456	25166
HYTEST	TNT-106RR	8.6	49.0	63.5	27.8	70.2	0.73	3504	26293
Asgrow	RX741RR	10.0	47.7	61.0	31.8	70.0	0.73	3462	25004
Hyland	HL S058	8.9	51.5	64.2	25.8	69.8	0.72	3471	22888
Croplan Genetics	DS107RR	7.9	53.2	64.4	25.3	69.6	0.72	3459	24752
Grand Valley	GVX8959RR	8.1	47.6	60.4	35.2	69.6	0.72	3428	23314
Wolf River Valley	2103L	8.3	49.2	62.0	31.6	69.6	0.72	3438	25402
Hyland	HL S067	8.4	49.9	60.6	29.4	68.6	0.71	3356	26282
Grand Valley	SX 1445	8.3	49.0	58.4	28.0	68.0	0.70	3298	26287
HYTEST	HT7615RR	8.1	48.4	55.6	30.8	67.7	0.70	3248	26173
Grand Valley	SX 8709	8.8	53.2	59.2	28.4	67.2	0.70	3242	24910
Mean		8.5	48.5	60.8	30.6	69.5	0.72	3421	25346
Significance of F test (P)		0.22 ^c	0.04	0.12	<0.01	0.39	0.50	0.39	0.60
LSD (0.05)		NS ^c	6.2	NS	3.5	NS	NS	NS	NS
LSD (0.30)		NS	3.1	NS	1.7	NS	NS	NS	NS
CV (%)		7.0	5.9	4.6	5.2	2.2	2.4	3.7	6.9

^aNDFD=neutral detergent fiber digestibility in rumen fluid, expressed as a percentage of fiber.

^bTDN=Total Digestible Nutrients at 1x maintenance level of intake; NEL=net energy for lactation at 3x maintenance intake (DM basis). Both are calculated from summation of digestibilities of individual constituents.

^cNo significant differences among hybrids.

Table 2a. 2003 silage corn production near Hooper (Davis Co.), UT (Kurt Fowers).

Planted May 7, harvested Sept. 5. Elevation 4236 ft, 3300 corn GDD, Warm Springs fine sandy loam.

Applications: 177 lb N/ac; Frontier[®] herbicide; and Isotox[®] Seed Treater F. Previous crop: corn.

Brand	Hybrid	Relative maturity	Population density	Silage moisture	Silage yield	
					DM (105 C)	70% moist.
		days	plants/ac	% fresh wt.	ton/ac	
Grand Valley	SX 1602	119	33334	76.5	9.54	31.79
DEKALB	C62-15	112	31500	71.7	9.16	30.51
Croplan Genetics	827RR	120	33584	78.0	9.01	30.02
DEKALB	C61-42	111	33500	75.1	8.97	29.92
Grand Valley	SX 1550	118	33084	74.8	8.90	29.66
DEKALB	C69-72	119	32666	74.7	8.88	29.59
HYTEST	HT7727CRW/RR2	112	33583	74.1	8.75	29.17
Croplan Genetics	721	113	31750	73.6	8.63	28.75
DEKALB	C64-10(RR)	114	33000	74.6	8.59	28.61
Hyland	HL S075	112	32334	75.4	8.57	28.54
DEKALB	641	114	--	74.4	8.54	28.44
Asgrow	RX718RR/YG	110	33250	72.2	8.50	28.33
DEKALB	C66-80	116	32166	78.0	7.97	26.54
HYTEST	HT7815RR	118	32916	78.7	7.89	26.29
Mean		115	32807	75.1	8.69	28.97
Significance of F test (P)			0.51 ^a	<0.01	0.17	0.17
LSD (0.05)			NS ^a	1.9	NS	NS
LSD (0.30)			NS	0.9	NS	NS
CV (%)			2.9	1.1	5.3	5.3

^aNo significant differences among hybrids.

Table 2b. 2003 silage corn forage quality near Hooper, UT, ranked by TDN.

Brand	Hybrid	MILK2000 outputs ^b							
		CP	NDF	NDFD ^a	Starch	TDN, 1x	NEL, 3x	Milk per	
		% DM	% DM	48 hr	% DM	mtnce.	mtnce.	Ton	ac
							Mcal/lb	DM	lb
DEKALB	C64-10(RR)	8.2	47.3	65.0	30.6	71.4	0.74	3593	30956
Croplan Genetics	721	8.3	46.3	63.8	31.4	71.1	0.74	3565	30767
Asgrow	RX718RR/YG	7.3	45.8	62.5	31.1	70.7	0.73	3527	29973
DEKALB	C62-15	8.1	51.2	67.1	28.6	70.4	0.73	3541	32413
Grand Valley	SX 1550	7.5	52.1	65.0	28.2	69.8	0.72	3482	30974
DEKALB	C61-42	8.7	46.1	60.9	33.3	69.7	0.72	3440	31015
HYTEST	HT7727CRW/RR2	7.5	46.2	61.1	31.2	69.7	0.72	3440	30089
Hyland	HL S075	8.0	53.0	62.8	22.4	67.7	0.70	3312	28367
Grand Valley	SX 1602	7.9	52.3	61.8	26.8	67.4	0.70	3284	31326
DEKALB	C66-80	8.8	55.3	60.7	22.2	65.3	0.67	3120	24853
DEKALB	C69-72	7.7	53.5	58.0	23.4	65.2	0.67	3092	27466
HYTEST	HT7815RR	8.3	53.9	59.4	22.9	64.7	0.67	3068	24200
Croplan Genetics	827RR	7.1	56.3	60.4	21.4	64.6	0.67	3069	27619
Mean		7.9	50.9	62.3	26.9	68.2	0.70	3346	29151
Significance of F test (P)		0.07	0.01	0.05	<0.01	<0.01	<0.01	<0.01	0.07
LSD (0.05)		1.0	5.6	4.8	4.7	3.4	0.04	280	5021
LSD (0.30)		0.5	2.8	2.4	2.3	1.7	0.02	139	2482
CV (%)		5.5	4.9	3.4	7.8	2.2	2.5	3.7	7.7

^aNDFD=neutral detergent fiber digestibility in rumen fluid, expressed as a percentage of fiber.

^bTDN=Total Digestible Nutrients at 1x maintenance level of intake; NEL=net energy for lactation at 3x maintenance intake (DM basis). Both are calculated from summation of digestibilities of individual constituents.

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