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Silage Corn Performance, 2002; Cache, Davis, and Utah Counties, Utah

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This report summarizes performance of irrigated silage corn hybrids on farms in Cache, Davis, and Utah counties in 2002. Sites were at 4236-4500 ft elevation and had long-term averages of 2880-3350 corn growing degree days (GDD, 50/86° F) per year (Tables 1-3). Hybrids from breeding programs and seed marketers were seeded with farm planters on May 6-15 at target rates of 32,000-35,000 seeds/ac. Furrow-irrigated plots were four-to-six rows wide at 30-in row spacing by 570-1240 ft long in three randomized complete blocks. Nutrient and pesticide applications and previous crops are indicated in Tables 1a-3a. Soil fertility levels were within recommended ranges.

Hybrids had relative maturity (RM) ratings of 105-118 days and included some with Roundup Ready[®], Bt, and imidazolinone herbicide tolerance traits. Plots were harvested with silage choppers on September 25-October 8 to target whole-plant moisture concentrations of 65-70%. Weights were obtained with trucks and commercial scales. The chopper at Lake Shore was equipped with a kernel processor. 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 1-3) 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 2a, DM yields of the top two hybrids are different at the 5% probability level, because they vary by more than the LSD of 0.39 ton/ac. Yields of the second- and third-ranked hybrids are not different at the 5% level because they vary by less 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 5.0-8.8 tons/ac among hybrids, depending on location. Differences were not strongly associated with varying population densities and RM ratings. In many 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 except at Hooper, quality rankings were typically 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. 2002 silage corn production at Benson (Cache Co.), UT (John & Bart Allen).

Planted May 15, harvested Sept. 30. Elevation 4430 ft, 2880 corn GDD, Kidman fine sandy loam.
Applications: 100 lb N/ac and light manure; atrazine herbicide; and Lorsban™ granular insecticide at planting.
Previous crop: alfalfa.

Brand	Hybrid	Relative maturity days	Population density plants/ac	Silage moisture % fresh wt.	Silage yield	
					DM (105 C)	70% moist.
					ton/ac	
DEKALB	DKC59-08	109	42575	70.0	9.98	33.27
Pioneer	33J56	113	41413	73.0	9.94	33.13
Grand Valley	TX1389	115	32643	74.3	9.75	32.50
Asgrow	RX740RR	111	36941	73.3	9.53	31.78
Croplan Genetics	DS107RR	107	38684	75.0	9.44	31.46
Mycogen	TMF108	108	36767	68.7	9.28	30.93
HYTEST	HT7722	113	41820	79.0	9.17	30.57
Mycogen	5481FQ	105	36535	71.7	9.08	30.24
HYTEST	HT7747RR	112	34967	73.7	8.22	27.39
Mean		110	38038	73.2	9.38	31.25
Significance of F test (P)			<0.01	<0.01	0.07	0.07
LSD (0.05)			3139	2.1	1.06	3.55
LSD (0.30)			1586	1.1	0.54	1.79
CV (%)			4.8	1.7	6.6	6.6

Table 1b. 2002 silage corn forage quality at Benson, UT, ranked by TDN.

Brand	Hybrid	CP % DM	NDF % NDF	NDFD ^a 48 hr % NDF	Starch % DM	MILK2000 outputs ^b			
						TDN, 1x mtnce. % DM	NEL, 3x mtnce. Mcal/lb	Milk per Ton DM lb	
DEKALB	DKC59-08	8.4	46.4	60.5	27.4	69.1	0.72	3394	33766
Asgrow	RX740RR	7.5	52.0	60.5	32.1	68.9	0.71	3378	31194
Mycogen	5481FQ	8.3	48.1	59.4	27.4	68.7	0.71	3358	30434
Croplan Genetics	DS107RR	7.9	54.1	62.3	31.4	68.5	0.70	3364	32896
HYTEST	HT7747RR	6.9	51.1	59.2	29.2	68.5	0.71	3344	28173
Mycogen	TMF108	8.0	52.3	60.6	28.0	68.3	0.70	3340	32582
Grand Valley	TX1389	8.6	54.2	60.3	24.2	66.7	0.68	3223	32585
Pioneer	33J56*	7.4	52.5	58.0	25.9	66.1	0.68	3161	28902
HYTEST	HT7722	7.8	56.1	53.1	28.7	61.7	0.63	2796	25434
Mean		7.9	51.9	59.4	28.2	67.4	0.70	3263	30706
Significance of F test (P)		0.08	<0.01	0.60 ^c	0.77	0.19	0.14	0.24	0.31
LSD (0.05)		1.0	2.9	NS ^c	NS	NS	NS	NS	NS
LSD (0.30)		0.5	1.4	NS	NS	NS	NS	NS	NS
CV (%)		5.5	2.3	6.7	16.0	3.5	4.5	6.2	10.2

^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. 2002 silage corn production near Hooper (Davis Co.), UT (Kurt Fowers).

Planted May 9, harvested Sept. 25. 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	
DEKALB	DK679	117	n/a	65.3	10.42	34.75
HYTEST	HT7820	117	n/a	64.9	9.23	30.77
Mycogen	8681FQ	118	n/a	67.0	9.14	30.47
HYTEST	HT7815RR	117	n/a	66.4	8.72	29.05
Asgrow	RX740RR	111	n/a	66.0	8.55	28.50
Mycogen	6481FQ	110	n/a	65.0	8.38	27.93
DEKALB	DKC64-10 (RR)	114	n/a	64.7	8.19	27.30
Croplan Genetics	DS107RR	107	n/a	66.4	7.90	26.33
DEKALB	DKC65-00 (RR)	115	n/a	64.8	7.78	25.92
Mean		114	-	65.7	8.66	28.85
Significance of F test (P)				0.52 ^a	<0.01	<0.01
LSD (0.05)				NS ^a	0.39	1.29
LSD (0.30)				NS	0.20	0.65
CV (%)				2.3	2.5	2.5

^aNo significant differences among hybrids.

Table 2b. 2002 silage corn forage quality near Hooper, UT, ranked by TDN.

Brand	Hybrid	CP	NDF	NDFD ^a	Starch	MILK2000 outputs ^b				
						48 hr	TDN, 1x	NEL, 3x	Milk per	
									mntnce.	mntnce.
		% DM	% DM	% DM	Mcal/lb		lb			
DEKALB	DKC64-10 (RR)	8.1	48.6	63.1	25.8	68.8	0.71	3398	28244	
Mycogen	6481FQ	7.8	46.5	62.2	22.3	67.8	0.70	3314	27710	
DEKALB	DKC65-00 (RR)	8.1	47.3	59.6	27.6	67.8	0.70	3293	25778	
Mycogen	8681FQ	8.5	51.0	60.6	27.9	67.3	0.70	3265	29848	
Croplan Genetics	DS107RR	8.0	50.8	59.9	20.7	66.9	0.69	3231	25570	
HYTEST	HT7820	8.1	50.8	60.2	25.1	66.7	0.68	3223	29758	
DEKALB	DK679	8.1	48.1	56.2	25.4	66.7	0.68	3184	34022	
Asgrow	RX740RR	7.4	47.3	56.5	23.9	66.0	0.68	3136	27199	
HYTEST	HT7815RR	7.3	54.4	54.6	20.4	61.5	0.63	2798	23980	
Mean		7.9	49.4	59.2	24.3	66.6	0.69	3205	28012	
Significance of F test (P)		0.85 ^c	<0.01	0.03	0.86	0.02	0.02	0.02	<0.01	
LSD (0.05)		NS ^c	3.0	4.6	NS	3.0	0.04	244	2243	
LSD (0.30)		NS	1.4	2.2	NS	1.5	0.02	117	1078	
CV (%)		10.1	2.6	3.4	23.8	2.0	2.5	3.3	3.5	

^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 3a. 2002 silage corn production at Lake Shore (Utah Co.), UT (Jay & Zane Evans & Lynn Hales).

Planted May 6, harvested Oct. 7-8. Elevation 4500 ft, 3350 corn GDD, Benjamin silty clay. Applications: 154 lb N, 78 lb P₂O₅, and 45 lb S/ac and chicken manure; and Clarity[®] and 2,4-D herbicides. Previous crop: wheat.

Brand	Hybrid	Relative maturity	Population density	Silage moisture	Silage yield	
					DM (105 C)	70% moist.
		days	plants/ac	% fresh wt.	ton/ac	
Mycogen	2888IMI	118	37333	73.7	6.96	23.20
HYTEST	HT7815	117	36417	76.0	6.58	21.93
Asgrow	RX897RR	118	38667	76.5	6.01	20.03
Mycogen	8681FQ	118	37667	76.4	5.91	19.70
DEKALB	DK687RR	118	34583	75.6	5.90	19.65
HYTEST	HT7806BT	115	32167	74.0	5.76	19.20
DEKALB	DKC64-10 (RR)	114	31917	72.2	5.56	18.53
Croplan Genetics	DS107RR	107	36250	74.0	5.47	18.21
Mean		116	35625	74.8	6.02	20.06
Significance of F test (P)			0.10	<0.01	<0.01	<0.01
LSD (0.05)			5129	1.2	0.48	1.61
LSD (0.30)			2573	0.6	0.24	0.81
CV (%)			8.2	0.9	4.6	4.6

Table 3b. 2002 silage corn forage quality at Lake Shore, UT, ranked by TDN.

Brand	Hybrid	MILK2000 outputs ^b								
		CP	NDF	NDFD ^a		Starch	TDN, 1x	NEL, 3x	Milk per	
				48 hr	% DM				mtnce.	mtnce.
		% DM	% DM	% DM	% DM	Mcal/lb	lb			
DEKALB	DKC64-10 (RR)	7.6	46.4	70.3	29.1	74.4	0.77	3851	21698	
HYTEST	HT7806BT	7.4	45.6	67.4	29.4	74.2	0.77	3816	23524	
Mycogen	8681FQ	7.2	50.6	69.5	31.9	73.0	0.76	3751	22640	
Croplan Genetics	DS107RR	7.2	51.4	69.2	32.9	72.9	0.76	3737	21706	
Mycogen	2888IMI	8.0	47.7	67.3	25.0	71.7	0.74	3638	25266	
DEKALB	DK687RR	8.1	51.1	65.8	24.7	71.0	0.74	3578	21873	
HYTEST	HT7815	8.1	51.6	66.3	26.8	70.8	0.73	3565	24078	
Asgrow	RX897RR	7.4	53.5	65.8	26.3	70.3	0.72	3525	21992	
Mean		7.6	49.7	67.7	28.3	72.3	0.75	3683	22847	
Significance of F test (P)		0.28 ^c	<0.01	0.02	0.28	0.12	0.11	0.10	0.16	
LSD (0.05)		NS ^c	2.8	2.6	NS	NS	NS	247	NS	
LSD (0.30)		NS	1.3	1.2	NS	NS	NS	117	NS	
CV (%)		5.7	2.4	1.6	12.3	1.9	2.3	2.8	5.6	

^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.

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