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Agricultural Experiment Station

Colorado State University

College of Agricultural Sciences | Department of Soil & Crop Sciences | Extension

Making Better Decisions

2023 Colorado Corn Variety Performance Trials

Crops Testing

Table of Contents

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Research conducted by Colorado State University Crops Testing Program
Department of Soil and Crop Sciences
Colorado State University Extension
Colorado Agricultural Experiment Station

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Additional Corn Resources

Colorado State University Crop Variety Testing Program: www.csucrops.com
Colorado Corn: Best Management Practices for Colorado Farms: http://waterquality.colostate.edu/documents/BMP_Corn6192020.pdf

2023 Colorado Corn Hybrid Performance Trials

Sally Jones-Diamond

Colorado State University (CSU) conducts hybrid corn performance trials to provide research-based, unbiased, current, and reliable information to Colorado corn producers to make better planting decisions. CSU promotes crop variety testing as a service to crop producers and seed companies who depend on us for crop variety performance information. The corn trials are made possible by funding received from company entry fees, the Colorado Corn Promotion Council, and the CSU Agricultural Experiment Station.

Colorado State University personnel planted five irrigated and two dryland corn grain hybrid performance trials in Colorado in addition to an irrigated silage performance trial. Irrigated grain trial locations were at Burlington, Holyoke, Wiggins, and Yuma. The irrigated silage trial was at Rocky Ford. The dryland trials were located at Akron and Julesburg. All but one trial was harvested. The Burlington irrigated site was lost due to heavy volunteer corn pressure that cultivation could not control. Forty-five hybrids with diverse origins, maturities, and value-added traits were tested at the different irrigated and dryland trial locations.

In 2023, there were microbiological product trials planted at two irrigated sites (Burlington and Holyoke) and one dryland site (Akron). These trials tested three products from two different companies and compared them to an untreated control. Treatments included bacterial products from Indigo Ag. and VanGrow Biotechnology. The trials were to determine if/how the various products affected the plant stands, grain yield, and quality compared to the untreated control.

All trial results were statistically analyzed and reported shortly after harvest on our website at www.csucrops.com.

Testing Methods

Hybrids were included in the tests based on paid company entries where company representatives select and enter hybrids and provide seed for planting. Sometimes check hybrids are included at the request of the farmer cooperators, or at our discretion based on past performance or production acreage in the region for certain hybrids.

All trial entries were randomized within each replication using a randomized complete block design. Irrigated hybrid performance trials contained three replicates at each location, with 35-foot plots, each containing four rows planted with 30 inch spacing. The center two rows of each irrigated plot were used for data collection. The dryland hybrid performance trials contained four replications at each location, with 35-foot-long plots and the same row configurations and harvested area as the irrigated trials. The microbiological product trials were set up exactly as the hybrid performance trials, with a minimum of six replications done at each trial location.

Plots at all locations, except the Rocky Ford research station were planted using a four-row Seed Research Equipment Solutions (SRES) 2013 Classic Aire small-plot vacuum planter equipped with

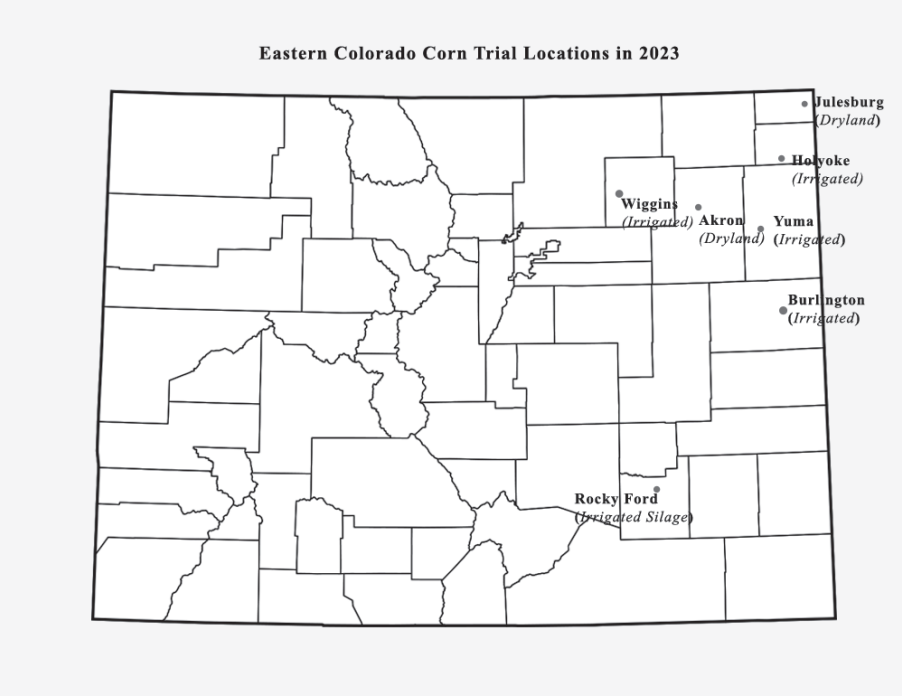
Monosem seed meters. Trials at Rocky Ford were planted with an International 800 cone planter. All irrigated trials were planted at 34,000 seeds per acre. The dryland trial at Julesburg was planted at 17,000 seeds per acre while the dryland trials at Akron were planted at 14,000 seeds per acre. Grain yields for all trial hybrids are reported in their respective tables.

Corn plots at all locations except Rocky Ford were harvested using a Case IH 1620 combine modified for small-plots and equipped with an H2 GrainGage weighing system (provides weight, moisture, and test weight). Irrigated plots at Rocky Ford were harvested using a modified Massey Ferguson combine equipped with a weighing system. The Rocky Ford location measured grain moisture and test weight using a Dickey John GAC 2100b. All yields have been adjusted to 15.5% moisture content.

Data Results

The least significant difference (LSD) is provided at the bottom of each results table. The LSD is used to help determine whether differences in hybrid yields are statistically significant. If the difference between two hybrid yields equals or exceeds the LSD value, the difference is significant. If two entries being compared have a difference in yield that is less than the LSD value, those two entries are considered equal yielding. Farmers should use the LSD ($P<0.30$) (which has a larger range of tolerance) for selecting superior hybrids to minimize economic loss due to false negative conclusions (concluding hybrids are the same when they are actually different). Scientists, academics and others may wish to use LSD ($P<0.05$) (which has a narrower range of tolerance) to minimize the risk of false positive conclusions (concluding hybrids are different when they are actually the same). Hybrid yields in bold are in the highest LSD yield group and are considered to be equal yielding to each other, but higher yielding than the non-bolded hybrid yields. Hybrids in the table are first grouped by maturity range and then sorted from highest to lowest yield.

While yield performance is the primary focus of this report, many factors should be considered when selecting a hybrid. These factors may include time to maturity, herbicide tolerance, disease resistance, pest tolerance, standability, drought tolerance and cost.



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2023 Dryland Corn Hybrid Performance Trial at Akron

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Brand	Hybrid	Insect and Herbicide Technology Traits[a]	Grain Yield[b]	Yield	Relative Maturity[c]	Moisture	Test Weight	Ear Height	Population
			bu/ac	% of test avg.		percent	lb/bu	in	plants/ac
Channel Seed	200-23	VT2PRIB, RR2	**128**	115%	100	17	58	28	15,017
Channel Seed	200-42	VT2PRIB, RR2	119	106%	100	17	59	29	14,673
Dekalb	DKC48-68	SSRIB, LL, RR2	112	100%	98	15	60	35	14,638
Channel Seed	195-85	DG, VT2P, RR2	107	96%	95	17	59	33	13,996
Channel Seed	194-49	DG, VT2P, RR2	103	92%	94	16	60	32	13,994
Dekalb	DKC47-54	SSRIB, LL, RR2	102	91%	97	15	60	28	14,904
		Average	**112**	**100%**	**97**	**16**	**59**	**31**	**14,500**
		Replicates	4			4	4	1	4
		[d]LSD (0.30)	8						
		[d]LSD (0.05)	16						
		Coefficient of Variation (CV)	10						

[a]Technology trait designations: DG=DroughtGard; LL=LibertyLink; RR2=Roundup Ready 2; SSRIB=SmartStax Refuge in a Bag Complete; VT2P=VecTran Double Protection; VT2PRIB=VecTran Double Protection Refuge in a Bag Complete. For a list of specific pests controlled by each trait, please click here.

[b]Yields corrected to 15.5% moisture.

[c]Relative maturity is provided by the respective companies and is the approximate time from planting to harvest maturity. The method of calculation of the relative maturity ratings may vary among companies.

[d]If the difference between varieties is equal to or greater than the LSD value, the chance the difference is significant is 70% (for LSD 0.30). There were no statistically significant differences at the 0.05 level. Farmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may use LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same).

Site Information

Collaborator:	Central Great Plains USDA-ARS Research Station
Planting Date:	May 25, 2023
Harvest Date:	October 19, 2023
Fertilizer:	Pre-plant: N at 50 lb/ac
Herbicides:	Pre-plant: Sharpen at 2 oz/ac, Sterling Blue at 4 oz/ac, and Buccaneer at 48 oz/ac
Soil Type:	Weld silt loam
Trial Coordinates:	40.15427, -103.14370
Trial Comments:	Planted into moisture in wheat residue. Good stands and emergence. Good weed control throughout the season. Radar estimates showed the trial received about 15.2 inches of rain from planting to harvest, and 21.8 inches since January 1st, which is 138% of the ten-year average (year-to-date).

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2023 Irrigated Corn Hybrid Performance Trial at Holyoke

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Brand	Hybrid	Insect and Herbicide Technology Traits[a]	Grain Yield[b]	Yield	Relative Maturity[c]	Moisture	Test Weight	Plant Height	Population
			bu/ac	% of test avg.		percent	lb/bu	in	plants/ac
109-114 Relative Maturity									
Pioneer	P0908 AML	AML, LL, RR2	**224**	119%	109	14	62	99	35,074
Pioneer	P1366 Q	Q, LL, RR2	215	114%	113	16	62	95	34,603
Pioneer	P1164 AM	AM, LL, RR2	212	113%	111	16	62	100	36,031
Pioneer	P1122 AML	AML, LL, RR2	205	109%	111	16	62	99	34,858
Dyna-Gro Seed	D49SP83	SSPro, LL, RR2	205	109%	109	14	62	95	33,780
Dekalb	DKC62-69	SS, LL, RR2	201	106%	112	16	62	92	35,422
Dyna-Gro Seed	D54SS74	SS, LL, RR2	186	99%	114	16	61	91	33,041
Dyna-Gro Seed	D51SS61	SS, LL, RR2	173	92%	111	15	60	99	31,545
101-108 Relative Maturity									
Pioneer	P0859 AM	AM, LL, RR2	210	111%	108	14	61	94	34,861
Dekalb	DKC107-33	SSPro, LL, RR2	175	93%	107	13	61	89	33,310
Dekalb	DKC56-65	SSRIB, LL, RR2	171	91%	106	13	61	79	33,300
Channel Seed	201-07	SSPro, LL, RR2	163	86%	101	12	60	87	28,918
Dyna-Gro Seed	D48SS50	SS, LL, RR2	151	80%	108	13	61	87	32,713
Dyna-Gro Seed	D45SP33	SSPro, LL, RR2	149	79%	105	12	59	87	33,680
		Average	**189**	**100%**	**109**	**14**	**61**	**92**	**33,700**
		Replicates	3			3	3	1	3
		[d]LSD (0.30)	12						
		[d]LSD (0.05)	23						
		Coefficient of Variation (CV)	8						

[a]Technology trait designations: AM=AcreMax; AML=AcreMax Leptra; LL=LibertyLink; Q=QROME; RR2=Roundup Ready 2; SS=SmartStax; SSPro=SmartStax Pro; SSRIB=SmartStax RIB Complete. For a list of specific pests controlled by each trait, please click here.

[b]Yields corrected to 15.5% moisture. Hybrid yields in bold are in the top LSD group (0.30).

[c]Relative maturity is provided by the respective companies and is the approximate time from planting to harvest maturity. The method of calculation of the relative maturity ratings may vary among companies.

[d]If the difference between varieties is equal to or greater than the LSD value, the chance the difference is significant is 70% (for LSD 0.30). There were no statistically significant differences at the 0.05 level. Farmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may use LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same).

Site Information

Collaborator:	Brent Adler
Planting Date:	May 3, 2023
Harvest Date:	October 24, 2023
Fertilizer:	Planting: N at 22, P at 55, K at 14, S at 14, Zn at 1.5 lb/ac
Soil Type:	Julesburg loamy sand
GPS Coordinates:	40.36517, -102.09600
Trial Comments:	Planted into corn stubble, excellent stands and emergence. Radar estimates showed the trial received about 21.5 inches of rain from planting to harvest, and 24.7 inches since January 1st, which is 120% of the ten-year average (year-to-date).

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2023 Dryland Corn Hybrid Performance Trial at Julesburg

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Brand	Hybrid	Insect and Herbicide Technology Traits[a]	Grain Yield[b]	Yield	Relative Maturity[c]	Moisture	Test Weight	Ear Height	Population
			bu/ac	% of test avg.		percent	lb/bu	in	plants/ac
Hoegemeyer Hybrids	7094 Q	Q, LL, RR2	**92**	109%	100	11	58	27	15,885
Dekalb	DKC47-54	SSRIB, LL, RR2	86	102%	97	11	58	26	15,647
Hoegemeyer Hybrids	7523 Q	Q, LL, RR2	84	100%	105	10	58	30	15,660
Hoegemeyer Hybrids	7138 AM	AM, LL, RR2	83	99%	101	10	55	30	15,939
Hoegemeyer Hybrids	7681 AML	AML, LL, RR2	83	99%	106	11	55	27	15,958
Channel Seed	195-85DG	DG, VT2P, RR2	76	91%	95	9	56	28	16,119
		Average	**84**	**100%**	**101**	**10**	**57**	**28**	**15,900**
		Replicates	4			4	4	1	4
		[d]LSD (0.30)	5						
		[d]LSD (0.05)	NS						
		Coefficient of Variation (CV)	9						

[a]Technology trait designations: AM=AcreMax; AML=AcreMax Leptra; LL=LibertyLink; Q=QROME; RR2=Roundup Ready 2; SSRIB=SmartStax RIB Complete; VT2P=VecTran Double Protection. For a list of specific pests controlled by each trait, please click here.

[b]Yields corrected to 15.5% moisture. Hybrid yields in bold are in the top LSD group (0.30).

[c]Relative maturity is provided by the respective companies and is the approximate time from planting to harvest maturity. The method of calculation of the relative maturity ratings may vary among companies.

[d]If the difference between varieties is equal to or greater than the LSD value, the chance the difference is significant is 70% (for LSD 0.30). There were no statistically significant differences at the 0.05 level. Farmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may use LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same).

Site Information

Collaborator:	Carlson Farms
Planting Date:	May 22, 2023
Harvest Date:	October 14, 2023
Soil Type:	Richfield loam
GPS Coordinates:	40.82122, -102.32380
Trial Comments:	Planted in to heavy stripper header wheat stubble. Very good stands and emergence. Radar estimates showed the trial received about 10.7 inches of rain from planting to harvest, and 19.6 inches since January 1st, which is 113% of the ten-year average (year-to-date).

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2023 Irrigated Corn Hybrid Performance Trial at Wiggins

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Brand	Hybrid	Insect and Herbicide Technology Traits[a]	Grain Yield[b]	Yield	Relative Maturity[c]	Moisture	Test Weight	Plant Height	Population
			bu/ac	% of test avg.		percent	lb/bu	in	plants/ac
Channel Seed	204-54	SSPro, LL, RR2	**196**	113%	104	15	60	93	33,018
Dekalb	DKC56-65	SSRIB, LL, RR2	179	103%	106	15	60	79	34,117
NK Seed	NK0922-V	V, RR2	176	101%	109	15	60	91	31,544
NK Seed	NK0243-D	D, RR2	173	100%	102	15	60	86	34,064
NK Seed	NK0007-AA	AA, RR2	170	98%	100	15	61	80	31,630
Pioneer	P0908 AML	AML, LL, RR2	166	96%	109	15	61	85	36,391
NK Seed	NK0821-D	D, RR2	163	94%	108	17	60	92	35,216
Channel Seed	201-07	SSPro, LL, RR2	162	94%	101	13	60	79	30,763
		Average	**173**	**100%**	**105**	**15**	**60**	**86**	**33,300**
		Replicates	3			3	3	1	3
		[d]LSD (0.30)	9						
		[d]LSD (0.05)	19						
		Coefficient of Variation (CV)	6						

[a]Technology trait designations: AA=Agrisure Above; AML=AcreMax Leptra; D=Duracade; LL=LibertyLink; RR2=Roundup Ready 2; SSPro=SmartStax Pro; SSRIB=SmartStax RIB Complete; V=Viptera. For a list of specific pests controlled by each trait, please click here.

[b]Yields corrected to 15.5% moisture. Hybrid yields in bold are in the top LSD group (0.30).

[c]Relative maturity is provided by the respective companies and is the approximate time from planting to harvest maturity. The method of calculation of the relative maturity ratings may vary among companies.

[d]If the difference between varieties is equal to or greater than the LSD value, the chance the difference is significant is 70% (for LSD 0.30). There were no statistically significant differences at the 0.05 level. Farmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may use LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same).

Site Information

Collaborator:	Cooksey Farms, LLC
Planting Date:	May 22, 2023
Harvest Date:	November 4, 2023
Fertilizer:	Pre-Plant: N at 20, P at 16, K at 11.5, S at 8 lb/ac and humic acid at 1 gal/ac In-Season: N at 200 lb/ac through strip tillage and pivot
Soil Type:	Truckton sandy loam
GPS Coordinates:	39.99784, -104.10372
Trial Comments:	Planted into dry bean stubble, excellent stands and emergence. Plant leaf burn occurred in July due to negative interaction of crop oil concentrate in a herbicide mix and high humidity at time of application. Radar estimates showed the trial received about 13 inches of rain from planting to harvest, and 23 inches since January 1st, which is 135% of the ten-year average (year-to-date).

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2023 Irrigated Corn Hybrid Performance Trial at Yuma

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Brand	Hybrid	Insect and Herbicide Technology Traits[a]	Grain Yield[b]	Yield	Relative Maturity[c]	Moisture	Test Weight	Plant Height	Population
			bu/ac	% of test avg.		percent	lb/bu	in	plants/ac
106-114 Relative Maturity									
Hoegemeyer Hybrids	7917 Q	Q, LL, RR2	**253**	114%	109	18	60	104	32,777
Hoegemeyer Hybrids	8235 Q	Q, LL, RR2	**244**	110%	112	20	60	111	32,668
Hoegemeyer Hybrids	7772 Q	Q, LL, RR2	239	108%	107	16	59	110	31,898
Pioneer	P0859 AM	AM, LL, RR2	238	108%	108	16	59	110	33,860
Dyna-Gro Seed	D49SP83	SSPro, LL, RR2	222	100%	109	15	60	108	34,609
Dekalb	DKC63-90	SXRA, LL, RR2	218	98%	113	13	59	106	34,552
Dyna-Gro Seed	D51SS61	SS, LL, RR2	217	98%	111	18	59	109	31,234
Dyna-Gro Seed	D54SS74	SS, LL, RR2	208	94%	114	18	59	105	30,910
96-105 Relative Maturity									
Hoegemeyer Hybrids	7549 Q	Q, LL, RR2	242	110%	105	16	60	104	33,723
Channel Seed	204-54	VT2PRIB, RR2	225	102%	104	13	58	103	32,437
Channel Seed	201-07	SSPro, LL, RR2	219	99%	101	14	59	109	29,829
Dyna-Gro Seed	D45SP33	SSPro, LL, RR2	211	95%	105	11	57	102	29,868
Partners Brand	PB7311	D, RR2	191	86%	103	11	57	112	32,129
Partners Brand	PB6613	V, RR2	172	78%	96	12	59	111	32,118
		Average	**221**	**100%**	**107**	**15**	**59**	**107**	**32,300**
		Replicates	3			3	3	1	3
		[d]LSD (0.30)	9						
		[d]LSD (0.05)	17						
		Coefficient of Variation (CV)	5						

[a]Technology trait designations: AM=AcreMax; D=Duracade; LL=LibertyLink; Q=QROME; RR2=Roundup Ready 2; SS=SmartStax; SSPro=SmartStax Pro; SXRA=SmartStax RIB Complete; V=Viptera. For a list of specific pests controlled by each trait, please click here.

[b]Yields corrected to 15.5% moisture. Hybrid yields in bold are in the top LSD group (0.30).

[c]Relative maturity is provided by the respective companies and is the approximate time from planting to harvest maturity. The method of calculation of the relative maturity ratings may vary among companies.

[d]If the difference between varieties is equal to or greater than the LSD value, the chance the difference is significant is 70% (for LSD 0.30). There were no statistically significant differences at the 0.05 level. Farmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may use LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same).

Site Information

Collaborator:	Byron Weathers
Planting Date:	May 10, 2023
Harvest Date:	October 18, 2023
Fertilizer:	Pre-Plant: N at 40, P at 9, K at 2, S at 11, Zn at 0.2, B at 1, Fe at 0.1, Mo at 0.03 lb/ac In-Season: N at 220
Soil Type:	Julesburg loamy sand
GPS Coordinates:	40.06591, -102.60361
Trial Comments:	Planted into corn stubble, excellent stands and emergence. Radar estimates showed the trial received about 21.6 inches of rain from planting to harvest, and 25.9 inches since January 1st, which is 140% of the ten-year average (year-to-date).

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2023 Irrigated Silage Corn Hybrid Performance Trial at Rocky Ford

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Hybrid	Brand	Insect and Herbicide Technology Traits[b]	Yield				Relative Maturity[d]	Plant Population	Plant Height	Forage Quality[a]											
			Silage[c]	Dry Matter	Yield	Moisture				CP	aNDFom	Lignin	Starch	Ash	Fat	NDFD 30hr	NDFD 240hr	TDN	NEL	Milk/Ton	Beef/Ton
			tons/ac		% of test avg.	% at harvest		plants/ac	in	percent									Mcal/cwt	lb/ton	lb/ton
11591	CHS Allegiant	TRE, RR2	**36.2**	**13.1**	111%	61.5	115	40,157	112	7.6	35.2	3.2	40.4	3.6	2.3	49.9	66.6	73.3	76.2	3211	246
D54SS34	Dyna-Gro Seed	STX, LL, RR2	**35.7**	**12.9**	109%	63.1	114	38,047	112	8.0	35.6	2.4	39.1	4.9	2.1	50.7	66.0	71.4	74.1	3081	230
8595 AML	Hoegemeyer Hybrids	AML, LL, RR2	34.3	12.4	105%	63.8	115	37,843	109	8.0	39.8	3.4	33.1	4.8	1.9	56.7	70.9	71.2	73.9	3115	244
PB8580	Revolution Seed	AVP3111, LL, RR2	33.7	12.2	103%	62.9	115	38,115	118	8.6	39.4	3.0	32.4	5.3	1.8	50.1	66.7	69.8	72.4	2938	206
11171	CHS Allegiant	VT2P, RR2	33.5	12.1	102%	61.0	114	37,979	105	7.5	34.5	3.4	41.0	3.8	2.0	48.4	67.0	73.8	76.8	3156	240
D58SS65	Dyna-Gro Seed	STX, LL, RR2	32.6	11.8	100%	64.4	118	37,094	101	8.2	38.8	3.0	35.2	4.6	2.0	50.5	67.9	70.4	73.0	3034	222
D53SS13	Dyna-Gro Seed	STX, LL, RR2	32.0	11.6	98%	62.2	113	38,523	110	8.1	35.6	2.5	38.5	4.5	2.2	49.1	65.2	71.9	74.7	3100	228
D51SS61	Dyna-Gro Seed	STX, LL, RR2	31.9	11.6	98%	65.1	111	39,204	108	8.4	36.5	2.7	36.9	4.8	1.9	48.5	65.5	71.4	74.2	3014	217
7917 Q	Hoegemeyer Hybrids	Q, LL, RR2	31.7	11.4	97%	63.5	109	37,639	111	8.5	35.5	3.2	38.7	3.9	2.2	52.8	71.1	73.6	76.5	3238	258
8397 Q	Hoegemeyer Hybrids	Q, LL, RR2	30.2	10.9	92%	63.2	113	38,523	109	8.3	38.7	3.4	34.3	4.6	1.7	48.8	67.9	71.3	74.0	2970	214
PB7311	Revolution Seed	AD5122, RR2	27.8	10.1	85%	56.4	103	37,502	107	7.2	36.8	2.5	40.2	4.4	1.9	49.7	65.5	70.9	73.6	3049	223
		Average	**32.7**	**11.8**	**100%**	**62.5**	**113**	**38,239**	**109**	**8.0**	**36.9**	**3.0**	**37.3**	**4.5**	**2.0**	**50.5**	**67.3**	**71.7**	**74.5**	**3082**	**230**
		[c]LSD (0.30)	1.5	0.5																	
		[c]LSD (0.05)	2.9	1.0																	
		Coefficient of Variation (%)	7.3																		

[a]All forage quality analyses results are dry basis values. CP=crude protein; aNDFom=ash free neutral detergent fiber; NDFD=neutral detergent fiber digestibility; TDN=total digestable nutrients; NEL=net energy for lactation; Milk/ton= predicted amount of milk produced per ton of silage dry matter calculated using MILK2006; Beef/ton=predicted amount of beef produced per ton of silage dry matter calculated using ISU Beef.

[b]Technology trait designations: AD5122=D Refuge Renew, formerly Agrisure 5122; AML=AcreMax Leptra; AVP3111=Agrisure Viptera 3111; LL=LibertyLink; Q=QROME; RR2=Roundup Ready 2; STX=SmartStax; TRE=Trecepta; VT2P=VecTran Double Protection.

[c]Silage yield adjusted to 65% moisture content based on dried samples. Hybrid yields in bold are in the top LSD group for the trial (0.30).

[d]Relative maturity is provided by the respective companies and is the approximate time from planting to harvest maturity. The method of calculation of the relative maturity ratings may vary among companies.

[e]Farmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same).

Site Information

Collaborator: CSU Arkansas Valley Research Center (Kevin Tanabe)
Planting Date: May 8, 2023
Harvest Date: September 7, 2023
Herbicide: Mad Dog Plus at 1 qt/ac, Status at 10 oz/ac, and Outlook at 11 oz/ac applied on May 26
Soil Type: Rocky Ford silty clay loam
GPS Coordinates: 38.0389, -103.6933
Trial Comments: Excellent stands and good early growth. The trial was cultivated twice and minimal weed pressure was present through the season. The trial received 7.8 inches of rain from planting to harvest (in addition to irrigation), and 14.3 inches since January 1st, which was 115% of the ten-year average (year-to-date).

COLORADO STATE UNIVERSITY EXTENSION

2023 Dryland Corn
Microbiological Product Trial at Akron

Crops Testing www.csucrops.com

Company	Application Type	Treatment[a]	Yield[b]	Test Weight	Moisture	Population
			bu/ac	lb/bu	percent	plants/ac
None	*n/a*	*Untreated Control*	*117*	*56*	*15*	*14,317*
Van Grow	Dry In-Furrow	ACB-5000	126	56	15	14,370
None	*n/a*	*Untreated Control*	*117*	*56*	*15*	*14,317*
Indigo Ag	Seed Treatment	W12	122	56	14	14,753
None	*n/a*	*Untreated Control*	*117*	*56*	*15*	*14,317*
Indigo Ag	Seed Treatment	W12 and M34	120	57	15	15,099
			121	**56**	**15**	**14,600**
		Replicates	7	7	7	7
		[c]P-Value	0.79, NS			
		Coefficient of Variation (CV)	13.7			

[a]All treatment products were applied at the labeled or instructed rate. Liquid products were not opened or mixed until after arrival at the field site and were mixed with unchlorinated water as a carrier.
[b]Yield corrected to 14% moisture.
[c]The p-value shows that treatment yields were not statistically different from one another, nor were they different from the control (Dunnett's adjustment used).

Site Information

Collaborator:	Central Great Plains USDA-ARS Research Station
Planting Date:	May 25, 2023
Harvest Date:	October 24, 2023
Fertilizer:	Pre-plant: N at 50 lb/ac
Herbicides:	Pre-plant: Sharpen at 2 oz/ac, Sterling Blue at 4 oz/ac, and Buccaneer at 48 oz/ac
Soil Type:	Weld silt loam
Pre-Plant Soil Test Results:	Nitrate-N at 115 lb/ac available in top 2 feet, phosphorus at 14 ppm (bicarb) in top foot organic matter at 1.3 percent, pH of 6.8 (7.9 in 2nd foot), soluble salts at 1.08 mmhos/cm, Sulfate-S at 4 ppm, K at 536 ppm, Fe at 11.3 ppm, Mg at 348 ppm, Zn at 0.1 ppm, Mn at 2.9 ppm, Cu at 0.5 ppm, and B at 0.4 ppm
Trial Comments:	Planted into moisture in wheat residue. Good stands and emergence. Good weed control throughout the season. Radar estimates showed the trial received about 15.2 inches of rain from planting to harvest, and 21.8 inches since January 1st, which is 138% of the ten-year average (year-to-date).

COLORADO STATE UNIVERSITY EXTENSION

2023 Irrigated Corn
Microbiological Product Trial at Holyoke

Crops Testing www.csucrops.com

Company	Application Type	Treatment[a]	Yield[b]	Test Weight	Moisture	Population
			bu/ac	lb/bu	percent	plants/ac
None	*n/a*	*Untreated Control*	*147*	*57*	*12*	*32,440*
Indigo Ag	Seed Treatment	W12 and M34	158	57	12	33,006
None	*n/a*	*Untreated Control*	*147*	*57*	*12*	*32,440*
Indigo Ag	Seed Treatment	W12	157	57	12	32,747
None	*n/a*	*Untreated Control*	*147*	*57*	*12*	*32,440*
Van Grow	Dry In-Furrow	ACB-5000	148	57	12	31,654
			153	**57**	**12**	**32,500**
		Replicates	6	6	6	6
		[c]P-Value	0.34, NS			
		Coefficient of Variation (CV)	10.3			

[a]All treatment products were applied at the labeled or instructed rate. Liquid products were not opened or mixed until after arrival at the field site and were mixed with unchlorinated water as a carrier.
[b]Yield corrected to 14% moisture.

[c]The p-value shows that treatment yields were not statistically different from one another, nor were they different from the control (Dunnett's adjustment used).

Site Information

Collaborator:	Brent Adler
Planting Date:	May 3, 2023
Harvest Date:	October 24, 2023
Soil Type:	Julesburg loamy sand
Pre-Plant Soil Test Results:	Nitrate-N at 11 lb/ac available in top 2 feet, phosphorus at 12 ppm (bicarb) in top foot organic matter at 1.2 percent, pH of 7.5, soluble salts at 0.58 mmhos/cm, Sulfate-S at 3 ppm, K at 334 ppm, Fe at 14.9 ppm, Mg at 240 ppm, Zn at 2.2 ppm, Mn at 3.2 ppm, Cu at 0.8 ppm, and B at 0.3 ppm
Trial Comments:	Planted into corn stubble, excellent stands and emergence. Radar estimates showed the trial received about 21.5 inches of rain from planting to harvest, and 24.7 inches since January 1st, which is 120% of the ten-year average (year-to-date).

COLORADO STATE UNIVERSITY EXTENSION

2023 Irrigated Corn
Microbiological Product Trial at Wiggins

Crops Testing www.csucrops.com

Company	Application Type	Treatment[a]	Yield[b]	Test Weight	Moisture	Population	Plant Height
			bu/ac	lb/bu	percent	plants/ac	inches
None	*n/a*	*Untreated Control*	*203*	*57*	*14*	*33,114*	*92*
Van Grow	Dry In-Furrow	ACB-5000	202	57	14	32,689	92
None	*n/a*	*Untreated Control*	*203*	*57*	*14*	*33,114*	*92*
Indigo Ag	Seed Treatment	W12	202	57	14	32,389	88
None	*n/a*	*Untreated Control*	*203*	*57*	*14*	*33,114*	*92*
Indigo Ag	Seed Treatment	W12 and M34	193	57	14	33,018	92
			200	**57**	**14**	**32,800**	**91**
		Replicates	4	4	4	4	2
		[c]P-Value	0.54, NS				
		Coefficient of Variation (CV)	5.1				

[a]All treatment products were applied at the labeled or instructed rate. Liquid products were not opened or mixed until after arrival at the field site and were mixed with unchlorinated water as a carrier.
[b]Yield corrected to 14% moisture.
[c]The p-value shows that treatment yields were not statistically different from one another, nor were they different from the control (Dunnett's adjustment used).

Site Information

Collaborator:	Cooksey Farms, LLC
Planting Date:	May 22, 2023
Harvest Date:	November 4, 2023
Fertilizer:	Pre-Plant: N at 20, P at 16, K at 11.5, S at 8 lb/ac and humic acid at 1 gal/ac In-Season: N at 200 lb/ac through strip tillage and pivot
Soil Type:	Truckton sandy loam
Pre-Plant Soil Test Results:	Nitrate-N at 30 lb/ac available in top 2 feet, phosphorus at 24 ppm (bicarb) in top foot organic matter at 1.6 percent, pH of 7.4, soluble salts at 0.80 mmhos/cm, Sulfate-S at 15 ppm, K at 177 ppm, Fe at 11.5 ppm, Mg at 219 ppm, Zn at 2.8 ppm, Mn at 4.5 ppm, Cu at 1.0 ppm, and B at 0.7 ppm
Trial Comments:	Planted into dry bean stubble, excellent stands and emergence. Used Channel 204-54 corn hybrid for all treatments. Plant leaf burn occurred in July due to negative interaction of crop oil concentrate in a herbicide mix and high humidity at time of application. Radar estimates showed the trial received about 13 inches of rain from planting to harvest, and 23 inches since January 1st, which is 135% of the ten-year average (year-to-date).

The Handy Bt Trait Table

Version January 2024

for U.S. Corn Production

Compiled by
Chris DiFonzo
Michigan State University

Web site hosting by
Pat Porter
Texas A&M University

The most up-to-date version of this table plus related extension materials are free online at:
https://www.texasinsects.org/bt-corn-trait-table.html
Questions? Comments? Complaints? difonzo@msu.edu

~ A helpful list of trait packages to make it easier to understand seed guides, sales materials, and bag tags ~

Updated design for 2024

In the past, all Bt trait packages have been in the trait table. But over the years, some industry colleagues commented that leaving older products in the table was confusing if growers assumed they could still be purchased. However, information on older packages is needed to interpret planting or research records from previous years. Also, companies still refer to original traits (like Herculex I or YieldGard) on field signs, web sites, and seed guides, because single traits are components of newer multi-trait hybrids.

To finally address this concern, the 2024 table is split. I looked at 2024 seed guides from the major seed companies plus many smaller regional providers. If I found a trait package offered in at least one hybrid, from any company, it stayed on the current trait table (page 2). Trait packages which were not found as standalone hybrids were moved into a new 'phased out' table (below) for historical reference. Hopefully, this split addresses any confusion in availability. This is a work in progress; if you see an error in the 'phased out' table, send me some evidence and I'll move that package back into the current table.

New Bt names: Names of pesticidal proteins that come from bacteria were recently updated. Most Bts in the trait table are unchanged, but **Cry34/35Ab1** is now **Gpp34Ab1/Tpp35Ab1**. I kept the old name in the Bt Trait Table for now, since many seed guides and extension materials haven't caught up to the change. But related materials on the Texas A&M website are up to date.

ABBREVIATIONS in the TRAIT TABLE

Insect Pest Targets

BCW black cutworm
CEW corn earworm
CRW corn rootworm
ECB European corn borer
FAW fall armyworm
NCR northern corn rootworm
SB stalk borer
SCB sugarcane borer
SWCB southwestern corn borer
TAW true armyworm
WBC western bean cutworm
WCR western corn rootworm

Herbicide Tolerance

GLY glyphosate / Roundup-Ready
LL glufosinate / Liberty Link
LL? check the bag tag for LL status
Enlist 2,4-D & fops / Enlist trait

Refuge

Unless specified as RIB (Refuge In Bag), all other percentages assume separate, structured refuge areas planted in strips, blocks, borders, or whole fields

HISTORICAL REFERENCE Trait packages phased out as standalone hybrids *some may be components of current trait package	**Bag tag code**	**Proteins in package *********** Font type denotes target:** caterpillar or *rootworm*	**Marketed to control:** BCW	CEW	ECB	FAW	SB	SCB	SWCB	TAW	WBC	CRW	**Species w/ resistance to all Bts in package**	**Refuge, northern states** (higher in south)	**Herbicide tolerance**
AcreMax RW	AMRW	*Cry34/35Ab1*										x	NCR WCR	10% RIB	GLY LL
AcreMax TRIsect	AMT	Cry1Ab Cry1F *mCry3A*	x	x	x	x	x	x	x			x	CEW FAW WBC WCR	10% RIB	GLY LL
Herculex I	HXI	Cry1F	x		x	x	x	x	x				ECB FAW SWCB WBC	20%	GLY LL
Herculex RW	HXRW	*Cry34/35Ab1*										x	NCR WCR	20%	GLY LL
Intrasect TRIsect	CYHR	Cry1Ab Cry1F *mCry3A*	x	x	x	x	x	x	x			x	CEW FAW WBC WCR	20%	GLY LL
Intrasect Xtra	YXR	Cry1Ab Cry1F *Cry34/35Ab1*	x	x	x	x	x	x	x			x	CEW FAW NCR WBC WCR	20%	GLY LL
Intrasect Xtreme	CYXR	Cry1Ab Cry1F *Cry34/35Ab1 mCry3A*	x	x	x	x	x	x	x			x	CEW FAW WBC WCR	5%	GLY LL
TRIsect	CHR	Cry1F *mCry3A*	x		x	x	x	x	x			x	ECB FAW SWCB WBC WCR	20%	GLY LL
VT Triple PRO	VT3P	Cry1A.105 Cry2Ab2 *Cry3Bb1*		x	x	x	x	x	x			x	CEW NCR WCR	20%	GLY
YieldGard Corn Borer	YGCB	Cry1Ab		x	x			x	x				CEW	20%	GLY
YieldGard Rootworm	YGRW	*Cry3Bb1*										x	NCR WCR	20%	GLY
YieldGard VT Triple	VT3	Cry1Ab *Cry3Bb1*		x	x			x	x			x	CEW NCR WCR	20%	GLY

The Handy Bt Trait Table for U.S. Corn Production

Version: January 2024

Currently available trait packages, A-Z (alternate name)	Bag tag code	Proteins in package ********** Font type denotes target: caterpillar or *rootworm*	Marketed to control: BCW	CEW	ECB	FAW	SB	SCB	SWCB	TAW	WBC	CRW	Species w/ resistance to all Bts in package	Refuge, northern states (higher in south)	Herbicide tolerance (? = check the bag tag)
AcreMax	AM	Cry1Ab Cry1F	x	x	x	x	x	x	x				CEW FAW WBC	5% RIB	GLY LL
AcreMax1	AM1	Cry1F *Cry34/35Ab1*	x		x	x	x	x	x			x	ECB FAW NCR SWCB WBC WCR	10% RIB 20% ECB	GLY LL
AcreMax Leptra	AML	Cry1Ab Cry1F Vip3A	x	x	x	x	x	x	x	x	x			5% RIB	GLY LL
AcreMax Xtra	AMX	Cry1Ab Cry1F *Cry34/35Ab1*	x	x	x	x	x	x	x			x	CEW FAW NCR WBC WCR	10% RIB	GLY LL
AcreMax Xtreme	AMXT	Cry1Ab Cry1F *Cry34/35Ab1 mCry3A*	x	x	x	x	x	x	x			x	CEW FAW WBC WCR	5% RIB	GLY LL
Agrisure 3000GT	3000GT	Cry1Ab *mCry3A*		x	x			x	x			x	CEW WCR	20%	GLY LL
Agrisure 3010 (Agrisure GT/CB/LL)	3010	Cry1Ab		x	x			x	x				CEW	20%	GLY LL
Agrisure Above (Agrisure 3120EZ) AA Refuge Renew (Agrisure 3120)	AA	Cry1Ab Cry1F	x	x	x	x	x	x	x				CEW FAW WBC	EZ: 5% RIB Renew: 5%	GLY LL?
Agrisure Total (Agrisure 3122EZ) AT Refuge Renew (Agrisure 3122)	AT	Cry1Ab Cry1F *Cry34/35Ab1 mCry3A*	x	x	x	x	x	x	x			x	CEW FAW WBC WCR	EZ: 5% RIB Renew: 5%	GLY LL?
Agrisure Viptera 3110	3110	Cry1Ab Vip3A	x	x	x	x	x	x	x	x	x			20%	GLY LL
Agrisure Viptera 3111	3111	Cry1Ab Vip3A *mCry3A*	x	x	x	x	x	x	x	x	x	x	WCR	20%	GLY LL
Duracade (Agrisure 5122EZ) D Refuge Renew (Agrisure 5122)	D	Cry1Ab Cry1F *eCry3.1Ab mCry3A*	x	x	x	x	x	x	x			x	CEW FAW WBC WCR	EZ: 5% RIB Renew: 5%	GLY LL?
Duracade Viptera (Agrisure 5222EZ) DV Refuge Renew (Agrisure 5222)	DV	Cry1Ab Cry1F Vip3A *eCry3.1Ab mCry3A*	x	x	x	x	x	x	x	x	x	x	WCR	EZ: 5% RIB Renew: 5%	GLY LL?
Duracade Viptera Z3 (Agrisure 5332EZ) DVZ Refuge Renew (Agrisure 5332)	DVZ	Cry1Ab Cry1A.105 Cry2Ab2 Vip3A *eCry3.1Ab mCry3A*	x	x	x	x	x	x	x	x	x	x	WCR	EZ: 5% RIB Renew: 5%	GLY LL?
Herculex XTRA	HXX	Cry1F *Cry34/35Ab1*	x		x	x	x	x	x			x	ECB FAW NCR SWCB WBC WCR	20%	GLY LL
Intrasect	YHR	Cry1Ab Cry1F	x	x	x	x	x	x	x				CEW FAW WBC	5%	GLY LL
Leptra	VYHR	Cry1Ab Cry1F Vip3A	x	x	x	x	x	x	x	x	x			5%	GLY LL
Powercore	PW	Cry1A.105 Cry2Ab2 Cry1F	x	x	x	x	x	x	x				CEW WBC	5%	GLY LL
Powercore Refuge Adv.	PWRA	Cry1A.105 Cry2Ab2 Cry1F	x	x	x	x	x	x	x				CEW WBC	5% RIB	GLY LL
Powercore Enlist Refuge Adv.	PWE	Cry1A.105 Cry2Ab2 Cry1F	x	x	x	x	x	x	x				CEW WBC	5% RIB	GLY LL Enlist
QROME	Q	Cry1Ab Cry1F *Cry34/35Ab1 mCry3A*	x	x	x	x	x	x	x			x	CEW FAW WBC WCR	5% RIB	GLY LL
SmartStax/Genuity SmartStax	SS SX	Cry1A.105 Cry2Ab2 Cry1F *Cry3Bb1 Cry34/35Ab1*	x	x	x	x	x	x	x			x	CEW NCR WBC WCR	5%	GLY LL
SmartStax Enlist or SS Enlist Refuge Advanced	SSE	Same as SmartStax	x	x	x	x	x	x	x			x	CEW NCR WBC WCR	5% Adv: 5% RIB	GLY LL Enlist
SmartStax Refuge Adv. or SmartStax RIB Complete	SXRA	Same as SmartStax	x	x	x	x	x	x	x			x	CEW NCR WBC WCR	5% RIB	GLY LL
SmartStax PRO	SSPro	Cry1A.105 Cry2Ab2 Cry1F *Cry3Bb1 Cry34/35Ab1 dvSnf7*	x	x	x	x	x	x	x			x	CEW WBC	5%	GLY LL
SmartStax PRO Enlist or SSPro Enlist Refuge Advanced	SSPro	Same as SmartStax Pro	x	x	x	x	x	x	x			x	CEW WBC	5% Adv: 5% RIB	GLY LL Enlist
SmartStax PRO Refuge Adv. RIB Complete, or w/RNAi Tech	SSPro	Same as SmartStax Pro	x	x	x	x	x	x	x			x	CEW WBC	5% RIB	GLY LL
Trecepta RIB Complete	TRERIB	Cry1A.105 Cry2Ab2 Vip3A	x	x	x	x	x	x	x	x	x			5% RIB	GLY
Viptera (Agrisure 3220EZ) Vip Refuge Renew (Agrisure 3220)	V	Cry1Ab Cry1F Vip3A	x	x	x	x	x	x	x	x	x			EZ: 5% RIB Renew: 5%	GLY LL?
Viptera Z3 (Agrisure 3330EZ) VZ Refuge Renew (Agrisure 3330)	VZ	Cry1Ab Cry1A.105 Cry2Ab2 Vip3A	x	x	x	x	x	x	x	x	x			EZ: 5% RIB Renew: 5%	GLY LL?
Vorceed Enlist	V	Cry1A.105 Cry2Ab2 Cry1F *Cry3Bb1 Cry34/35Ab1 dvSnf7*	x	x	x	x	x	x	x			x	CEW NCR WBC	5% RIB	GLY LL Enlist
VT Double PRO	VT2P	Cry1A.105 Cry2Ab2		x	x	x	x	x	x				CEW	5%	GLY
VT2 PRO RIB Complete	VT2PRIB	Cry1A.105 Cry2Ab2		x	x	x	x	x	x				CEW	5% RIB	GLY
VT3 PRO RIB Complete	VT3PRIB	Cry1A.105 Cry2Ab2 *Cry3Bb1*		x	x	x	x	x	x			x	CEW NCR WCR	10% RIB	GLY
VT4 PRO w/RNAi Tech.	VT4PRO	Cry1A.105 Cry2Ab2 Vip3A *Cry3Bb1 dvSnf7*	x	x	x	x	x	x	x	x	x	x		5% RIB	GLY

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