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North Dakota Multilocation Corn Hybrid Performance Results – 2010

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Introduction

This publication reports the results of multilocation corn hybrid trials conducted in three regions of eastern North Dakota. These trials were conducted by the NDSU corn breeding project. The hybrids tested were entered voluntarily by the companies that market them, and the management of these trials was partially financed by the entry fee they paid. Links to the participating companies are summarized in Table 1. This year, we are reporting the results from trials conducted in multiple locations. Other corn hybrid trials were implemented by the Research Extension Centers and other Extension programs in the state and can be found at *www.ag.ndsu.edu/varietytrials/corn*. However, data from single-location trials should be viewed with caution because they are inefficient in predicting the relative performance of hybrids in other environments.

Corn Production and Weather in 2010

In 2010, the area planted to corn was 2.05 million acres, up 5 percent from the previous year. The average yield of corn harvested for grain was a record 137 bushels per acre, up 19 percent from the previous year. Weather conditions were generally favorable for corn production in most of the state. In eastern North Dakota, growing degree day accumulations for the season were near normal, allowing for timely harvest and excellent field drying before harvest. Rainfall was generally adequate. However, cool, wet weather in May delayed the emergence of early planted corn and affected stand establishment in some fields, particularly in low-lying areas.

Experimental Procedures

Hybrids were planted in replicated plots across locations within the three regions. Growing the same hybrids across locations exposed the real (genetic) strengths and weaknesses of hybrids for all traits evaluated. Experiments were conducted utilizing partially balanced lattice designs. These incomplete block designs were up to 194 percent efficient in 2010, meaning they were almost two times more efficient than if we were to conduct trials with randomized complete block designs (RCBD). The larger the number of hybrids evaluated, the more the results are impacted negatively by nongenetic causes in an RCBD. For instance, if trials have more than 60 entries, we do not recommend the use of RCBD. Even, with lower numbers, controlling the environment with incomplete block designs is advantageous.

Plots consisted of three 30-inch rows 23 feet in length. Plots were overseeded and later thinned to the desired population. Stand counts were recorded at harvest; no yield bias was associated with plant population. Entries were planted and harvested by machines adapted for small experimental plots**.** Grain yield was adjusted to 15.5 percent moisture.

Data Analysis

Data were analyzed using analyses of variance (ANOVA). ANOVA were performed for all traits within and among locations. The homogeneity of variances was evaluated for each location. Means adjusted by incomplete blocks were used when the relative efficiency of lattices was higher than 105 percent compared with RCBD. Sources of variation were partitioned by genetic effects, environmental effects and the ones due to genotype by environment interaction. Fisher-protected least significant differences (LSD) were used to compare among genotype means at $P \leq 0.05$. LSDs at the 5 percent level were calculated from these analyses and are placed at the bottom of each column of data. These values apply only to the numbers in the column in which they appear.

If the difference (for instance, for yield) between two varieties exceeds the LSD value, it means that with 95 percent confidence, the higher-yielding hybrid has a significant yield advantage. Conversely, when the difference between the means of two hybrid is less than the LSD value, the hybrid have no statistical differences. The coefficient of variation (CV), which also is placed at the bottom of each column, is a measure of the variability for that trait within the trial. Large CVs mean a large amount of variation in the experiment cannot be explained by just the genetic variation among the hybrids. Also, low-mean experiments may cause this value to be high. Therefore, high CVs for low-mean experiments might not mean lack of accuracy.

Hybrids are ranked in descending order for yield in each table. Carefully consider grain moisture at harvest in addition to yield. Comparing the yields of hybrids with similar moisture levels allows you to compare the yield of hybrids with similar relative maturities (RM). RM given are independent industry estimates for hybrids. Therefore, values for grain moisture might not correspond to RM given. We recommend you closely pay attention to grain moisture values. These results also can be viewed on the Web at *www.ag.ndsu.nodak.edu/plantsci/breeding/corn*.

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Table 1. Companies that submitted hybrids for evaluation by NDSU in eastern North Dakota in 2010 with their websites.

G2 Genetics (now NuTech Seed LLC.), www.yieldleader.com
Gold Country Seed Inc., www.goldcountryseed.com
Hyland Seeds, www.hylandseeds.com
Integra Seed, www.FortifiedSeed.com
Monsanto Co., www.dekalb.com
NuTech Seed LLC, www.yieldleader.com
Peterson Farms Seed, www.petersonfarmsseed.com
Pioneer Hi-Bred Intl. Inc., www.pioneer.com
Proseed, www.proseed.net
Seeds 2000 Inc., www.seeds2000.net
Stine Seed Co., www.stineseed.com
Terning Seeds, www.terningseeds.com
Wensman Seed, www.wensmanseed.com

Table 2. Corn hybrid performance - Northeastern Zone (Thompson, Lakota and Larimore).

Company	Hybrid	RM	Grain Yield	Grain Moisture	Test Weight
			(bu/A)	(%)	(lb/bu)
Hyland Seeds	HL B32R	87	156.2	22.1	50.6
NuTech	5N-186 GT/CB/LL/RW	86	148.0	22.6	53.0
Gold Country	84-24 VT3	84	147.3	22.2	53.3
Wensman	W 8085VT2PRO	84	146.0	22.2	52.2
Proseed	787 VT3	87	143.1	22.5	52.2
Hyland Seeds	HL B24R	85	138.8	26.1	48.7
Seeds 2000	2823 CBLL	82	136.5	23.9	51.6
Proseed	781 RRBt	83	135.6	26.8	48.6
Proseed	1084 CVT3	82	131.6	21.8	53.2
Monsanto	DEKALB DKC30-20 (VT3)	80	130.4	18.9	57.0
Hyland Seeds	8234	86	128.3	21.9	50.9
Monsanto	DEKALB DKC33-54 (RR2)	83	127.8	20.0	55.7
Hyland Seeds	HL R228	85	126.0	20.9	52.9
NuTech	0A-183	83	125.7	20.5	52.2
NuTech	3T-484 VT3	84	125.4	22.8	51.7
Proseed	981 GTCBLL	81	125.0	20.6	54.7
NuTech	3T-083 VT3	83	124.4	22.2	53.1
G2 Genetics	5H-885 RR/HX	85	122.6	24.5	50.3
Pioneer Hi-Bred	Pioneer 39V07	79	122.6	19.0	53.5
Seeds 2000	8201 VT3	82	122.3	21.6	52.3
Pioneer Hi-Bred	Pioneer P8581R	85	121.7	21.0	53.6
G2 Genetics	5H-884 RR/HX	84	120.8	21.6	53.2
Peterson	PFS 54M83	83	119.4	21.4	55.0
G2 Genetics	5H-080 RR/HX	82	118.8	19.4	51.9
Hyland	HL 4227	85	117.4	21.7	56.3
Gold Country	84-03 VT3	84	115.7	21.5	53.8
Seeds 2000	2852 GTCBLL	85	113.7	23.4	50.1
Dyna-Gro	51V57	85	113.0	32.4	49.1
Gold Country	81-21 VT3	81	111.9	19.3	54.6
NuTech	3T-482 VT3	82	110.8	19.8	56.9
Proseed	884 VT3	84	110.4	22.5	56.4
Dyna-Gro	50K21	78	110.4	20.1	54.4
Dyna-Gro	51V45	82	109.2	22.4	55.7
NuTech	3A-484 RR	84	105.4	24.7	49.3
Pioneer Hi-Bred	Pioneer 39D97	80	104.3	19.0	54.8
Wensman	W 7080VT3	80	103.9	20.9	55.4
Wensman	W 8082VT2PRO	83	103.2	21.4	53.0
NuTech	3A-382 GT	82	100.6	23.1	54.9
Experiment Mean			122.7	22.1	53.1
CV (%)			18.7	8.9	3.9
LSD 0.05			23.2	3.8	4.1

Table 3. Corn hybrid performance – East-central Zone (Casselton, Prosper and Fargo).

Company	Hybrid	RM	Grain Yield (bu/A)	Grain Moisture (%)	Root Ldg. (%)	Stalk Ldg. (%)	Test Weight (lb/bu)
NuTech	5B-290 GT/CB/LL	90	189.3	23.7	0.0	0.7	51.0
Pioneer Hi-Bred	Pioneer 38M58	94	187.9	25.3	0.0	0.0	52.4
Proseed	1091 3000GT	91	187.1	24.6	1.3	0.0	52.5
Proseed	990 GTCBLL	90	178.1	22.6	0.0	0.0	51.1
NuTech	5B-887 GT/CB/LL	87	174.8	28.5	0.0	0.0	51.2
G2 Genetics	5H-992 RR/HX	93	170.4	25.6	1.3	1.6	51.0
Hyland Seeds	HL B32R	87	169.0	21.9	0.0	0.6	53.0
Wensman	W 8107VT2PRO	90	168.9	23.8	0.0	0.0	51.0
NuTech	0A-693	93	167.9	24.0	1.2	1.5	51.0
NuTech	3T-294 VT3	94	164.0	25.1	0.0	0.0	52.0
Peterson	PFS 56J86	86	161.7	22.7	0.0	0.0	50.6
Seeds 2000	2883 GTCBLL	88	161.6	24.8	0.0	0.6	53.9
G2 Genetics	5H-589 RR/HX	89	161.6	25.3	0.0	0.9	51.8
NuTech	1B-291 CB/LL	91	158.7	28.6	1.7	1.7	52.2
Hyland Seeds	8234	86	158.4	22.5	0.0	2.2	58.2
NuTech	5N-186 GT/CB/LL/RW	86	158.2	21.9	0.0	0.0	53.7
Proseed	1086 3000GT	86	157.5	23.1	1.4	1.5	51.0
NuTech	1B-485 CB/LL	85	157.3	22.4	2.5	2.1	52.2
Gold Country	86-16 VT3	86	156.6	22.6	0.0	0.8	54.2
Pioneer Hi-Bred	Pioneer P8917XR	89	153.6	23.0	0.0	0.0	54.1
Wensman	W 6094GTCBLL	88	152.6	24.2	0.0	0.0	52.2
Seeds 2000	2903 GTCBLL	90	151.9	23.0	0.0	0.0	54.6
Peterson	PFS 98L90	90	151.6	23.1	0.0	0.0	52.3
Seeds 2000	8801 VT3	88	151.4	24.1	0.0	0.0	49.7
NuTech	1B-186 GT/CB/LL	86	151.3	23.1	0.0	0.6	53.4
Gold Country	93-39 RR	93	151.3	23.2	0.0	0.7	55.8
Proseed	787 VT3	87	150.2	23.6	0.0	0.0	50.4
Stine	9200 VT3	85	149.5	25.6	1.6	0.0	51.1
Wensman	W 6114GTCBLL	92	149.2	23.3	0.0	0.0	54.6
NuTech	3A-889 RR	89	148.5	28.1	0.0	0.6	51.6
NuTech	1B-592 CB/LL	92	147.9	24.3	0.0	0.0	51.9
NuTech	5N-593 GT/CB/LL/RW	93	146.1	26.6	2.4	0.7	50.9
Peterson	PFS 27V89	89	145.8	24.7	0.0	1.4	51.9
Pioneer Hi-Bred	Pioneer 39B23	89	144.1	23.1	0.0	0.0	52.2
Proseed	1085 RRBt	85	143.0	25.4	3.6	3.2	51.7
Integra	9361VT3	86	142.7	23.3	0.0	0.0	51.4
Wensman	W 7089VT3	86	142.2	21.5	0.0	0.0	50.9
NuTech	3C-889 RR/YGCB	89	140.2	24.3	0.0	0.8	51.9
G2 Genetics	5H-992A RR/HX	92	137.0	23.9	1.4	1.3	51.7
G2 Genetics	5H-885 RR/HX	85	136.9	21.8	0.0	0.0	51.8
G2 Genetics	5H-891 RR/HX	91	132.1	22.5	0.0	0.7	51.8
Pioneer Hi-Bred	Pioneer P8581R	85	130.2	21.8	1.6	0.0	52.8
Gold Country	89-09 VT3P	89	129.8	20.9	0.0	0.0	57.1
Proseed	786 GTCBLL	86	129.2	24.2	0.0	2.5	50.9
Hyland Seeds	HL CVR48	88	128.3	23.1	0.0	0.0	53.2
NuTech	3T-393 VT3	93	123.9	24.8	0.0	0.0	53.0
Experiment Mean			153.2	23.9	0.4	0.6	52.3
CV (%)			16.8	7.5	204.5	227.2	3.3
LSD 0.05			22.5	3.5	3.2	2.5	2.5

Table 4. Corn hybrid performance - Southeastern Zone (Milnor, Barney and Colfax).

Company	Hybrid	RM	Grain Yield (bu/A)	Grain Moisture (%)	Test Weight (lb/bu)
Gold Country	98-90 VT3	98	202.0	27.0	59.4
Gold Country	96-20 VT3	96	202.0	23.6	55.7
G2 Genetics	5H-696 RR/HX	96	198.8	25.3	53.5
G2 Genetics	5H-999 RR/HX	99	196.3	25.8	55.4
Proseed	990 GTCBLL	90	193.8	20.8	54.1
G2 Genetics	5H-700 RR/HX	100	192.5	26.7	54.7
Wensman	W 7270VT3PRO	97	192.1	22.6	54.6
G2 Genetics	5H-501 RR/HX	100	190.3	29.2	55.6
Monsanto	DEKALB DKC48-37 (VT3)	98	189.2	24.1	55.9
G2 Genetics	5X-500 RR/HXT	100	189.2	23.6	55.5
Seeds 2000	9602 G3	96	186.0	22.7	54.5
NuTech	3T-294 VT3	94	182.2	23.1	56.0
Monsanto	DEKALB DKC42-72 (VT3)	92	181.0	22.5	55.5
G2 Genetics	5H-696A RR/HX	96	180.9	26.4	55.3
NuTech	3T-401 VT3	100	180.8	30.3	55.1
G2 Genetics	5X-598A RR/HXT	98	180.0	26.7	53.6
G2 Genetics	5H-797 RR/HX	97	179.2	24.1	54.8
Gold Country	95-11 VT3	95	178.3	20.7	56.6
NuTech	5N-197A GT/CB/LL/RW	97	177.1	32.0	54.5
NuTech	5N-197 GT/CB/LL/RW	97	177.0	32.8	55.7
Proseed	794 3000GT	94	176.7	23.5	55.4
Monsanto	DEKALB DKC45-52 (GENVT3P)	95	175.8	23.2	55.6
Hyland Seeds	8454	92	174.4	23.3	55.0
Hyland Seeds	HL CVR68	98	173.6	29.4	54.2
G2 Genetics	5X-598 RR/HXT	98	173.3	26.5	52.1
Wensman	W 6114GTCBLL	92	172.3	20.7	56.9
Pioneer Hi-Bred	Pioneer 38A57	97	171.9	23.3	57.4
Peterson	PFS 26R92	92	170.4	21.0	54.9
Pioneer Hi-Bred	Pioneer 38M58	94	170.1	23.5	56.2
Wensman	W 7268VT3	97	169.7	23.8	53.0
Pioneer Hi-Bred	Pioneer 38H08	92	168.4	20.4	53.8
Integra Seeds	9453VT3	94	165.4	25.4	53.0
Peterson	PFS 98L90	90	163.4	21.0	55.5
Proseed	E1095 CVT3P	95	162.2	23.3	54.7
Wensman	W 8262STX	97	161.8	30.4	55.4
Wensman	W 7143VT3	93	160.1	22.9	55.1
Wensman	W 7230VT3	96	159.1	23.6	53.5
Wensman	W 8180STX	95	158.6	27.2	52.8
Seeds 2000	9501 VT3	95	157.3	25.4	52.5
NuTech	5N-695 GT/CB/LL/RW	95	156.9	23.2	55.6
Peterson	PFS 27V89	89	156.3	22.0	54.4
Proseed	894 VT3	94	156.3	22.8	55.2
Integra Seeds	9422VT3	92	155.1	21.2	56.1
G2 Genetics	5H-597 RR/HX	97	150.6	36.3	55.4
G2 Genetics	5H-992 RR/HX	93	147.4	21.4	51.5
Seeds 2000	X298G3	98	141.7	32.6	53.0
G2 Genetics	5X-895 RR/HXT	95	141.4	26.5	53.4
Experiment Mean			173.2	25.0	54.8
CV (%)			9.6	6.6	2.7
LSD			21.3	3.5	2.4

Entry forms for entries in the 2011 eastern hybrid performance trials and 2010 breeder data can be obtained by writing to:
Marcelo J. Carena, Corn Breeding and Genetics
North Dakota State University, Department of Plant Sciences
P.O. Box 6050, Dept. 7670
Fargo, ND 58108-6050
or online at: www.ag.ndsu.nodak.edu/plantsci/breeding/corn/Trials/2011CornTrialsApplication.pdf