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Corn Silage Performance, 2005; Cache County, Utah

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This report summarizes on-farm performance of irrigated silage corn hybrids at Benson (Cache County) in 2005. The site is at 4440 ft elevation and has a long-term average of 2740 corn growing degree days (50/86° F) per year. Hybrids were seeded with a six-row planter on May 27 at approximately 38,000 seeds/ac into Kidman fine sandy loam. Planting was approximately 10-14 days later than normal, due to an unusually wet spring. Furrow-irrigated plots were six rows wide at 30-in row spacing by 1070 ft long in three randomized complete blocks. Nutrient and pesticide applications are indicated in Table 1. The previous crop was 5 years of alfalfa. Soil test levels (0-12 in) at planting were pH 7.5, 1.7% organic matter, 33 ppm P, 229 ppm K, 18 ppm NO₃-N, and 8 ppm SO₄-S. Levels of Cu, Fe, Mn, and Zn were 1, 13, 11, and 3 ppm, respectively. All nutrient levels were within recommended ranges.

Hybrids spanned relative maturity (RM) ratings of 103-113 days and included some Roundup Ready[®] and Bt traits (Table 1). Plots were harvested with a silage chopper without a kernel processor on September 27 to target whole-plant moisture concentrations of 65-70%. Weights were obtained with trucks and calibrated axle scales. Samples were dried at 55° C (131° F) for forage quality analyses and 105° C (221° F) for dry matter (DM) determination. Plot weights were expressed as tons/ac of DM and 70% moisture silage. Forage crude protein (CP), neutral detergent fiber (NDF), in vitro true DM digestibility (IVTDMD), neutral detergent fiber digestibility (NDFD), and starch levels were determined via near-infrared reflectance spectroscopy. 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.



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 hybrids in a column for detection of true variety effects at a given

level of probability. Values of LSD are shown for 5 and 30% probabilities that observed differences are merely due to chance, rather than to hybrid effects. For example, in Table 1, DM yields of the top five hybrids are not different at the 5% probability level, because they vary by less than the LSD of 0.48 ton/ac. Yields of the first- and sixth-ranked hybrids differ at the 5% level because they vary by at least the LSD. At 30% probability that yield variations are due to chance, smaller differences become significant. The coefficient of variation (CV) describes variation among replications of the same hybrid; values below 10% suggest good precision for detecting hybrid differences.

Forage production at 70% moisture differed by 5.3 tons/ac among hybrids (Table 1). Differences were not strongly associated with varying population densities and RM ratings. The higher harvest moisture concentrations that are often associated with longer RM ratings were not observed in this study. In most cases, harvest moisture concentrations exceeded 70%, which can lead to energy loss via seepage of soluble DM and

impaired 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 CP and fiber digestibility (NDFD) did not differ significantly among hybrids (Table 2), hybrids ranked differently for energy value (TDN, NEL, and milk/ton) than for forage production. Hybrids that were highest-ranked for TDN had some combination of high starch and low NDF. These characteristics, in conjunction with high fiber digestibility, contribute to energy density. Hybrids that were highest-ranked for potential milk production/ac tended to be those with highest forage production rankings, but they were not necessarily those with highest quality rankings. Differences in rankings for DM production and nutritional value underscore the need to clearly define nutritional requirements that hybrids should fulfill.

We would like to acknowledge the generous contributions of our cooperating grower, John Allen, who provided land and services for this project.

Table 1. 2005 silage corn production at Benson, UT (John Allen, cooperator).

Planted May 27, harvested Sept. 27. Elevation 4440 ft, 2740 corn GDD^a, Kidman fine sandy loam. Applications: winter and early spring manure, no commercial fertilizer; Dual[®] and Distinct[®] herbicides, no insecticides. Previous crop: alfalfa, 5 years. Furrow-irrigated.

Brand	Hybrid	Specialty traits ^b	Relative maturity	Population density	Harvest moisture	Silage yield ^c	
						DM (105° C)	70% moist.
			days	plants/ac	% fresh wt.	ton/ac	
Grand Valley	23R53	RR	112	32230	74.8	9.34	31.12
DEKALB	DKC61-72 (RR2)	RR	111	33563	72.3	9.19	30.63
Asgrow	RX715RR2	RR	111	34675	74.1	9.11	30.36
Helena/Dahlco	X4101		110	36453	70.4	8.94	29.81
DEKALB	DKC63-62 (RR2)	RR	113	32563	74.3	8.91	29.70
DEKALB	DKC57-30		107	34563	72.2	8.65	28.83
Grand Valley	22B70	RR/Bt	107	32674	71.9	8.60	28.66
DEKALB	DKC61-50		111	33786	73.5	8.49	28.30
DEKALB	DKC57-84 (YGCB)	Bt	107	32674	71.7	8.49	28.29
Grand Valley	22R40	RR	104	37231	70.6	8.42	28.07
Helena/Dahlco	X4121RR	RR	112	33230	68.6	8.39	27.98
Grand Valley	87R03	RR	103	31230	73.3	8.11	27.04
Grand Valley	87R09	RR	109	30007	73.7	7.74	25.78
Mean			109	33452	72.4	8.64	28.81
Significance of F test (P)				0.13	<0.01	<0.01	<0.01
LSD (0.05)				NS ^d	1.6	0.48	1.61
LSD (0.30)				--	0.8	0.25	0.83
CV (%)				7.8	1.3	3.3	3.3

^aCorn Growing Degree Days (base 50°/max. 86° F per year).

^bRoundup Ready[®] hybrids tolerate glyphosate herbicide; Bt hybrids produce an insecticidal protein from the bacterium *Bacillus thuringiensis*.

^cDry matter or corrected to standard moisture.

^dNo significant differences among hybrids.

Table 2. 2005 silage corn forage quality at Benson, UT, ranked by TDN. No kernel processor on chopper.

Brand	Hybrid	CP ^a	NDF ^b	NDFD ^c	Starch	MILK2000 outputs ^d				
						48 hr	TDN, 1x	NEL, 3x	Milk per	
									mtnce.	mtnce.
		% DM	% NDF	% DM	Mcal/lb		lb			
Grand Valley	22R40	7.7	44.7	64.1	23.1	70.6	0.73	3542	29803	
Helena/Dahlco	X4121RR	7.9	43.0	63.3	24.0	70.2	0.73	3509	29448	
Grand Valley	22B70	8.0	47.4	63.1	20.3	69.2	0.72	3434	29462	
Helena/Dahlco	X4101	7.7	47.5	63.5	20.0	69.2	0.72	3435	30711	
DEKALB	DKC61-72 (RR2)	7.9	48.8	63.9	18.8	69.0	0.71	3424	31452	
DEKALB	DKC63-62 (RR2)	8.8	46.1	65.6	18.2	68.5	0.71	3400	30280	
Grand Valley	23R53	8.1	50.1	63.3	16.6	67.5	0.70	3314	30903	
DEKALB	DKC57-30	8.1	48.8	64.1	17.0	67.5	0.70	3321	28719	
DEKALB	DKC57-84 (YGCB)	8.1	45.4	62.0	20.0	67.4	0.70	3295	27983	
DEKALB	DKC61-50	8.0	46.0	63.8	18.8	67.3	0.70	3303	28045	
Asgrow	RX715RR2	8.4	49.1	62.3	16.5	66.6	0.69	3240	29513	
Grand Valley	87R03	9.1	49.7	60.7	15.6	66.0	0.68	3185	25840	
Grand Valley	87R09	8.3	50.6	61.3	14.2	64.7	0.67	3094	23911	
Mean		8.2	47.5	63.2	18.7	68.0	0.70	3346	28928	
Significance of F test (P)		0.28	<0.01	0.22	<0.01	<0.01	<0.01	<0.01	<0.01	
LSD (0.05)		NS ^e	3.7	NS	3.2	2.2	0.02	173	1650	
LSD (0.30)		--	1.9	--	1.6	1.2	0.01	89	846	
CV (%)		7.6	4.6	3.0	10.2	2.0	2.0	3.1	3.4	

^{a, b}Crude protein and neutral detergent fiber.

^cNeutral detergent fiber digestibility in rumen fluid, expressed as % of fiber.

^dTotal digestible nutrients at 1x maintenance level of intake and net energy for lactation at 3x maintenance intake (DM basis). Both are calculated from summation of digestibilities of individual constituents.

^eNo significant differences among hybrids.

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