



CORN SILAGE

Results for this year's Minnesota Hybrid Corn Silage Evaluation Program are presented in this bulletin. The program was initiated as a test to evaluate corn hybrids intended for use as silage. Unbiased forage yield and quality information provided by this program will be useful in education activities and in marketing corn hybrids grown for silage.

The program is financed in part by entry fees from private seed companies that chose to enter hybrids for testing, which are listed in this publication. Results this year are from corn silage performance trials established in two regions of extensive corn silage use, southeastern and central Minnesota, and an inaugural site in Ottertail County that represents west-central Minnesota. The locations are in the state's primary dairy regions.

Test Sites

Trials were conducted in southeastern and central Minnesota in 2003. Silage hybrids entered each of these regions were tested at both sites. Region locations are categorized as:

Southeast Dairy Region:

La Crescent (Houston County)
Potsdam (Olmsted County)

Central Dairy Region:

Paynesville (Stearns County)
Melrose (Stearns County)

A new trial was conducted in west-central Minnesota in 2003. Silage hybrids entered in this region were tested at one

site with two replications. The region is categorized as:

West-Central Dairy Region: Ottertail (Otter Tail County)

Test Procedure

Southeast and Central

Design: Research plots were established at La Crescent, Potsdam, Paynesville and Melrose in randomized block designs with four replications. Hybrids were planted at 33,000 seeds per acre with 30-inch row spacing. Plant nutrients, manure or inorganic fertilizer, were applied to maximize plant yield. Cultivation and herbicides were used to control weeds.

Harvesting: Plots were harvested and whole-plant herbage sampled for yield and forage quality at each site. The whole-plant target harvest timing was a moisture content of 65% across entries at a site. Harvest at La Crescent, Potsdam, Paynesville and Melrose was on September 4, September 3, September 5 and September 2, respectively.

West-central

Design: Research plots were established at Ottertail under central pivot irrigation in randomized complete block design with two replications. Hybrids were planted at 26,000 seeds per acre with 36-

inch row spacing. Plant nutrients, manure or inorganic fertilizer, were applied to maximize plant yield. Cultivation and herbicides were used to control weeds.

Harvesting: Plots were harvested and whole-plant herbage sampled for yield and forage quality on September 11-12.

Results Provided

The first four tables summarize hybrid yield and forage quality results from La Crescent, Potsdam, Paynesville and Melrose; respectively; the fifth summarizes results from the new location at Ottertail. Relative maturity (RM), moisture content, whole-plant dry matter (DM) yield and silage yield are listed, with hybrids ranked in descending order by RM.

Whole-plant quality concentration traits listed include crude protein (CP), neutral detergent fiber (NDF), in vitro digestibility (IVD), 48-hour neutral detergent fiber digestibility (NDFD) and starch percent. Except for NDFD, all quality-concentration predictions are expressed as a percent of dry matter. NDFD is expressed as a percent of NDF.

Milk parameter estimates of milk per ton (Ton) and milk per acre (Acre) were calculated using a model from the spreadsheet entitled, MILK2000 developed at the University of Wisconsin. MILK2000 approximates animal perfor-

Companies participating in the 2003 hybrid corn silage performance trials:

Agventure, 65064 250 Ave, Kasson, MN 55944

Crows Hybrid Corn Co., 12812 Welcome Lane, Burnsville, MN 55337

Dairyland Seed Company, Inc., P.O. Box 958, West Bend, WI 53095-0958

Dyna Gro Seed Company, W Lake Lansing Road, 102 East, East Lansing, MI 48823

Garst Seed Company, S366 Lee Lane, Coon Valley, WI 54623

Golden Seed Company, Inc. - Golden Harvest, 1716 La Crescent Street, Apartment 77, La Crosse, WI 54600

Hyland Seeds, 2 Hyland Drive, Box 130, Blenheim, Ontario, Canada N0P 1A0

Land O' Lakes - Croplan Genetics, 1080 County Road F West, Shoreview, MN 55126

Monsanto - Dekalb Genetics, 3100 Sycamore Road, De Kalb, IL 60115

Pioneer Hi-Bred, International Inc., 99 Navaho Avenue, Suite 101A, Mankato, MN 56001

Producers Hybrids, P.O. Box C, Battle Creek, NE 68715

Seeds 2000, Box 200, Breckenridge, MN 56520

Syngenta Seeds, 7500 Olson Memorial Highway, Golden Valley, MN 55427

Trelay Seed Company, 11623 Highway 80, Livingston, WI 53554

Wensman Seed Company, P.O. Box 190, Wadena, MN 56482

mance using pounds of milk per ton of silage and per acre of cropland for a given hybrid based on standard cow weight and milk production level (1,350-pound body weight and 90 pounds of milk/day at 3.8% fat).

Values based on field calculations for hybrid moisture and DM yield; lab-determined values for CP, NDF, NDFD, starch and ash concentration; and book values for NDFCP (1.3%) and ether extract (3.2%) concentration were used for spreadsheet calculations. For MILK2000 predictions, we assumed that kernel processing occurred.

How to Use Results

Hybrids entered in the southeast and central regions differ in dry matter and/or silage yield, silage quality and milk estimates. Because of insufficient replication, hybrid entries in the west-central region showed few significant differences at the 10% level for yield and milk parameter estimates, although there is a difference in crude protein concentration.

NDF is a negative indicator of forage intake and relates to better animal performance. IVD is a laboratory test to estimate digestibility in ruminant livestock, and NDFD estimates digestibility of the

cell wall fraction. IVD, NDFD and starch have a positive effect on animal performance. Starch concentration is associated with corn silage digestion because it is assumed to be 100% digestible. Milk per acre represents the combined impact of yield and quality.

Means and least significant difference (LSD) statistical figures at the 10% level of probability are shown at each location. Where the difference between two selected hybrids in a table is greater than the LSD value, 9 of 10 times there is a real difference for that value: moisture, yield, quality concentration or milk estimate.

Relative maturity (RM), moisture, silage yield and quality traits for corn hybrids planted at La Crescent (Houston County) in 2003.

Brand	Hybrid	RM, Rating	Moisture, %	Yield, Ton/Acre ¹		Concentration, Percent ²					Milk Yield ³	
				DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/Ton	Lb/Acre
Producers Hybrids	SS110	116	63.0	9.8	26.5	8.2	45	76	48	30	3,071	30,096
Pioneer	33J57	114	67.4	10.0	30.5	8.5	42	79	51	32	3,301	32,845
Pioneer	34M93	110	60.7	11.8	30.1	8.0	43	79	52	34	3,289	38,810
Dairyland	DST-10930	109	67.1	9.0	27.3	8.4	43	80	53	31	3,346	30,030
Ag Venture	743	108	59.7	9.9	24.5	7.9	42	79	50	36	3,235	31,865
Dairyland HiDF	4200	108	61.2	9.5	24.5	7.9	42	78	49	35	3,183	30,239
Dekalb	DKC58-24RRYGCB	108	58.8	9.9	24.1	8.3	44	77	48	31	3,040	30,020
Dekalb	DKC58-78YGCB	108	61.2	10.4	26.9	8.1	41	81	53	35	3,397	35,159
NK Brand	N64-J9	108	64.2	9.1	25.3	8.2	40	82	54	34	3,537	32,098
High Cycle	7748Bt	108	64.0	9.0	25.1	8.0	43	78	49	33	3,214	29,006
Croplan Genetics	DS107	107	66.5	8.5	25.2	8.1	45	78	52	24	3,110	26,280
NK Brand	N58-D1	107	59.2	10.1	24.7	7.9	40	79	49	34	3,267	32,915
High Cycle	7698Rb	107	61.0	10.1	25.9	8.1	42	79	50	36	3,277	33,016
Ag Venture	696	106	60.0	9.8	24.6	7.7	38	81	49	38	3,391	33,317
Garst	8510YG1RR	106	60.5	9.9	25.2	7.7	42	79	49	34	3,242	32,177
Pioneer	35Y67	106	58.0	10.1	24.2	7.7	41	79	48	34	3,149	31,884
Crows	SR-470	105	63.4	8.6	23.3	7.4	41	78	47	38	3,265	27,916
Golden Harvest	H-8662Bt	105	61.6	10.1	26.2	8.0	43	77	47	35	3,145	31,607
Producers Hybrids	6605	105	61.8	9.1	23.8	7.6	45	76	47	31	3,027	27,546
Trelay	7012	105	55.7	10.1	22.7	8.0	41	80	51	37	3,219	32,351
Ag Venture	600	104	60.0	8.6	21.4	8.2	40	80	49	36	3,277	28,018
Pioneer	35D45	104	62.7	9.2	24.8	8.4	42	78	49	31	3,207	29,585
Producers Hybrids	SS104RR	104	64.6	9.3	26.4	8.1	45	78	51	27	3,159	29,458
Garst	8579RR	101	60.3	9.5	24.0	7.6	40	80	50	37	3,327	31,690
NK Brand	N33-H6	101	63.1	8.7	23.5	8.6	46	75	46	27	2,900	25,158
Croplan Genetics	DS100	100	60.4	9.3	23.3	8.4	47	75	47	29	2,884	26,677
Garst	85901T	100	61.1	9.8	25.1	7.2	42	79	50	35	3,269	31,954
Means			61.7	9.6	25.2	8.0	42	79	50	33	3,212	30,804
LSD (0.10)			1.7	1.1	3.0	0.3	2	1	2	2	174	4,256

¹ DM yield is whole-plant corn yield at 100% dry matter; silage yield is whole-plant corn yield at harvest moisture. ² Concentration description expressed as a % of DM, except NDFD, which is expressed as a % of NDF. Refer to RESULTS PROVIDED text for additional information. ³ Milk estimate values calculated using spreadsheet MILK2000 developed at the University of Wisconsin. Refer to RESULTS PROVIDED for additional information.

Relative maturity (RM), whole-plant moisture, silage yield and quality traits for corn hybrids planted at Potsdam (Olmsted County) in 2003.

Brand	Hybrid	RM, Rating	Moisture, %	Yield, Ton/Acre ¹		Concentration, Percent ²					Milk Yield ³	
				DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/Ton	Lb/Acre
Producers Hybrids	SS110	116	72.0	9.9	35.4	8.0	50	74	49	25	2,947	29,175
Pioneer	33J57	114	74.3	9.9	38.5	8.6	49	77	52	24	3,128	30,967
Pioneer	34M93	110	70.7	10.5	35.9	7.6	50	75	50	24	2,972	31,280
Dairyland	DST-10930	109	74.1	7.5	28.8	8.2	48	76	50	26	3,040	22,648
Ag Venture	743	108	71.6	8.2	28.7	8.0	49	75	49	27	3,015	24,572
Dairyland HiDF	4200	108	71.9	9.2	32.6	8.1	46	77	50	30	3,153	28,850
Dekalb	DKC58-24RRYGCB	108	70.9	9.2	31.7	8.2	48	76	50	26	3,095	28,551
Dekalb	DKC58-78YGCB	108	71.8	9.1	32.4	8.4	47	77	52	28	3,197	29,173
NK Brand	N64-J9	108	72.7	8.9	32.7	8.2	46	79	53	26	3,269	29,176
High Cycle	7748Bt	108	74.2	9.3	35.9	8.0	50	74	48	24	2,907	26,890
Croplan Genetics	DS107	107	71.8	9.9	35.1	7.7	49	75	50	24	3,059	30,284
NK Brand	N58-D1	107	69.8	10.0	32.9	7.8	46	78	52	28	3,230	32,139
High Cycle	7698Rb	107	70.8	9.6	33.0	8.5	47	77	50	28	3,119	30,020
Ag Venture	696	106	71.9	9.3	33.2	8.0	47	76	50	28	3,112	29,019
Garst	8510YG1RR	106	70.5	10.4	35.3	7.4	48	75	48	27	3,045	31,744
Pioneer	35Y67	106	69.6	10.4	34.1	7.6	45	77	50	31	3,218	33,387
Crows	SR-470	105	74.0	8.6	32.9	8.2	48	76	50	28	3,119	26,667
Golden Harvest	H-8662Bt	105	70.5	9.6	32.5	8.1	48	75	49	28	3,051	29,290
Producers Hybrids	6605	105	73.0	7.0	25.7	8.6	47	77	52	27	3,179	22,094
Trelay	7012	105	71.0	8.9	30.5	8.0	48	76	50	29	3,107	27,497
Ag Venture	600	104	70.6	8.2	28.0	8.3	44	79	52	30	3,313	27,249
Pioneer	35D45	104	71.1	9.0	31.2	8.2	47	76	49	29	3,085	27,842
Producers Hybrids	SS104RR	104	72.1	9.2	33.1	7.9	49	75	49	26	3,025	27,906
Garst	8579RR	101	69.3	10.0	32.6	7.5	45	78	51	32	3,280	32,800
NK Brand	N33-H6	101	68.3	9.9	31.3	8.2	45	77	50	31	3,175	31,512
Croplan Genetics	DS100	100	66.8	9.7	29.3	7.4	50	74	47	27	2,920	28,397
Garst	85901T	100	71.5	8.4	29.6	7.6	47	77	50	29	3,151	26,547
Means			71.4	9.2	32.3	8.0	48	76	50	27	3,108	28,729
LSD (0.10)			1.7	0.9	3.0	0.4	2	2	ns	2	189	3,768

¹DM yield is whole-plant corn yield at 100% dry matter; silage yield is whole-plant corn yield at harvest moisture. ²Concentration description expressed as a % of DM, except NDFD, which is expressed as a % of NDF. Refer to RESULTS PROVIDED text for additional information. ³Milk estimate values calculated using spreadsheet MILK2000 developed at the University of Wisconsin. Refer to RESULTS PROVIDED for additional information.

Relative maturity (RM), whole-plant moisture, silage yield and quality traits for corn hybrids planted at Paynesville (Stearns County) in 2003.

Brand	Hybrid	RM,		Yield, Ton/Acre ¹		Concentration, Percent ²					Milk Yield ³	
		Rating	Moisture, %	DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/Ton	Lb/Acre
Seeds 2000	3171RR	107	76.7	5.2	22.1	7.3	47	75	47	25	2,921	15,043
Dairyland Stealth	1606	106	67.3	6.4	19.6	7.5	43	79	50	32	3,263	20,883
Pioneer	35Y67	106	65.6	6.5	19.0	6.7	46	77	49	28	3,065	19,999
NK Brand	N59-Q9	106	70.3	6.9	23.1	7.3	45	77	49	28	3,074	21,134
Dairyland DST	10427	104	68.5	6.6	20.8	7.4	46	77	49	27	3,111	20,377
Hyland Seeds	HL S067	104	69.8	8.3	27.5	7.4	51	73	47	22	2,814	23,356
Pioneer	35D45	104	69.8	7.2	23.8	7.5	44	78	50	29	3,221	23,111
Dekalb	DKC53-34RRYGCB	103	66.7	7.5	22.4	7.4	42	79	51	33	3,334	24,838
Hyland Seeds	HL S058	102	68.8	8.3	26.6	7.2	47	76	49	24	3,005	24,942
Trelay	6900	102	69.2	5.7	18.5	7.5	44	79	52	27	3,203	18,257
NK Brand	N45-A6	101	63.8	6.5	17.8	6.9	44	78	50	31	3,187	20,556
NK Brand	NX3360	101	63.4	7.6	20.8	6.8	45	76	47	31	3,032	23,119
Producers Hybrids	547RR	99	61.9	7.3	19.0	7.3	41	77	45	35	3,103	22,497
Pioneer	37F16	98	64.9	6.5	18.6	6.9	44	78	49	30	3,179	20,743
Trelay	5011	98	66.1	6.8	19.9	7.5	47	74	45	29	2,823	19,055
Pioneer	37R71	97	64.8	6.3	17.9	7.0	40	80	51	35	3,390	21,357
Hyland Seeds	HL S041	95	67.3	7.6	23.2	7.7	43	79	51	31	3,289	24,914
Dekalb	DKC44-46RRYGCB	94	63.9	7.4	20.4	6.8	42	79	50	35	3,289	24,256
Garst	8865	90	66.1	7.6	22.3	7.2	46	76	48	30	3,032	22,967
Means			67.1	6.9	21.2	7.2	45	77	49	30	3,123	21,653
LSD (0.10)			4.8	1.3	2.8	0.3	2	2	2	2	204	4,176

¹DM yield is whole-plant corn yield at 100% dry matter; silage yield is whole-plant corn yield at harvest moisture. ²Concentration description expressed as a % of DM, except NDFD, which is expressed as a % of NDF. Refer to RESULTS PROVIDED text for additional information. ³Milk estimate values calculated using spreadsheet MILK2000 developed at the University of Wisconsin. Refer to RESULTS PROVIDED for additional information.

Relative maturity (RM), whole-plant moisture, silage yield and quality traits for corn hybrids planted at Melrose (Stearns County) in 2003.

Brand	Hybrid	RM,		Yield, Ton/Acre ¹		Concentration, Percent ²					Milk Yield ³	
		Rating	Moisture, %	DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/Ton	Lb/Acre
Seeds 2000	3171RR	107	72.2	6.1	21.8	8.2	52	74	49	17	2,617	15,833
Dairyland Stealth	1606	106	66.9	6.9	20.7	7.8	46	78	52	27	3,177	21,762
Pioneer	35Y67	106	67.3	6.2	19.0	7.7	48	76	51	23	2,975	18,519
NK Brand	N59-Q9	106	70.6	6.3	21.3	7.5	47	77	51	24	3,040	19,000
Dairyland DST	10427	104	66.8	6.4	19.4	7.7	49	75	49	25	2,947	18,934
Hyland Seeds	HL S067	104	69.9	6.2	20.6	8.0	53	73	49	17	2,663	16,511
Pioneer	35D45	104	67.6	6.1	18.7	8.1	48	76	50	22	2,905	17,575
Dekalb	DKC53-34RRYGCB	103	66.0	6.5	19.0	7.8	49	74	47	27	2,789	18,059
Hyland Seeds	HL S058	102	71.0	5.6	19.3	7.5	50	76	52	16	2,687	15,047
Trelay	6900	102	68.1	6.5	20.5	7.6	48	76	49	22	2,860	18,662
NK Brand	N45-A6	101	59.7	6.9	17.2	7.6	50	73	47	26	2,705	18,732
NK Brand	NX3360	101	66.6	6.4	19.1	8.0	53	72	46	21	2,585	16,479
Producers Hybrids	547RR	99	66.2	5.6	16.4	8.1	51	72	46	23	2,676	14,852
Pioneer	37F16	98	63.9	6.1	16.9	7.8	48	75	48	26	2,909	17,745
Trelay	5011	98	66.6	7.1	21.3	7.6	53	71	45	24	2,598	18,511
Pioneer	37R71	97	63.4	6.7	18.2	7.8	47	75	47	29	2,890	19,219
Hyland Seeds	HL S041	95	64.2	6.4	17.9	7.7	47	76	49	29	3,010	19,264
Dekalb	DKC44-46RRYGCB	94	62.4	7.0	18.7	7.2	49	74	48	28	2,835	19,916
Garst	8865	90	63.2	6.0	16.4	7.6	51	74	48	25	2,782	16,762
Means			66.5	6.4	19.1	7.8	49	75	49	24	2,824	17,967
LSD (0.10)			2.2	ns	2.3	ns	2	2	3	3	249	3,077

¹ DM yield is whole-plant corn yield at 100% dry matter; silage yield is whole-plant corn yield at harvest moisture. ² Concentration description expressed as a % of DM, except NDFD, which is expressed as a % of NDF. Refer to RESULTS PROVIDED text for additional information. ³ Milk estimate values calculated using spreadsheet MILK2000 developed at the University of Wisconsin. Refer to RESULTS PROVIDED for additional information.

Relative maturity (RM), whole-plant moisture, silage yield and quality traits for corn hybrids planted at Ottertail (Otter Tail County) in 2003.¹

Brand	Hybrid	RM,		Yield, Ton/Acre ²		Concentration, Percent ³					Milk Yield ⁴	
		Rating	Moisture, %	DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/Ton	Lb/Acre
Hyland	HL S058	102	66.2	6.6	19.6	8.2	44	80	54	30	3,369	22,335
Dyna Gro	DG5227	100	61.4	6.7	17.5	7.5	44	79	52	32	3,255	21,926
Hyland	HL S041	98	61.8	7.0	18.3	8.1	40	81	53	35	3,484	24,432
Mycogen	TMF 2M405	97	62.6	7.4	19.8	8.2	44	78	50	33	3,181	23,519
Producer Hybrid	5611	96	62.8	7.0	18.8	7.8	41	80	53	35	3,426	23,944
Mycogen	2D421	95	57.4	7.1	16.6	7.7	42	79	50	34	3,171	22,481
Wensman	W4164	93	60.7	6.6	16.7	7.8	43	79	51	33	3,229	21,203
Dyna Gro	DG5195	92	63.3	6.1	16.7	8.4	43	80	54	33	3,420	20,987
Hyland	HL S034	90	58.9	6.8	16.6	7.9	42	79	51	36	3,242	22,172
Means			61.7	6.8	17.9	8.0	43	79	52	33	3,309	22,555
LSD (0.10)			ns	ns	ns	0.3	ns	ns	ns	ns	ns	ns

¹ Planted April 26-27 at 26,000 seeds / acre on 36 rows; central pivot irrigation; harvested September 11-12. ² DM yield is whole-plant corn yield at 100% dry matter; silage yield is whole-plant corn yield at harvest moisture. ³ CP is crude protein, NDF is neutral detergent fiber, IVD is in vitro digestibility, and NDFD is NDF digestibility; concentrations are expressed as a % of DM, except NDFD, which is expressed as a % of NDF. ⁴ Milk estimate values calculated using spreadsheet MILK2000 developed by the University of Wisconsin.