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Leafy and Conventional Silage Corn Performance Trial, 2003; Millard County, Utah

***M.G. Pace*[1], *T.C. Griggs*[2], *L. Rasmussen*[3], *T. Tuttle*[4],** and ***K. Pack*[2]**
[1]USU Extension Agent, Box Elder County, [2]Dept. of Plants, Soils, & Biometeorology, [3]Millard County Producer, [4]Double T Feeds, Custom Harvester

This report summarizes on-farm performance of irrigated silage corn hybrids at Flowell (Millard County) in 2003. The site is at 4700 ft elevation and has an average of 3572 corn growing degree days (50/86° F) per year. Hybrids were seeded with a six-row planter on May 14 at approximately 32,000 seeds/ac into Escalante fine sandy loam. Pivot-irrigated plots were six rows wide at 30-in row spacing by 1650 ft long in three randomized complete blocks. Nutrient and pesticide applications are indicated in Table 1. The previous two crops were corn silage. Soil test levels (0-12 in) at planting were pH 8.0, 19 ppm P and 120 ppm K (both within recommended ranges), and 10 ppm NO_3-N.

Hybrids spanned relative maturity (RM) ratings of 98-107 days (Table 1). All hybrids had a Roundup Ready® trait and all but two had the leafy trait with an increased number of leaves per plant and an additional 2-4 leaves above the ear, relative to conventional hybrids. One hybrid, HL R257, was a grain type. Plots were harvested with a silage chopper equipped with kernel processor on September 15 to target whole-plant moisture concentrations of 65-70%. Weights were obtained with trucks and commercial scales. Samples were dried at 60º C (140º F) for forage quality analyses and at 105º C (221º 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 for two replicates of each hybrid 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 seven hybrids are not different at the 5% probability level, because they vary by less than the LSD of 0.69 tons/ac. Yields of the first- and eighth-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 4.3 tons/ac among hybrids (Table 1). Production of the two conventional hybrids did not differ from the top-

performing leafy hybrids at the 5% level, but the grain hybrid HL R257 was less productive than the top-performing leafy hybrid at the 30% level. Forage production tended to be greater for hybrids with longer RM but was not strongly associated with differing plant population densities. In a few cases, harvest moisture concentrations exceeded 70%, which can lead to energy loss via seepage of soluble DM in silage effluent 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.

Hybrid rankings for forage energy value (TDN, NEL, and milk/ton; Table 2) were different than those for forage production. Hybrids that were most highly-ranked for TDN, including the two conventional silage and grain types, had a combination of high starch and low fiber levels. These characteristics, in conjunction with high fiber digestibility (NDFD), contribute to energy density. In other Utah trials with conventional hybrids, those with highest TDN levels often have high fiber digestibility, but in this trial the hybrids with greatest fiber digestibility also had high fiber and low starch levels. Differences in rankings among hybrids for DM production and nutritional value underscore the need to clearly define nutritional requirements that hybrids should fulfill.

Table 1. 2003 silage corn production at Flowell (Millard Co.), UT (Lars Rasmussen, cooperator). Planted May 14, harvested Sept. 15. Elevation 4700 ft, 3572 corn GDD[a], Escalante fine sandy loam. Applications: 5 tons mushroom compost/ac plus 200 lb N/ac; glyphosate; and Aztec® 2.1% granular insecticide at planting. Previous crop: corn, 2 years. Pivot-irrigated.

Brand	Hybrid	Specialty traits[b]	Relative maturity	Population density	Silage moisture	Silage yield[c] DM (105 C)	Silage yield[c] 70% moist.
			days	plants/ac	% fresh wt.	ton/ac	
Mycogen	TMF 2D601	RR, Leafy	106	36,232	71.3	7.46	24.86
Croplan Genetics	DS107RR	RR, Leafy	107	34,241	71.4	7.34	24.46
DEKALB	DKC53-33	RR2	103	32,692	66.6	7.29	24.29
HYTEST	TNT-106RR	RR, Leafy	106	33,743	71.2	7.23	24.10
Hyland	HL R257	RR	100	31,973	66.5	7.09	23.64
Croplan Genetics	DS103RR	RR, Leafy	103	34,850	70.1	6.99	23.29
Croplan Genetics	DS100RR	RR, Leafy	98	33,411	69.0	6.87	22.88
HYTEST	TNT-100RR	RR, Leafy	100	33,356	69.2	6.42	21.40
Wolf River Valley	2203 LRR	RR, Leafy	102	34,462	70.4	6.17	20.56
Mean			**103**	**33,884**	**69.5**	**6.98**	**23.28**
Significance of F test (P)				<0.01	<0.01	0.02	0.02
LSD (0.05)				1458	1.6	0.69	2.34
LSD (0.30)				736	0.8	0.35	1.18
CV (%)				2.5	1.4	5.7	5.8

[a]Corn Growing Degree Days (base 50°/max. 86° F) per year.
[b]Roundup Ready® hybrids tolerate glyphosate herbicide; leafy hybrids have more leaves per plant and an additional 2-4 leaves above the ear.
[c]Dry matter or corrected to standard moisture.

Table 2. 2003 silage corn forage quality at Flowell, UT, ranked by TDN.

						MILK2000 outputs[d]			
				NDFD[c]		TDN, 1x	NEL, 3x	Milk per	
Brand	**Hybrid**	**CP[a]**	**NDF[b]**	**48 hr**	**Starch**	**mtnce.**	**mtnce.**	**Ton DM**	**ac**
		% DM		% NDF	% DM		Mcal/lb	lb	
DEKALB	DKC53-33	7.1	42.5	60.5	31.5	71.6	0.74	3584	26225
Hyland	HL R257	7.5	46.0	61.5	25.3	70.6	0.73	3521	24609
HYTEST	TNT-100RR	8.0	47.5	63.7	20.3	69.7	0.72	3477	22188
Croplan Genetics	DS100RR	7.7	48.5	62.8	20.4	69.4	0.72	3446	23894
Croplan Genetics	DS103RR	7.1	48.3	60.2	21.2	68.7	0.71	3372	24128
Wolf River Valley	2203 LRR	6.9	50.0	61.2	19.1	67.9	0.71	3325	20008
Croplan Genetics	DS107RR	7.4	48.2	65.8	15.8	66.1	0.69	3236	23433
Mycogen	TMF 2D601	7.2	49.7	66.5	14.5	65.9	0.68	3227	23452
HYTEST	TNT-106RR	7.5	50.3	66.3	13.3	65.3	0.68	3181	23025
Mean		**7.4**	**48.0**	**63.1**	**20.1**	**68.3**	**0.71**	**3371**	**23586**
Significance of F test (P)		0.02	0.07	0.02	<0.01	0.02	0.03	0.04	0.35
LSD (0.05)		0.5	NS[e]	3.7	6.0	3.2	0.04	235	NS
LSD (0.30)		0.3	2.2	1.8	2.9	1.5	0.02	113	NS
CV (%)		3.1	4.1	2.5	13.0	2.0	2.2	3.0	8.9

[a, b]Crude protein and neutral detergent fiber.
[c]Neutral detergent fiber digestibility in rumen fluid, expressed as % of fiber.
[d]Total 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.
[e]No significant differences among hybrids.

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