

2019 Illinois Corn Management Yield Potential Preliminary Report

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The Illinois Corn Management Yield Potential Trial is conducted to help understand the interactions between commercial corn hybrids and different agronomic management factors in order to maximize corn productivity. Our goal is to provide information for a hybrid's management yield potential that can help farmers and agronomists better select hybrids for an intended level of crop management.

Research approach

In our research approach, hybrids with above average yield responses to intensive agronomic management [i.e. supplemental in-season nitrogen (N), banded premium fertilizers, fungicide, high plant density, and/or narrow row spacing] are considered 'high management' hybrids, which we expect would have remarkable yield potential when managed appropriately. On the contrary, hybrids demonstrating exceptional yield under standard management conditions or minimal response to intensive agronomic management are considered optimal for a non-intensive management system.

Trial implementation

The trial was planted using a precision plot planter with variable rate capability (SeedPro 360, ALMACO, Nevada, IA) at Yorkville, IL (41°36'53.01"N, 88°23'10.21"W; 9 June), Champaign, IL (40° 3'8.85"N, 88°14'2.46"W; 31 May), and Ewing, IL (38° 5'56.84"N, 88°50'50.49"W; 5 June). Plots were 17.5 feet in length and two rows in width. Warrior (1.75 oz/acre) was applied prior to planting and Force 3G insecticide at planting for insect protection. Preplant applications of Acuron (3 qt/acre) at Champaign and Ewing and Breakfree ATZ (2 qt/acre) at Yorkville were used for weed control. The trial area at each site received 160 lbs N/acre as UAN (28-0-0) broadcast applied and incorporated prior to planting.

How hybrids were tested

The 48 commercial corn hybrids (36 at each location) listed in Table 1 were assessed for their responses to the different agronomic management levels outlined in Table 2. Hybrids received either no supplemental N in addition to the preplant application or an additional 60 lbs N/acre as UAN-28 applied mid-row with a coulter on 31 June, 4 July, and 9 July in Champaign, Ewing, and Yorkville, respectively. Hybrids were also compared across standard [broadcast MAP (11-52-0) and MOP (0-0-60)] and intensive [MicroEssentials SZ (12-40-0-10S-1Z) banded 4-6" beneath the crop row and broadcast Aspire (0-0-58-0.5B)] fertility schemes (Table 3). Miravis Neo was applied at 13.7 oz/acre at VT/RI (pollination stage) to assess hybrids for their responses to fungicide. Fungicide spray dates were 2 August, 14 August, and 21 August at Champaign, Ewing, and Yorkville respectively. Hybrids were planted at 36,000 or 44,000 plants/acre and in 30- or 20-inch row arrangements to assess their tolerance to increased crowding stress and narrowing row spacing. Lastly, because hybrid performance can largely be controlled by environmental factors, hybrids were planted across three sites in Illinois representing a wide range in inherent soil fertility levels (Table 4).

Data collection and analysis

At maturity, plots were harvested with a two-row plot combine and grain yield was reported as bushels/acre at 15.5% moisture concentration. The percentage of erect plants at the time of harvest were considered the proportion of total plants not leaning at an angle more than 45 degrees or broken below the ear. Plots that were deemed severely affected by lodging or green snap were removed from analysis and results shown in site reports (Tables 5-7). The experimental design was a strip-plot with a split-plot arrangement in four randomized complete blocks within each environment. Statistical analysis was performed using a linear mixed model approach with PROC MIXED in SAS (version 9.4; SAS Institute, Cary, NC) and means were separated using Fisher's protected LSD test at the 0.10 level of significance. The normalities of residuals were assessed using PROC UNIVARIATE and the assumption of homoscedasticity was tested using the Brown-Forsythe modification of the Levene Test in PROC GLM.

Table 1. Hybrid Entries and Distribution

Brand	RM	Hybrid	Yorkville	Champaign	Ewing
AgriGold	111	A641-06STXRIB	x	x	x
AgriGold	111	A641-54VT2PRO	x	x	x
AgriGold	114	A6572VT2RIB	x	x	x
Channel	111	211-44STXRIB	x	x	x
Channel	113	213-93STXRIB	x	x	x
Channel	117	217-76STXRIB	x	x	x
Dekalb	108	DKC58-34RIB	x		
Dekalb	109	DKC59-81RIB	x		
Dekalb	111	DKC61-40RIB	x	x	x
Dekalb	111	DKC61-98RIB		x	x
Dekalb	112	DKC62-52RIB	x	x	x
Dekalb	113	DKC63-57RIB	x	x	x
Dekalb	114	DKC64-34RIB	x	x	x
Dekalb	115	DKC65-94RIB	x	x	x
Dekalb	116	DKC66-17RIB	x	x	x
Dekalb	118	DKC68-69RIB	x	x	x
Dekalb	120	DKC70-27RIB		x	x
Golden Harvest	103	G03R40-5222	x		
Golden Harvest	105	G05K08-3010A	x		
Golden Harvest	106	G06Q68-3220	x		
Golden Harvest	108	G08D29-3120A	x	x	x
Golden Harvest	108	G08M20-3120	x	x	
Golden Harvest	109	G09A86-3330	x	x	x
Golden Harvest	109	G09Y24-3220A	x	x	x
Golden Harvest	110	G10L16-3330A	x	x	x
Golden Harvest	110	G10T63-3122	x	x	x
Golden Harvest	111	G11A33-5222	x		
Golden Harvest	112	G12J11-3220A			x
Golden Harvest	112	G12U17-3010	x	x	x
Golden Harvest	112	G12W66-3122		x	
Golden Harvest	112	GX91214-3120		x	
Golden Harvest	113	G13H15-3120	x	x	x
Golden Harvest	113	G13M88-3110			x
Golden Harvest	113	G13T41-3120	x	x	x
Golden Harvest	113	G13Z50-3220	x	x	x
Golden Harvest	114	G14N11-3110		x	x
Golden Harvest	114	G14V04-3120			x
Golden Harvest	115	G15L32-3330	x	x	x
Golden Harvest	118	G18D87-3111		x	x
Pioneer	110	P1017AMXT	x	x	
Pioneer	110	P1093AMXT			x
Pioneer	111	P1197AM	x	x	x
Pioneer	113	P1366AMXT	x		x
Pioneer	115	P1563AM		x	
Stone	111	6198RIB	x	x	x
Stone	115	6548RIB	x	x	x
Stone	116	6632RIB	x	x	x

Table 2. Agronomic Treatments

Treatment Description	N rate ¹ (lbs/ac)	Fertility ²	VT/ R1 Fungicide ³	Population (plants/ac)	Row spacing
Standard	160	Standard	None	36,000	30
+N sidedress	160 + 60	Standard	None	36,000	30
+Intensive fert.	160 + 60	Intensive	None	36,000	30
+Fungicide	160 + 60	Intensive	Miravis Neo	36,000	30
+High Pop.	160 + 60	Intensive	Miravis Neo	44,000	30
+Narrow	160 + 60	Intensive	Miravis Neo	44,000	20

¹UAN-28 broadcast incorporated preplant + sidedress mid-row at V6 growth stage.

²Standard: 192 lbs/ac MAP and 125 lbs/ac MOP broadcast applied.

Intensive: 250 lbs/ac MicroEssentials SZ banded beneath the crop row and 129 lbs/ac Aspire broadcast applied.

³Miravis Neo (Syngenta) applied at 13.7 oz/acre with 6.4 oz/acre Masterlock.

Table 3. Supplied Nutrients

Treatment Description	N	P ₂ O ₅	K ₂ O	S	Zn	B
	----- lbs/acre -----					
Standard	181	100	75	0	0	0
+N sidedress	241	100	75	0	0	0
+Intensive fertility	251	100	75	25	2.5	0.6
+Fungicide	251	100	75	25	2.5	0.6
+High Population	251	100	75	25	2.5	0.6
+Narrow Rows	251	100	75	25	2.5	0.6

Table 4. Soil Test Levels

Location	OM	CEC	pH	P	K	Ca	Mg	S	Zn
	%	Meq/100g				----- ppm -----			
Yorkville, IL	5.3	27.7	6.8	40	150	3578	808	11	2.6
Champaign, IL	3.4	21.0	6.0	38	148	2765	524	8	1.2
Ewing, IL	1.6	10.7	7.0	54	69	1920	74	26	2.6

Soil samples taken from the 1-6 inch depth prior to planting and extracted using Mehlich III.

Table 5. Yorkville, IL Hybrid Performances

Brand	RM	Hybrid	Average Performance ¹			Yields (bu/acre) ²					
			Moisture (%)	Erect (%)	Yield (bu/acre)	Standard	+N sidedress	+Intensive fertility	+Fungicide	+High population	+Narrow rows
AgriGold	110	A641-06STXRIB	22.0	100	245	240	238	252	250	246	247
AgriGold	115	A641-54VT2PRO	21.9	91	260	253	256	261	265	250	272
AgriGold	115	A6572VT2RIB	21.8	100	260	261	261	264	263	284	235
Channel	111	211-44STXRIB	20.4	99	245	238	249	244	251	255	232
Channel	113	213-93STXRIB	25.1	100	254	245	252	252	261	260	250
Channel	117	217-76STXRIB	27.7	100	246	232	247	241	253	253	251
Dekalb	108	DKC58-34RIB	21.0	100	241	230	229	240	247	258	241
Dekalb	109	DKC59-81RIB	20.9	100	259	255	256	258	270	247	271
Dekalb	111	DKC61-40RIB	20.1	100	255	240	246	251	262	274	259
Dekalb	112	DKC62-52RIB	20.8	98	259	247	252	256	250	264	288
Dekalb	113	DKC63-57RIB	21.3	100	276	274	276	268	289	286	264
Dekalb	114	DKC64-34RIB	24.8	100	254	248	238	254	249	265	264
Dekalb	115	DKC65-94RIB	22.3	100	248	242	242	252	245	259	247
Dekalb	116	DKC66-17RIB	25.4	99	243	241	243	251	247	232	245
Dekalb	118	DKC68-69RIB	30.7	100	257	248	247	258	259	257	275
Golden Harvest	103	G03R40-5222	19.4	100	231	224	224	229	237	250	221
Golden Harvest	105	G05K08-3010A	18.9	97	237	233	230	228	244	238	245
Golden Harvest	106	G06Q68-3220	18.3	99	215	223	227	234	208	208	190
Golden Harvest	108	G08D29-3120A	18.3	94	240	229	232	238	248	256	240
Golden Harvest	108	G08M20-3120	19.1	97	239	233	242	245	233	244	234
Golden Harvest	109	G09A86-3330	20.1	100	237	239	239	242	234	245	221
Golden Harvest	109	G09Y24-3220A	20.7	94	252	249	252	254	245	247	268
Golden Harvest	110	G10L16-3330A	19.8	91	263	259	262	255	273	273	257
Golden Harvest	110	G10T63-3122	21.3	99	257	253	252	262	263	257	258
Golden Harvest	111	G11A33-5222	21.2	100	224	212	220	224	240	232	218
Golden Harvest	112	G12U17-3010	20.9	96	248	241	242	244	249	275	243
Golden Harvest	113	G13H15-3120	20.6	95	245	236	235	240	256	262	239
Golden Harvest	113	G13T41-3120	22.8	99	250	246	241	246	258	251	258
Golden Harvest	113	G13Z50-3220	20.7	100	244	235	240	240	248	259	244
Golden Harvest	115	G15L32-3330	21.7	85	266	263	266	270	275	269	260
Pioneer	110	P1017AMXT	20.4	99	254	245	250	253	259	261	259
Pioneer	111	P1197AM	20.9	100	272	259	259	267	280	282	287
Pioneer	113	P1366AMXT	21.0	100	251	247	254	255	248	240	264
Stone	111	6198RIB	20.9	100	244	245	239	237	249	260	235
Stone	115	6548RIB	26.0	100	245	230	245	251	236	237	269
Stone	116	6632RIB	22.9	100	251	239	240	250	260	259	261
LSD ($P \leq 0.10$)			0.8	3	13	14	14	12	12	15	15
Mean			21.7	98	249	243	245	249	253	255	250
Range			18.3-30.7	85-100	215-276	212-274	220-276	224-270	208-289	208-286	190-288

¹Average Moisture, Erect, and Yield across six agronomic management treatments.

²Values are the average of four replications.

Table 6. Champaign, IL Hybrid Performances

Brand	RM	Hybrid	Average Performance ¹			Yields (bu/acre) ²					
			Moisture (%)	Erect (%)	Yield (bu/acre)	Standard	+N sidedress	+Intensive fertility	+Fungicide	+High population	+Narrow rows
AgriGold	110	A641-06STXRIB	18.5	99	254	231	238	253	267	277	257
AgriGold	115	A641-54VT2PRO	17.8	99	254	248	258	244	276	254	247
AgriGold	115	A6572VT2RIB	19.6	98	270	245	255	255	274	276	310
Channel	111	211-44STXRIB	17.1	100	264	258	258	261	269	267	268
Channel	113	213-93STXRIB	19.5	100	276	271	272	279	276	281	278
Channel	117	217-76STXRIB	19.8	99	241	225	235	234	263	252	244
Dekalb	111	DKC61-40RIB	17.2	100	278	251	266	273	281	302	303
Dekalb	111	DKC61-98RIB	17.3	99	240	226	249	236	236	249	244
Dekalb	112	DKC62-52RIB	16.9	98	256	246	257	249	275	266	248
Dekalb	113	DKC63-57RIB	18.2	100	277	256	273	269	288	292	284
Dekalb	114	DKC64-34RIB	19.3	99	245	227	225	250	264	260	240
Dekalb	115	DKC65-94RIB	19.5	98	241	243	236	243	248	251	234
Dekalb	116	DKC66-17RIB	20.3	99	251	249	232	256	270	247	256
Dekalb	118	DKC68-69RIB	22.3	98	259	219	246	252	288	283	263
Dekalb	120	DKC70-27RIB	21.0	100	276	228	262	272	304	309	286
Golden Harvest	108	G08D29-3120A	16.3	99	260	247	258	247	277	275	256
Golden Harvest	108	G08M20-3120	17.4	99	245	225	232	237	253	261	261
Golden Harvest	109	G09A86-3330	17.5	99	246	234	241	240	260	267	234
Golden Harvest	109	G09Y24-3220A	18.4	99	268	231	262	272	282	288	275
Golden Harvest	110	G10L16-3330A	16.8	99	280	255	281	276	292	288	290
Golden Harvest	110	G10T63-3122	18.6	99	275	239	266	279	283	301	287
Golden Harvest	112	G12U17-3010	18.2	100	247	230	249	243	264	265	234
Golden Harvest	112	G12W66-3122	18.9	100	229	214	230	226	238	241	223
Golden Harvest	112	GX91214-3120	18.9	97	261	239	262	260	274	267	263
Golden Harvest	113	G13H15-3120	18.2	99	244	231	249	238	251	252	240
Golden Harvest	113	G13T41-3120	19.7	100	240	236	255	208	256	246	230
Golden Harvest	113	G13Z50-3220	19.3	100	254	241	252	250	254	256	267
Golden Harvest	114	G14N11-3110	18.9	99	270	258	268	266	276	274	277
Golden Harvest	115	G15L32-3330	18.5	97	263	252	267	265	273	269	247
Golden Harvest	118	G18D87-3111	20.9	99	270	253	258	265	294	283	265
Pioneer	110	P1017AMXT	17.7	100	266	255	261	265	277	285	255
Pioneer	111	P1197AM	18.5	100	289	261	277	282	309	293	310
Pioneer	115	P1563AM	19.3	99	271	268	276	270	266	273	271
Stone	111	6198RIB	17.3	99	257	251	250	259	259	273	247
Stone	115	6548RIB	20.2	99	263	254	240	268	274	275	272
Stone	116	6632RIB ³	-	-	-	-	-	-	-	-	-
LSD ($P \leq 0.10$)			0.4	1	12	14	14	14	15	18	18
Mean			18.7	99	259	243	254	256	271	271	262
Range			16.3-22.3	97-100	229-289	214-271	225-281	208-282	236-309	241-309	223-310

¹Ave. Moisture, Erect, and Yield across 6 agronomic management treatments. ²Four replications. ³Stone 6632RIB results are not reported due to green snap.

Table 7. Ewing, IL Hybrid Performances

Brand	RM	Hybrid	Average Performance ¹			Yields (bu/acre) ²					
			Moisture (%)	Erect (%)	Yield (bu/acre)	Standard	+N sidedress	+Intensive fertility	+Fungicide	+High population	+Narrow rows
AgriGold	110	A641-06STXRIB	13.1	98	143	121	146	169	132	147	143
AgriGold	115	A641-54VT2PRO	12.5	99	140	132	127	147	143	139	154
AgriGold	115	A6572VT2RIB	14.6	99	153	145	143	157	168	161	162
Channel	111	211-44STXRIB	12.6	97	151	142	147	161	149	152	158
Channel	113	213-93STXRIB	14.8	98	142	134	128	155	147	141	150
Channel	117	217-76STXRIB	16.4	99	135	132	120	148	138	137	139
Dekalb	111	DKC61-40RIB	12.5	99	151	143	140	158	155	156	164
Dekalb	111	DKC61-98RIB	13.0	98	142	140	130	139	144	140	157
Dekalb	112	DKC62-52RIB	11.8	99	155	144	150	158	172	151	155
Dekalb	113	DKC63-57RIB	13.0	97	156	140	140	163	167	155	166
Dekalb	114	DKC64-34RIB	14.9	99	135	126	128	143	140	132	148
Dekalb	115	DKC65-94RIB	14.4	98	149	135	161	162	139	148	145
Dekalb	116	DKC66-17RIB	16.5	97	144	129	155	162	149	141	129
Dekalb	118	DKC68-69RIB	19.0	97	138	134	134	145	149	138	140
Dekalb	120	DKC70-27RIB	18.6	98	134	127	138	150	132	126	136
Golden Harvest	108	G08D29-3120A	12.1	100	122	109	90	129	148	131	126
Golden Harvest	109	G09A86-3330	13.4	99	118	115	81	123	145	128	134
Golden Harvest	109	G09Y24-3220A	12.9	98	139	130	124	151	136	147	146
Golden Harvest	110	G10L16-3330A	11.8	97	144	129	131	140	142	145	174
Golden Harvest	110	G10T63-3122	12.8	99	123	107	97	135	129	129	139
Golden Harvest	112	G12J11-3220A	12.8	99	123	96	123	136	123	116	141
Golden Harvest	112	G12U17-3010	12.8	98	106	96	92	114	109	85	135
Golden Harvest	113	G13H15-3120	14.1	98	103	89	99	129	110	94	102
Golden Harvest	113	G13M88-3110	16.8	99	122	104	85	138	137	137	134
Golden Harvest	113	G13T41-3120	15.6	98	107	101	115	131	92	78	111
Golden Harvest	113	G13Z50-3220	14.6	99	134	137	137	142	137	115	134
Golden Harvest	114	G14N11-3110	15.8	98	123	112	128	148	117	111	124
Golden Harvest	114	G14V04-3120	11.6	98	114	78	93	137	126	123	130
Golden Harvest	115	G15L32-3330	14.3	100	117	107	114	119	119	107	126
Golden Harvest	118	G18D87-3111	13.8	97	94	97	92	108	88	70	105
Pioneer	110	P1093AMXT	12.7	99	122	113	107	122	128	115	153
Pioneer	111	P1197AM	13.8	100	133	124	119	147	141	138	149
Pioneer	113	P1366AMXT	12.4	100	96	101	94	101	86	78	117
Stone	111	6198RIB	13.2	97	123	112	116	117	133	125	132
Stone	115	6548RIB	17.5	99	139	120	141	156	125	134	152
Stone	116	6632RIB	14.1	99	138	131	124	145	137	152	145
LSD ($P \leq 0.10$)			1.3	2	20	25	25	22	22	21	21
Mean			14.1	98	131	120	122	141	134	128	140
Range			11.6-19.0	97-100	94-156	78-145	81-161	101-169	86-172	70-161	102-174

¹Average Moisture, Erect, and Yield across six agronomic management treatments.

²Values are the average of four replications.