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Department of Soil & Crop Sciences

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**2017 Colorado
Corn
Variety
Performance
Trials**

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Department of Soil and Crop Sciences
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2017 Colorado Corn Hybrid Performance Trials

Jerry Johnson and Sally Jones

Colorado State University conducts hybrid corn performance trials to provide research-based, unbiased and reliable information to Colorado corn producers so they can select the best hybrids for their farms. The corn trials are made possible by funding received from company entry fees and the CSU Agricultural Experiment Station.

Colorado produced over 187 million bushels of corn on 1,270,000 harvested acres in 2017 according to the USDA National Ag. Statistics Service (www.nass.usda.gov). The total value of production was over 569 million dollars in 2016 (most recent year available). Figure 1 shows the dryland and irrigated corn acres planted in Colorado from 1997 through 2016. Dryland corn acreage had decreased from 2012-2015, but in 2016 the acreage increased dramatically. In general, there is a substantial increase in dryland acreage over the past 20 years, starting from 154,000 acres in 1996 and increasing to over 500,000 in 2016.

No – till systems and herbicide resistant corn have played a large part in increasing acreage. Higher corn prices in some years have led to increased corn acreage. The rapid decrease in corn value, drought from 2011-2014, and stubbornly high prices for corn inputs combined to make corn less desirable and resulted in reduced acres for a few years.

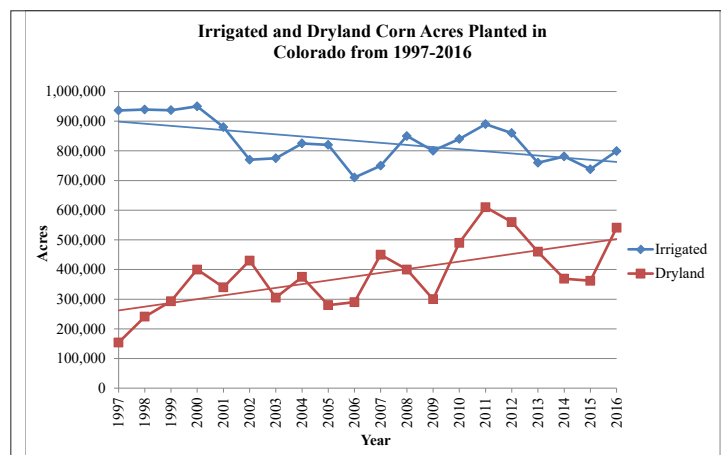


Figure 1: Irrigated and Dryland Corn Acres Planted in Colorado from 1997- 2016

Figure 2 shows the yearly average yield for irrigated and dryland corn in Colorado from 1997 through 2016. There is a steady linear increase in irrigated corn yield from 161 bu/ac in 1997 to 190 bu/ac in 2014. Note that in 2006 and 2010 average yields were 200 bu/ac or better! Improved genetics and more precise farming practices may account for the increasing general trend in average irrigated yield. The high average yields in 2006 and 2010 were most likely due to higher than average growing season heat units (longer growing season).

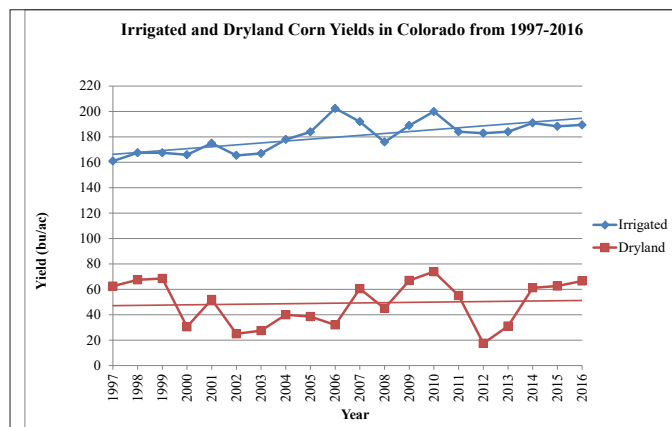
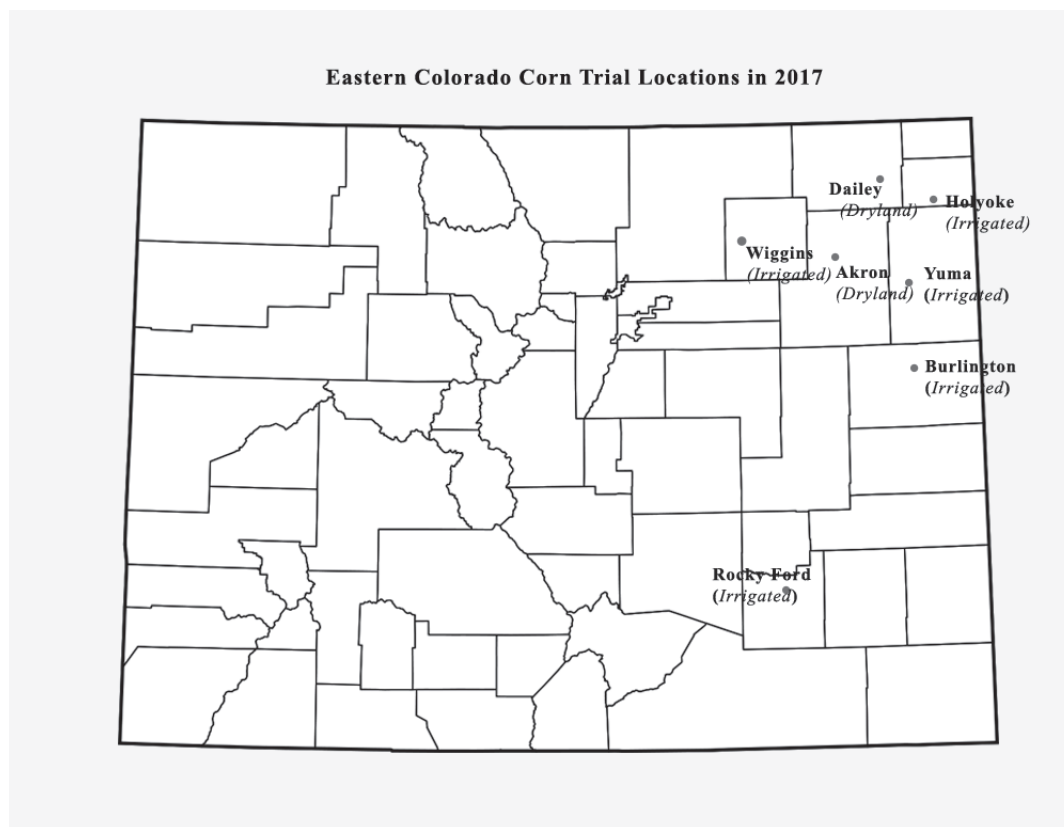


Figure 2: Irrigated and Dryland Corn Yields in Colorado from 1997-2016

Dryland corn yields are highly dependent on weather conditions during the growing season. The amount and timing of rainfall received can make- or-break dryland corn yields. This was true in the drought years from 2002 through 2006, and again in 2012 and 2013 when there was not enough rainfall during the growing season and the average dryland corn yield fell below 50 bu/ac. The yield has seen a slight increase the past few

years.

Colorado State University personnel planted five irrigated and two dryland corn trials in eastern Colorado. Irrigated trial locations were Burlington, Holyoke, Rocky Ford, Wiggins, and Yuma. The dryland trials were located at Akron and Dailey. Forty-five hybrids with diverse origins, maturities, and value-added traits were tested in our different irrigated and dryland trial locations based on company entries. Plot sizes were 150 ft² in the irrigated trials and 300 ft² in the dryland trials. All trials were replicated four times. All irrigated trials were planted at 34,000 seeds per acre. The dryland trial at Dailey was planted at 17,000 seeds per acre and the dryland trial at Akron was planted at 14,000 seeds per acre. Seed yields for all trial varieties are reported in the tables. Yield adjusted to 15.5% seed moisture content.



2017 Irrigated Corn Variety Performance Trial at Holyoke

Brand	Hybrid	Insect and Herbicide Technology Traits ^a	Yield ^b bu/ac	Relative Maturity ^c	Moisture percent	Test Weight lb/bu	Plant Height in	Population plants/ac	Bacterial Leaf Streak score (1-5) ^d
AgVenture	EXP186147YHB	INT, RR2, LL	294.3	114	18.8	57.1	121	32,234	4
AgVenture	EXP185137YHB	INT, RR2, LL	294.1	113	16.9	57.1	115	31,871	3
Pioneer	P0801AM	AM, RR2, LL	286.3	108	15.6	57.3	120	30,565	3
Dyna-Gro Seed	D52VC63	VT2Pro, RR2	280.4	112	18.9	55.7	119	30,782	4
NuTech\G2 Genetics	5F308	AM, RR2, LL	271.6	108	15.9	58.8	118	31,073	3
NuTech\G2 Genetics	5F510	AM, RR2, LL	271.2	110	16.6	59.1	113	31,944	3
Dyna-Gro Seed	D50VC30	VT2Pro, RR2	267.1	110	15.2	57.9	118	33,576	2
AgVenture	EXP183117AM	AM, RR2, LL	266.2	111	18.0	56.1	113	32,067	3
NuTech\G2 Genetics	5F906	AM, RR2, LL	261.9	106	16.3	58.5	117	28,907	3
Pioneer	P0805AM	AM, RR2, LL	260.7	108	16.5	59.7	116	31,654	4
Dyna-Gro Seed	D51SS54	STX, RR2, LL	259.9	111	16.9	58.0	110	32,487	2
Pioneer	P1151AM	AM, RR2, LL	252.3	111	17.2	59.2	114	31,694	4
Dyna-Gro Seed	D52SS91	STX, RR2, LL	252.0	112	19.5	57.4	107	31,331	2
Allegiant	11000 SS RIB	STXRIB, RR2, LL	250.9	110	16.4	57.6	114	30,279	3
Dyna-Gro Seed	D46VC62	VT2Pro, RR2	246.7	106	15.7	57.1	110	32,743	2
AgVenture	EXP182127YHB	INT, RR2, LL	241.4	112	17.4	58.3	117	31,944	3
Dyna-Gro Seed	D45SS65	STX, RR2, LL	240.4	105	14.5	58.5	112	32,525	1
Dyna-Gro Seed	D45VC65	VT2Pro, RR2	237.2	105	14.6	58.5	110	31,621	2
Dyna-Gro Seed	D44VC36	VT2Pro, RR2	233.5	104	14.8	58.4	113	31,750	1
Dekalb	DKC55-20RIB	STXRIB, RR2, LL	233.1	105	14.3	58.0	115	31,624	3
Dyna-Gro Seed	D50SS51	STX, RR2, LL	232.6	110	16.4	58.7	110	29,997	1
Allegiant	10890 SS RIB	STXRIB, RR2, LL	231.7	108	15.8	57.4	110	31,000	1
Dekalb	DKC56-45RIB	STXRIB, RR2, LL	231.3	106	16.7	57.9	111	28,895	2
Dyna-Gro Seed	D47VC29	VT2Pro, RR2	230.7	107	15.5	57.6	107	30,056	1
Dekalb	DKC51-38RIB	STXRIB, RR2, LL	214.3	101	14.0	58.2	111	30,983	3
Allegiant	10590 SS RIB	STXRIB, RR2, LL	211.5	105	14.5	58.9	114	31,441	2
Allegiant	10117 SS RIB	STXRIB, RR2, LL	207.4	101	15.0	57.9	107	31,796	2
Dyna-Gro Seed	D49VC39	VT2Pro, RR2	204.6	109	17.0	56.9	108	24,394	4
Dekalb	DKC50-08RIB	STXRIB, RR2, LL	183.6	100	14.0	58.6	107	27,525	3
Average			246.5	108	16.2	58.0	113	30,992	2

^aLSD (P<0.30)

11.0

^bTechnology trait designations: AM=Optimum AcreMax; INT=Optimum Intrasect; LL=LibertyLink; RR2=Roundup Ready 2; STX=Genuity Smart Stax; STXRIB=Genuity SmartStax Refuge in the Bag Complete; VT2Pro=Genuity VecTran Double Protection.

^cYields corrected to 15.5% moisture.

^dRelative 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.

^eBacterial Leaf Streak (*Xanthomonas vasicola* pv. *vasculorum*) Score: 1 equals little disease present (1-20% of leaf area affected) and 5 equals severe disease presence (81-100% of leaf area affected).

^fIf the difference between two hybrid yields equals or exceeds the LSD value, there is a 70% chance the difference is significant.

Site Information

Collaborator: Brent Adler
 Planting Date: May 8, 2017
 Harvest Date: November 1, 2017
 Fertilizer: N at 230, P at 60, K at 60, and S at 30 lb/ac; Starter: N at 3, P at 12, and Zn at 1.5 lb/ac
 Herbicide: 1st application: glyphosate at 48 oz/ac, Status at 4 oz/ac, and atrazine at 0.75 lb/ac; 2nd application: glyphosate at 48 oz/ac, Status at 4 oz/ac, and Dual 1.33 pt/ac
 Soil Type: Valent sand
 Irrigation Type: Center pivot

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2017 Irrigated Corn Variety Performance Trial at Rocky Ford

Brand	Hybrid	Insect and Herbicide Technology Traits ^a	Yield ^b bu/ac	Relative Maturity ^c	Moisture percent	Test Weight lb/bu	Plant Height in	Population plants/ac
Dyna-Gro Seed	D52VC63	VT2Pro, RR2	336.0	112	17.1	56.7	118	33,106
Dyna-Gro Seed	D52SS91	STX, RR2, LL	302.6	112	17.5	58.0	110	33,783
Dyna-Gro Seed	D50VC30	VT2Pro, RR2	293.7	110	14.8	57.6	119	34,558
Dyna-Gro Seed	D50SS51	STX, RR2, LL	289.2	110	14.9	58.6	113	32,525
Dyna-Gro Seed	D51SS54	STX, RR2, LL	277.9	111	15.7	57.5	112	34,654
Dyna-Gro Seed	D46VC62	VT2Pro, RR2	277.8	106	14.4	57.6	112	34,364
Dyna-Gro Seed	D49VC39	VT2Pro, RR2	273.7	109	15.1	57.0	110	31,266
Pioneer	P1151AM	AM, RR2, LL	253.7	111	16.1	59.0	120	33,299
Dyna-Gro Seed	D47VC29	VT2Pro, RR2	251.6	107	14.0	57.5	106	34,267
Dyna-Gro Seed	D45SS65	STX, RR2, LL	242.5	105	13.5	58.3	114	33,009
Dyna-Gro Seed	D41SS71	STX, RR2, LL	237.9	101	13.3	58.3	115	33,686
Dyna-Gro Seed	D44VC36	VT2Pro, RR2	233.1	104	14.4	57.2	111	34,074
Dyna-Gro Seed	D45VC65	VT2Pro, RR2	232.6	105	13.2	59.0	113	33,493
Dyna-Gro Seed	D39DC43	VT2Pro, RR2	219.8	99	13.2	57.1	110	33,590
Average			265.9	107	14.8	57.8	113	33,548

^dLSD (P<0.30)

15.8

^aTechnology trait designations: AM=Optimum AcreMax; LL=LibertyLink; RR2=Roundup Ready 2; STX=Genuity SmartStax; VT2Pro=Genuity VecTran Double Protection.

^bYields corrected to 15.5% moisture.

^cRelative 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.

^dIf the difference between two hybrid yields equals or exceeds the LSD value, there is a 70% chance the difference is significant.

Site Information

Collaborator: Arkansas Valley Research Center
 Planting Date: May 8, 2017
 Harvest Date: November 1, 2017
 Fertilizer: N at 10, P at 27, K at 3, and S at 1 lb/ac applied June 12
 N at 173, K at 20, S at 33, and Zn at 2 lb/ac applied June 13
 Herbicide: Status at 7.5 oz/ac and Roundup at 32 oz/ac on June 2
 Soil Type: Rocky Ford silty clay loam
 Irrigation: Furrow irrigated on May 19, June 15, June 29, July 15, Aug. 15, and Sept. 5
 Comments: Trial was damaged by hail on July 26

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2017 Irrigated Corn Variety Performance Trial at Burlington

Brand	Hybrid	Insect and Herbicide Technology Traits ^a	Yield ^b	Relative Maturity ^c	Moisture	Test Weight	Plant Height	Population
			bu/ac		percent	lb/bu	in	plants/ac
Pioneer	P0805AM	AM, RR2, LL	210.8	108	15.1	60.3	111	30,565
NuTech\G2 Genetics	5F906	AM, RR2, LL	196.2	106	15.2	59.6	109	29,040
AgVenture	EXP183117AM	AM, RR2, LL	192.5	111	17.8	57.7	113	31,234
AgVenture	EXP185137YHB	INT, RR2, LL	189.4	113	17.0	58.2	107	30,105
Dyna-Gro Seed	D52VC63	VT2Pro, RR2	188.3	112	14.5	57.9	108	30,408
Dyna-Gro Seed	D52SS91	STX, RR2, LL	185.6	112	16.7	59.3	98	30,565
Dyna-Gro Seed	D51SS54	STX, RR2, LL	184.2	111	14.2	58.7	103	29,621
Dyna-Gro Seed	D46VC62	VT2Pro, RR2	183.9	106	13.2	58.3	106	31,291
AgVenture	EXP182127YHB	INT, RR2, LL	179.3	112	15.9	59.4	108	30,596
AgVenture	EXP186147YHB	INT, RR2, LL	177.7	114	18.2	58.9	112	30,274
Dyna-Gro Seed	D50SS51	STX, RR2, LL	172.4	110	14.6	60.4	105	28,895
Pioneer	P1151AM	AM, RR2, LL	169.0	111	16.2	61.1	112	29,565
Dyna-Gro Seed	D49VC39	VT2Pro, RR2	162.8	109	13.7	58.1	107	24,934
Dyna-Gro Seed	D50VC30	VT2Pro, RR2	160.5	110	13.7	59.5	113	30,782
NuTech\G2 Genetics	5F308	AM, RR2, LL	160.0	108	14.6	60.4	109	29,693
NuTech\G2 Genetics	5F510	AM, RR2, LL	157.6	110	14.5	60.8	109	30,129
Dyna-Gro Seed	D45SS65	STX, RR2, LL	157.3	105	12.7	60.2	103	30,782
Dyna-Gro Seed	D44VC36	VT2Pro, RR2	155.8	104	12.4	58.8	103	31,348
Dyna-Gro Seed	D47VC29	VT2Pro, RR2	155.1	107	12.6	58.5	100	28,050
Dyna-Gro Seed	D45VC65	VT2Pro, RR2	150.2	105	12.4	59.2	95	29,595
Average			174.4	109	14.8	59.3	106	29,874

^dLSD (P<0.30)

12.2

^aTechnology trait designations: AM=Optimum AcreMax; INT=Optimum Intrasect; LL=LibertyLink; RR2=Roundup Ready 2; STX=Genuity Smart Stax; VT2Pro=Genuity VecTran Double Protection.

^bYields corrected to 15.5% moisture.

^cRelative 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.

^dIf the difference between two hybrid yields equals or exceeds the LSD value, there is a 70% chance the difference is significant.

Site Information

Collaborator: Tim Stahlecker
 Planting Date: May 16, 2017
 Harvest Date: November 1, 2017
 Fertilizer: N at 220, P at 60, S at 10, Zn at 1.25 lb/ac
 Herbicide: 1st application: Roundup PowerMAX at 32 oz/ac, WideMatch at 1.33 pt/ac, atrazine at 1 pt/ac; 2nd application: Roundup PowerMAX at 32 oz/ac
 Soil Type: Kuma-Keith silt loam
 Irrigation Type: Center pivot

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2017 Irrigated Corn Variety Performance Trial at Yuma

Brand	Hybrid	Insect and Herbicide Technology Traits ^a	Yield ^b bu/ac	Relative Maturity ^c	Moisture percent	Test Weight lb/bu	Population plants/ac	Plant Height in	Bacterial Leaf Streak score (1-5) ^d
Pioneer	P0801AM	AM, RR2, LL	287.8	108	14.6	58.9	31,166	117	3
NuTech\G2 Genetics	5F308	AM, RR2, LL	274.6	108	15.3	60.1	32,743	115	4
Dekalb	DKC64-34	STX, RR2, LL	273.7	114	14.2	59.5	32,380	112	2
NuTech\G2 Genetics	5F906	AM, RR2, LL	273.3	106	15.8	59.5	31,077	111	4
B-H Genetics	BH 8399VT2P	VT2Pro, RR2	272.4	113	14.4	59.3	33,162	108	4
Dyna-Gro Seed	D52VC63	VT2Pro, RR2	270.3	112	15.2	58.9	32,231	112	3
Dyna-Gro Seed	D52SS91	STX, RR2, LL	269.2	112	15.9	59.5	32,811	101	3
NuTech\G2 Genetics	5F510	AM, RR2, LL	268.4	110	15.3	60.7	32,670	111	4
Pioneer	P1151AM	AM, RR2, LL	263.4	111	15.6	60.1	31,218	109	3
Pioneer	P0805AM	AM, RR2, LL	262.2	108	15.4	60.5	31,145	116	4
B-H Genetics	BH 8590VT2P	VT2Pro, RR2	247.0	115	14.2	60.1	31,073	99	4
Dyna-Gro Seed	D51SS54	STX, RR2, LL	246.8	111	14.5	59.1	32,670	104	2
Allegiant	11000 SS RIB	STXRIB, RR2, LL	246.0	110	14.1	59.0	31,420	107	3
Dyna-Gro Seed	D50VC30	VT2Pro, RR2	245.3	110	12.7	59.1	33,388	115	1
Dekalb	DKC60-87RIB	STXRIB, RR2, LL	238.4	110	13.7	60.2	31,363	102	3
Allegiant	10890 SS RIB	STXRIB, RR2, LL	237.8	108	13.6	59.3	31,799	103	2
Dyna-Gro Seed	D44VC36	VT2Pro, RR2	235.4	104	13.0	60.1	32,418	116	2
Dyna-Gro Seed	D50SS51	STX, RR2, LL	235.1	110	13.5	60.7	30,710	103	1
Allegiant	10117 SS RIB	STXRIB, RR2, LL	231.1	101	13.1	59.1	31,913	103	3
Allegiant	10590 SS RIB	STXRIB, RR2, LL	230.7	105	12.4	59.7	31,291	111	2
Dyna-Gro Seed	D47VC29	VT2Pro, RR2	229.5	107	12.5	59.0	31,871	110	2
Dyna-Gro Seed	D46VC62	VT2Pro, RR2	225.2	107	13.4	58.9	30,947	105	3
Dyna-Gro Seed	D45SS65	STX, RR2, LL	221.9	105	12.7	60.2	32,949	112	2
Dyna-Gro Seed	D49VC39	VT2Pro, RR2	220.5	109	14.2	58.2	25,918	109	4
Dekalb	DKC63-21RIB	STXRIB, RR2, LL	218.7	113	13.2	58.8	33,541	103	1
B-H Genetics	BH 7646VT2P	VT2Pro, RR2	218.0	106	12.5	58.6	32,017	103	4
Dekalb	DKC60-67RIB	STXRIB, RR2, LL	214.9	110	13.9	59.9	31,654	107	3
Dyna-Gro Seed	D45VC65	VT2Pro, RR2	214.6	105	12.8	59.8	30,977	109	3
Average			245.4	109	14.0	59.5	31,733	108	3

^eLSD (P<0.30)

13.3

^aTechnology trait designations: AM=Optimum AcreMax; LL=LibertyLink; RR2=Roundup Ready 2; STXRIB=Genuity SmartStax Refuge in the Bag Complete; STX=Genuity SmartStax; VT2Pro=Genuity VecTran Double Protection.

^bYields corrected to 15.5% moisture.

^cRelative maturity is provided by the respective companies and is the approximate time from planting to harvest maturity.

^dBacterial Leaf Streak (*Xanthomonas vasicola* pv. *vasculorum*) Score: 1 equals little disease present (1-20% of leaf area affected) and 5 equals severe disease presence (81-100% of leaf area affected).

^eIf the difference between two hybrid yields equals or exceeds the LSD value, there is a 70% chance the difference is significant.

Site Information

Collaborator: Joe Newton
 Planting Date: May 12, 2017
 Harvest Date: November 13, 2017
 Fertilizer: N at 240, P at 25, K at 0, S at 45 lb/ac
 Herbicide: Early post-emergence: Clarity at 8 oz/ac, atrazine at 1 pt/ac, Roundup at 1 qt/ac; Mid-season: Clarity at 4 oz/ac, Laudis at 3 oz/ac, Dual Magnum at 1.3 pt/ac, Roundup at 1 qt/ac
 Insecticide: Belt, Oberon, Bifenture, Dimethoate
 Soil Type: Julesburg loamy sand

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2017 Irrigated Corn Variety Performance Trial at Wiggins

Brand	Hybrid	Insect and Herbicide Technology Traits ^a	Yield ^b bu/ac	Relative Maturity ^c	Moisture percent	Test Weight lb/bu	Population plants/ac	Plant Height in
NuTech\G2 Genetics	5F308	AM, RR2, LL	277.0	108	16.2	58.2	30,422	112
Pioneer	P0801AM	AM, RR2, LL	273.9	108	16.5	57.0	31,546	115
NuTech\G2 Genetics	5F906	AM, RR2, LL	272.6	106	16.7	57.2	27,541	101
AgVenture	EXP163027YHB	INT, RR2, LL	269.9	102	15.5	58.7	30,351	107
NuTech\G2 Genetics	5F510	AM, RR2, LL	263.9	110	16.9	58.9	30,703	112
Pioneer	P0805AM	AM, RR2, LL	253.5	108	17.5	58.7	30,164	114
Dyna-Gro Seed	D47VC29	VT2Pro, RR2	251.3	107	15.4	57.2	31,124	105
Dyna-Gro Seed	D41VC71	VT2Pro, RR2	250.6	101	14.9	57.8	30,422	105
Allegiant	11000 SS RIB	STXRIB, RR2, LL	250.5	110	20.1	54.2	30,703	104
Dyna-Gro Seed	D45VC65	VT2Pro, RR2	247.1	105	14.9	58.6	31,335	108
AgVenture	EXP157997AM	AM, RR2, LL	246.4	99	15.2	58.2	29,789	107
Dyna-Gro Seed	D49VC39	VT2Pro, RR2	242.8	109	17.4	55.0	29,789	108
Dyna-Gro Seed	D50SS51	STX, RR2, LL	241.6	110	15.6	59.0	29,789	104
Dyna-Gro Seed	D39DC43	VT2Pro, RR2	239.5	99	14.6	57.5	30,211	104
Dyna-Gro Seed	D41SS71	STX, RR2, LL	232.7	101	14.8	57.8	29,789	105
Dyna-Gro Seed	D45SS65	STX, RR2, LL	230.7	105	14.7	58.6	31,546	101
Dyna-Gro Seed	D46VC62	VT2Pro, RR2	230.4	107	15.1	57.2	31,405	102
Allegiant	10590 SS RIB	STXRIB, RR2, LL	228.8	105	14.7	59.1	30,492	110
Allegiant	10117 SS RIB	STXRIB, RR2, LL	225.1	101	14.5	57.7	30,422	103
Dyna-Gro Seed	D44VC36	VT2Pro, RR2	224.8	104	14.8	58.0	31,054	103
AgVenture	EXP167047CYXR	CYXR, RR2, LL	223.8	106	14.8	58.0	26,628	101
Allegiant	10890 SS RIB	STXRIB, RR2, LL	217.6	108	15.0	57.8	30,070	99
Average			245.2	105	15.7	57.7	30,241	106
^d LSD (P<0.30)			10.6					

^aTechnology trait designations: AM=Optimum AcreMax; CYXR=Optimum Intrasect XTreme; INT=Optimum Intrasect; LL=LibertyLink; RR2=Roundup Ready 2; STX=Genuity Smart Stax; STXRIB=Genuity SmartStax Refuge in the Bag Complete; VT2Pro=Genuity VecTran Double Protection.

^bYields corrected to 15.5% moisture.

^cRelative 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.

^dIf the difference between two hybrid yields equals or exceeds the LSD value, there is a 70% chance the difference is significant.

Site Information

Collaborator: Cooksey Farms
 Planting Date: May 8, 2017
 Harvest Date: October 11, 2017
 Fertilizer: N at 220, P at 70, K at 40, S at 10 lb/ac
 Herbicide: Pre-emerge: glyphosate, Balance Flexx, and atrazine; Mid-season: glyphosate and generic WideMatch.
 Soil Type: Heldt Clay
 Irrigation Type: Center-pivot

This table may be reproduced only in its entirety.

2017 Dryland Corn Variety Performance Trial at Akron

Brand	Hybrid	Insect and Herbicide Technology Traits ^a	Yield ^b bu/ac	Relative Maturity ^c	Moisture percent	Test Weight lb/bu	Ear Height in	Population plants/ac	Lodging percent
Pioneer	P0805AM	AM, RR2, LL	76.0	108	13.8	58.9	30	12,778	7
NuTech/G2 Genetics	5F-601	AM, RR2, LL	66.9	101	13.2	59.0	27	12,705	6
Allegiant	10117 VT2P RIB	VT2PRIB, RR2	65.2	101	12.7	59.2	24	12,778	0
Dyna-Gro Seed	D44VC36	VT2Pro, RR2	62.3	104	12.8	57.6	27	13,286	0
Dyna-Gro Seed	D47VC29	VT2Pro, RR2	62.1	107	13.1	59.0	27	12,560	1
Dyna-Gro Seed	D46VC62	VT2Pro, RR2	61.4	107	13.3	59.5	27	13,141	1
Dyna-Gro Seed	D39DC43	VT2Pro, RR2	59.0	99	12.7	57.9	26	12,415	1
Dyna-Gro Seed	D41VC71	VT2Pro, RR2	56.7	101	13.4	59.5	26	12,778	12
Dyna-Gro Seed	D41SS71	STXRIB, RR2, LL	53.6	102	13.5	59.5	26	12,560	26
Dyna-Gro Seed	D45VC65	VT2Pro, RR2	53.3	105	13.0	60.5	29	12,124	3
Dyna-Gro Seed	D45SS65	STXRIB, RR2, LL	52.3	105	13.2	60.2	31	12,705	0
Allegiant	9458 VT2P RIB	VT2PRIB, RR2	50.7	94	12.8	58.6	25	12,560	13
Average			60.0	103	13.1	59.1	27	12,699	6

^dLSD (P<0.30)

5.6

^aTechnology trait designations: AM=Optimum AcreMax; LL=LibertyLink; RR2=Roundup Ready 2; STXRIB=Genuity SmartStax Refuge in the Bag Complete; VT2PRIB=Genuity VecTran Double Protection Refuge in the Bag Complete; VT2Pro=Genuity VecTran Double Protection.

^bYields corrected to 15.5% moisture.

^cRelative 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.

^dIf the difference between two hybrid yields equals or exceeds the LSD value, there is a 70% chance the difference is significant.

Site Information

Collaborator: Central Great Plains Research Center

Planting Date: May 25, 2017

Harvest Date: October 29, 2017

Fertilizer: N at 50 lb/ac

Herbicide: Glyphosate at 2 qt/ac, Status at 3 oz/ac, Starane at 4 oz/ac, Sterling Blue at 3 oz/ac, Harness Xtra at 2.3 qt/ac applied on June 13

Soil Type: Weld Silt Loam

This table may be reproduced only in its entirety.

2017 Dryland Corn Variety Performance Trial at Dailey

Brand	Hybrid	Insect and Herbicide Technology Traits ^a	Yield ^b bu/ac	Relative Maturity ^c	Moisture percent	Test Weight lb/bu	Ear Height in	Population plants/ac
Dyna-Gro Seed	D46VC62	VT2Pro, RR2	106.4	107	13.5	57.2	30	15,972
Dyna-Gro Seed	D39DC43	VT2Pro, RR2	100.8	99	12.4	56.3	30	16,117
Dyna-Gro Seed	D41VC71	VT2Pro, RR2	97.1	101	12.9	56.4	30	16,045
Dyna-Gro Seed	D45VC65	VT2Pro, RR2	95.5	105	12.5	58.1	33	16,045
Allegiant	10117 VT2P RIB	VT2PRIB, RR2	95.2	101	12.8	57.5	30	15,391
NuTech/G2 Genetics	5F-601	AM, RR2, LL	93.9	101	13.3	57.7	31	15,235
Dyna-Gro Seed	D41SS71	STXRIB, RR2, LL	92.3	102	12.8	56.2	33	15,647
Dyna-Gro Seed	D47VC29	VT2Pro, RR2	91.3	107	12.9	56.1	33	16,045
Dyna-Gro Seed	D44VC36	VT2Pro, RR2	90.9	104	12.9	56.8	31	15,972
Allegiant	9458 VT2P RIB	VT2PRIB, RR2	89.7	94	12.1	56.4	32	15,972
Pioneer	P0805AM	AM, RR2, LL	89.6	108	14.0	57.8	35	15,682
Dyna-Gro Seed	D45SS65	STXRIB, RR2, LL	78.7	105	12.7	58.1	36	15,899
Average			93.4	103	12.9	57.0	32	15,835

^dLSD (P<0.30)

3.5

^aTechnology trait designations: AM=Optimum AcreMax; LL=LibertyLink; RR2=Roundup Ready 2; STXRIB=Genuity SmartStax Refuge in the Bag Complete; VT2PRIB=Genuity VecTran Double Protection Refuge in the Bag Complete; VT2Pro=Genuity VecTran Double Protection.

^bYields corrected to 15.5% moisture.

^cRelative 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.

^dIf the difference between two hybrid yields equals or exceeds the LSD value, there is a 70% chance the difference is significant.

Site Information

Collaborator: Mark and Neal Lambert
 Planting Date: May 31, 2017
 Harvest Date: October 29, 2017
 Fertilizer: Pre-plant: N at 40 and P at 25 lb/ac applied as compost. Starter: N at 20, P at 10, Zn at 5 lb/ac
 Herbicide: Roundup PowerMAX at 22 oz/ac, atrazine at 1 lb/ac, and DiFlexx
 Soil Type: Haxtun sandy loam

This table may be reproduced only in its entirety.

Status of Bacterial Leaf Streak of Corn in the United States

Dr. Kirk Broders

The bacterial pathogen *Xanthomonas vasicola* pv *vasculorum* (*Xvv*), which causes the disease bacterial leaf streak (BLS), was officially reported on maize in the U.S. in 2016 (Korus et al. 2017). This represents the first report of this disease in North American and is the only report of the disease anywhere in the world outside of South Africa. The disease was observed in 51 counties in Nebraska as well as 6 counties in eastern Colorado and 16 counties in western Kansas. The disease has continued to expand in 2016 reaching epidemic proportion in regions of Colorado, Kansas and Nebraska with several fields reporting disease incidence levels above 90% and disease severity reaching greater than 50% of leaf area infected. This level of disease will likely have an impact on yield. The disease was also recently identified from maize fields in Iowa, Illinois, Oklahoma, South Dakota and Texas. The rapid penetration of *Xvv* into the U.S. maize production region combined with a lack of management methods has created a critical and urgent need for research and engagement with affected producers and allied industry. The 2017 production year again saw significant levels of disease in eastern Colorado, Nebraska and Kansas. While the disease was identified again in Iowa, Illinois, Minnesota and South Dakota, disease incidence remains low. This may indicate that either the weather in the Colorado, Kansas, Nebraska region is more conducive or the varieties grown in this region are more susceptible.

Xvv causes bacterial leaf streak (BLS), which is primarily a foliar disease of corn. Growers in southwestern Nebraska first began to notice symptoms of BLS as early as 2014. The disease was observed to be the most severe in semi-arid regions, such as western Nebraska, western Kansas and eastern Colorado, under center-pivot irrigation and in continuous corn production systems. Early symptoms began to appear at the V4 growth stage on lower leaves (Fig 1). It is likely the bacteria are splashed by rain or irrigation water onto these lower leaves. As the season progresses, the disease continues to move throughout the field and into the upper canopy, likely due to recurrent overhead irrigation or rain. Significant long-distance dispersal has also been observed in fields where no early or mid-season infections were observed, but after strong thunderstorms, severe symptoms were observed in the upper canopy (Fig. 1). The combination of warm weather with periodic overhead irrigation and ample residue for survival of *Xvv* has likely amplified the outbreak of BLS in this region as the climatic and production conditions appear optimal for *Xvv* infection and reproduction.



Figure 1. Symptoms of bacterial leaf streak caused by *Xvv* early in the season on lower leaves (upper left) and later in the season on the upper third of the plant (lower left, right)

The only information pertaining to this disease on maize has come from work done in South Africa, which primarily investigated host range on other African crops, such as sugarcane and banana. We therefore have very limited information on how this pathogen infects its host, what plant tissue(s) it is capable of infecting, how the pathogen survives the winters, where initial inoculum comes from at the beginning of each crop season, how the bacteria spreads from plant to plant and long distance, what climatic variables favor disease development and spread, how many other plant species *Xvv* is capable of infecting or using as alternate hosts, and if this bacteria will be able to persist and thrive in all corn growing regions of the U.S.

Efforts to develop new epidemiological models for *Xanthomonas vasicola* pv. *vasculorum*

Since *Xvv* was first reported in the United States, researchers at CSU, University of Nebraska and Iowa State University have been leading an effort to describe the disease (Korus et al. 2017), survey the extent and distribution of the disease, develop early detection methods (Lang et al. 2017), assess severity of the disease, and provide outreach programs designed to educate growers (Robertson et al. 2017). Through these efforts, we have established that the most significant levels of BLS have been observed in the region encompassing northeastern Colorado, southeastern Nebraska and northwestern Kansas, which is where first reports of the disease were made in 2014 and 2015 (Fig 2). During the 2016 production year, a significant eastward spread of the disease was observed as reports of BLS were confirmed in Iowa, Illinois, Oklahoma, South Dakota and Texas (Fig. 2).

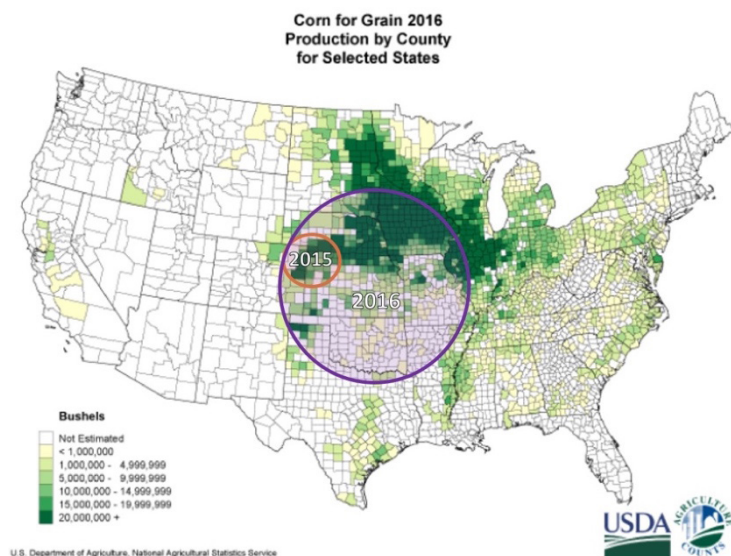


Figure 2. Distribution of BLS during 2015 and 2016 based on confirmed identification of *Xvv* from infected leaf tissue. Not all counties within the 2016 radius had positive confirmations of *Xvv*, but fall within the range of the most east, west, north and south locations with positive identifications, and therefore represent the potential distribution of BLS

In addition to monitoring the spread of this disease, work in the lab of Dr. Broders has focused on understanding the evolutionary history of *Xvv* and how it may have arrived to the United States. BLS was first described in 1949 on corn in South Africa (Dyer 1949), but prior to 2016 it had not been documented in the United States (Korus et al. 2017). Due to the importance of corn in the USA, and the implications of the emergence and spread of a new disease, accurate identification of the causal agent and determination of its relationship to the strains from South Africa are of critical importance to the corn industry.

The only other report of BLS of corn outside of South Africa and the U.S. is Argentina (Plazas et al. Accepted). Dr. Broders is collaborating with researchers at the Universidad Católica de Córdoba in

Cordoba, Argentina, regarding symptoms on maize they believed to be BLS. Bacteria were isolated from symptomatic leaves and then shipped to the Broders lab, where seven of the bacterial isolates were determined to be *Xv*. While the official report of the disease in Argentina is relatively recent, the symptoms of BLS were first observed in 2010 in Cordoba province and have since spread to the other nine provinces where maize is grown (Plazas et al. Accepted). In order to understand the evolutionary history of maize *Xv* isolates, we sequenced the genomes of 23 isolates recovered from maize in the U.S., Argentina and South Africa. We then compared these to isolates recovered from sugarcane, sorghum and *Triticum laxum*, a wild relative of maize. We found that *Xv* isolated from maize in Argentina, South Africa and the US forms a distinct genetic group from isolates infecting sugarcane and *T. laxum* (Fig. 3). The preliminary analysis indicated there is greater diversity among isolates of *Xv* from Argentina than isolates from South Africa and the US (Fig. 3). This would suggest *Xv* has been present in Argentina longer than previously thought. It also seems likely that the strain of *Xv* introduced into the US is more similar to isolates from Argentina than South Africa. However, greater sampling density of *Xv* in South Africa is currently in progress order to provide a more definitive answer on where strains from the US originated.

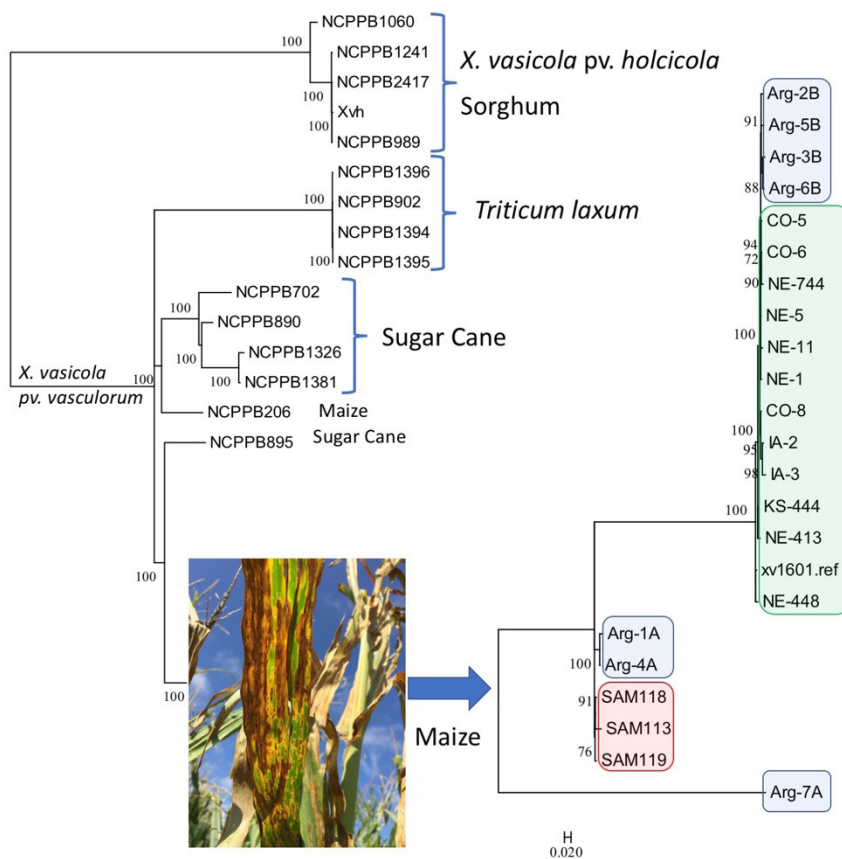


Figure 3. Whole genome phylogeny of *X. vasicola* isolates recovered from sorghum, *T. laxum*, Sugar cane and Maize. Isolates from Argentina, South Africa and US are highlighted in blue, red and green, respectively.

The maize growing regions where BLS is present in Argentina, South Africa and the U.S. share several similarities. BLS seems to be most prevalent in semi-arid to dry subhumid production regions in Argentina, South Africa and the United States often located at elevations near 3000 feet above sea level and between 28-40° from the equator (Fig. 4). These regions experience similar growing conditions with hot, dry summers with occasionally intense thunderstorms. We have several hypotheses that may explain this phenomenon. First, semi-arid maize production often requires some type of irrigation, most frequently overhead irrigation. We believe the combination of warm temperatures and frequent overhead irrigation creates an ideal environment for this disease to reach epidemic levels. This has certainly been

the case in the U.S. where the most significant levels of disease have been observed in eastern Colorado and western Nebraska where the majority of the corn is under center-pivot irrigation and the climate is

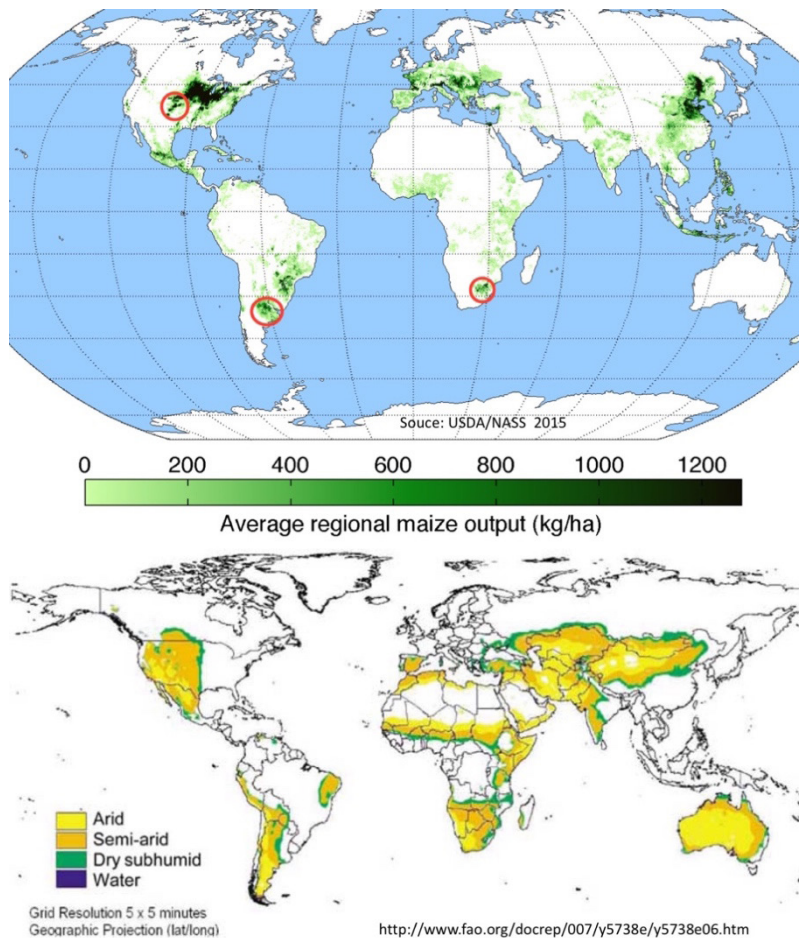


Figure 4. Global distribution of confirmed *XvV* infections of maize causing BLS (red circles) in relation to global maize production and distribution of semi-arid and dry subhumid production regions

more arid. In the case of Argentina, much of the corn is grown without irrigation, but summers are hot and the area is prone to thunderstorms that produce strong winds and hail, which may be important for disease spread. *XvV* may be very well-adapted to thrive in these hot, dry climates where periodic wind, rain and irrigation allow it to spread.

In order to understand how this bacterial pathogen survives through the winter, we have set up a series of studies to investigate survival in infected debris. Based on observations we believe *XvV* is overwintering in infected corn debris left on the soil surface. As young seedlings emerge and begin to grow, we believe the bacteria is being splashed onto the leaves closest to the ground. In order to determine the amount of inoculum that survives in the residue, we collected infected leaves as the corn plants were beginning to senesce.

These leaves were put into mesh bags and either buried at 10 cm below the surface or left on the soil surface. The bags were left in the field for six months (October – March), and were recovered on or near April 1, 2017. We used cultural and molecular methods to detect the presence of *XvV* in the infected debris. We have been able to quantify *XvV* DNA from infected tissue, corroborating our culture methods that the bacterial is able to survive at high enough levels to cause infection in the spring. Of greatest significance is the difference between the amount of *XvV* that survives in residue left on the surface versus the amount of *XvV* in residue buried just 4 inches below the surface. We found that there was on average a greater than 1000% reduction in the amount of *XvV* in residue buried in the soil compared to *XvV* in residue left on the soil surface (Fig 5). This is likely the result of soil microbes degrading the leaf tissue and out competing *XvV* for space.

Finally, we scored the CSU corn variety trial to determine which hybrids are more resistant or susceptible to *XvV*. Bacterial leaf streak was present at the Burlington, Yuma and Holyoke variety trial, however we only recorded disease severity data at the Yuma and Holyoke sites as hail damage prevented accurate scoring at Burlington. The results show a significant effect of hybrid on disease severity, varieties ranging from moderately resistant to highly susceptible. None of the hybrids were completely resistant, but there were several that had very limited disease (Fig 6).

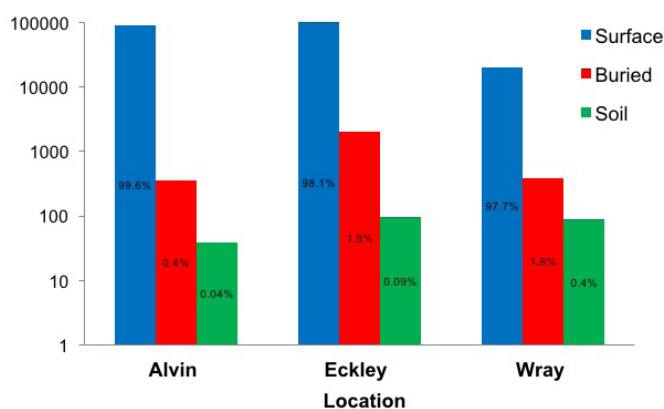


Figure 5. Survival of *Xv* in corn residue left on the soil surface, buried 4 inches below the surface or present in the soil at three locations in eastern Colorado. CFU = Colony forming units or a single bacterial cell.

There are few effective methods for management of *Xanthomonas* in the field. Little is known about the effective management of BLS in corn. To date, there is no chemical control commercially available for BLS. While cultural control measures are likely to offer some degree of control of BLS by decreasing the amount of primary inoculum present, further study is required. Preliminary data suggests that varietal resistance exists, indicating management may be possible through host resistance. Because of the limited amount of information available for BLS control, we must look to related crop species to examine which management methods might be successful for *Xv*. For bacterial leaf streak of sorghum which is caused by *X. v. pv. holcicola*, resistant varieties are the main method of disease control, followed by cultural methods including rotation and weed control (Janse 2005). Currently little is known about host resistance to BLS. BLS can be severe on grain corn, sweet corn and popcorn, indicating there is susceptibility in all types of maize germplasm and maize varieties need to be evaluated and improved for BLS so that susceptible germplasm is not released. In order to query host resistance, it is necessary to evaluate populations to demonstrate that sufficient phenotypic variation exists in order to provide the raw material to breed for resistance. Once phenotypic variation is shown to exist, alleles for resistance and susceptibility can be identified. After identification of resistant alleles, favorable alleles need to be incorporated into breeding programs and detrimental alleles purged.

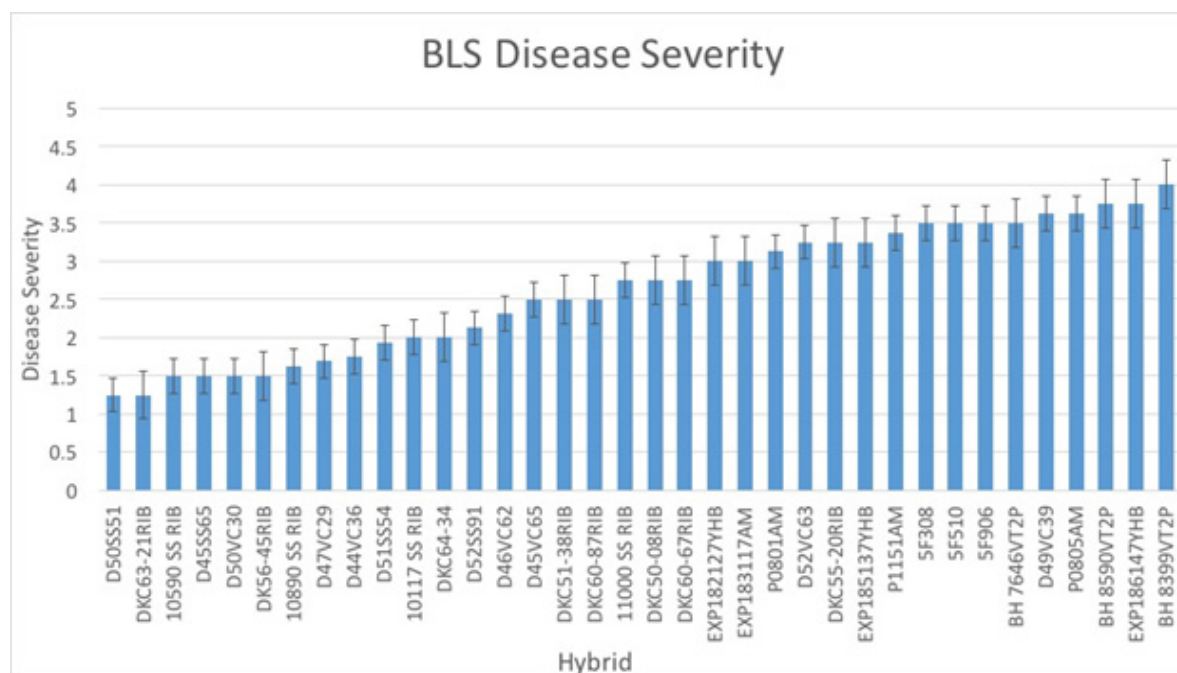


Figure 6. Bacterial leaf streak severity on 36 corn hybrids at two locations in Colorado. Disease severity was rated on a 0-5 rating scale with 0= no disease 1=1-20%, 2=21-40%, 3=41-60%, 4=61-80% and 5=>80% of leaf area affected. Complete table available at the end of this document.

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The Handy Bt Trait Table

for U.S. Corn Production

Updated
December 2017

Posted at <https://www.texasinsects.org/bt-corn-trait-table.html>

For questions or corrections: Chris DiFonzo, Michigan State University, difonzo@msu.edu

Contributors: Pat Porter, Texas A&M University & Kelley Tilmon, The Ohio State University

Most corn hybrids planted in the U.S. have one or more transgenic traits for insect management. These traits can increase flexibility and profitability for producers, but can also cause confusion because of varying spectrum of control or refuge requirements. The Handy Bt Trait Table provides a helpful list of trait names (below) and details of trait packages (next page) to make it easier to understand company seed guides, sales materials, and bag tags.

New for 2018

- ✓ Trait packages are now alphabetized, instead of grouped by seed company.
- ✓ To make the trait table easier to read, the “Marketed for” and “Herbicide trait” columns were redesigned to replace letter abbreviations for insect names and herbicides with a simple ‘X’.
- ✓ In 2017, we added a column listing insect x Bt combinations with documented field-failures, confirmed resistance, or cross-resistance in published lab assays &/or field research. For 2018, this column has the same format, but is relabeled “Resistance to a Bt protein in the trait package has developed in:”. This column is intended to alert producers and consultants to potential management problems and encourage field scouting. Growers should check with local extension educators and seed dealers to determine the status of Bt resistance in their local area. Citations for cases of resistance are posted at the web site in the header of this bulletin.
- ✓ Note that based on strong evidence from lab assays and the field, companies removed western bean cutworm control from the Cry1F Bt protein (i.e., the Herculex trait). Only hybrids with the Vip3A Bt protein provide reliable control of this insect. For all other hybrid packages, western bean cutworm infestations should be managed using a combination of scouting and spraying at threshold.

Field corn ‘events’ (transformations of one or more genes) and their Trade Names

Trade name for trait	Event	Protein(s) expressed	Insect Target + Herbicide Activity
Agrisure CB/LL	Bt11	Cry1Ab + PAT	corn borer + <i>glufosinate tolerance</i>
Agrisure Duracade	5307	eCry3.1Ab	rootworm
Agrisure GT	GA21	EPSPS	<i>glyphosate tolerance</i>
Agrisure RW	MIR604	mCry3A	rootworm
Agrisure Viptera	MIR162	Vip3A	broad Lep control (but not corn borer)
Herculex I (HXI) or CB	TC1507	Cry1Fa2 + PAT	corn borer + <i>glufosinate tolerance</i>
Herculex CRW	DAS-59122-7	Cry34Ab1/Cry35Ab1 + PAT	rootworm + <i>glufosinate tolerance</i>
(None – part of Qrome)	DP-4114	Cry1F + Cry34Ab1/Cry35Ab1 + PAT	corn borer+rootworm+ <i>glufosinate tol.</i>
Roundup Ready 2	NK603	EPSPS	<i>glyphosate tolerance</i>
Yieldgard Corn Borer	MON810	Cry1Ab	corn borer
Yieldgard Rootworm	MON863	Cry3Bb1	rootworm
Yieldgard VT Pro	MON89034	Cry1A.105 + Cry2Ab2	Lepidopteran control
Yieldgard VT Rootworm RR	MON88017	Cry3Bb1 + EPSPS	rootworm + <i>glyphosate tolerance</i>

Abbreviations used in the Trait Table

Herbicide traits

GT *glyphosate tolerant*

LL Liberty Link - *glufosinate-tolerant*

RR2 Roundup Ready 2, *glyphosate-tolerant*

Insect targets

BCW black cutworm

CEW corn earworm

CRW corn rootworm

ECB European corn borer

FAW fall armyworm

SB stalk borer

SCB sugarcane borer

SWCB southwestern corn borer

TAW true armyworm

WBC western bean cutworm

The Handy Bt Trait Table for U.S. Corn Production, updated December 2017

Trait packages in alphabetical order (acronym)	Bt protein(s) in the trait package	Marketed for control of:												Resistance to a Bt protein in the trait package has developed in: *	Herbicide trait		Non-Bt Refuge % (cornbelt)
		B	C	E	F	S	S	W	T	W	C	R	W		GT	LL	
AcreMax (AM)	Cry1Ab Cry1F	x		x	x	x	x	x						FAW WBC	x	x	5% in bag
AcreMax CRW (AMRW)	Cry34/35Ab1												x	CRW	x	x	10% in bag
AcreMax1 (AM1)	Cry1F Cry34/35Ab1	x		x	x	x	x	x					x	FAW SWCB WBC CRW	x	x	10% in bag 20% ECB
AcreMax Leptra (AML)	Cry1Ab Cry1F Vip3A	x	x	x	x	x	x	x	x	x					x	x	5% in bag
AcreMax TRIsect (AMT)	Cry1Ab Cry1F mCry3A	x		x	x	x	x	x					x	FAW WBC CRW	x	x	10% in bag
AcreMax Xtra (AMX)	Cry1Ab Cry1F Cry34/35Ab1	x		x	x	x	x	x					x	FAW WBC CRW	x	x	10% in bag
AcreMax Xtreme (AMXT)	Cry1Ab Cry1F mCry3A Cry34/35Ab1	x		x	x	x	x	x					x	FAW WBC CRW	x	x	5% in bag
Agrisure 3010 and 3010A	Cry1Ab			x			x	x							x	x	20%
Agrisure 3000GT and 3011A	Cry1Ab mCry3A			x			x	x					x	CRW	x	x	20%
Agrisure Viptera 3110	Cry1Ab Vip3A	x	x	x	x	x	x	x	x	x					x	x	20%
Agrisure Viptera 3111	Cry1Ab Vip3A mCry3A	x	x	x	x	x	x	x	x	x	x			CRW	x	x	20%
Agrisure 3120 EZ Refuge	Cry1Ab Cry1F	x		x	x	x	x	x						FAW WBC	Depends on hybrid; see bag for code EZ0 (GT) or EZ1 (GT LL)		5% in bag
Agrisure 3122 EZ Refuge	Cry1Ab Cry1F mCry3A Cry34/35Ab1	x		x	x	x	x	x					x	FAW WBC CRW			5% in bag
Agrisure Viptera 3220 EZ Refuge	Cry1Ab Cry1F Vip3A	x	x	x	x	x	x	x	x	x							5% in bag
Agrisure Duracade 5122 EZ Refuge	Cry1Ab Cry1F mCry3A eCry3.1Ab	x		x	x	x	x	x					x	FAW WBC CRW			5% in bag
Agrisure Duracade 5222 EZ Refuge	Cry1Ab Cry1F Vip3A mCry3A eCry3.1Ab	x	x	x	x	x	x	x	x	x	x		x	CRW			5% in bag
Herculex I (HXI)	Cry1F	x		x	x	x	x	x						FAW SWCB WBC	x	x	20%
Herculex RW (HXRW)	Cry34/35Ab1												x	CRW	x	x	20%
Herculex XTRA (HXX)	Cry1F Cry34/35Ab1	x		x	x	x	x	x					x	FAW SWCB WBC CRW	x	x	20%
Intrasect (YHR)	Cry1Ab Cry1F	x		x	x	x	x	x						FAW WBC	x	x	5%
Intrasect TRIsect (CYHR)	Cry1Ab Cry1F mCry3A	x		x	x	x	x	x					x	FAW WBC CRW	x	x	20%
Intrasect Xtra (YXR)	Cry1Ab Cry1F Cry34/35Ab1	x		x	x	x	x	x					x	FAW WBC CRW	x	x	20%
Intrasect Xtreme (CYXR)	Cry1Ab Cry1F mCry3A Cry34/35Ab1	x		x	x	x	x	x					x	FAW WBC CRW	x	x	5%
Leptra (VYHR)	Cry1Ab Cry1F Vip3A	x	x	x	x	x	x	x	x	x					x	x	5%
Powercore ^a	Cry1A.105 Cry2Ab2	x	x	x	x	x	x	x						CEW WBC	x	x	^a 5%
Powercore Refuge Advanced ^b	Cry1F																^b 5% in bag
QROME (Q)	Cry1Ab Cry1F mCry3A Cry34/35Ab1	x		x	x	x	x	x					x	FAW WBC CRW	x	x	5% in bag
SmartStax ^a	Cry1A.105 Cry2Ab2	x	x	x	x	x	x	x					x	CEW WBC CRW	x	x	^a 5%
Smartstax Refuge Advanced ^b	Cry1F Cry3Bb1																^b 5% in bag
SmartStax RIB Complete ^b	Cry34/35Ab1																
Trecepta ^a	Cry1A.105 Cry2Ab2	x	x	x	x	x	x	x	x	x					x		^a 5%
Trecepta RIB Complete ^b	Vip3A																^b 5% in bag
TRIsect (CHR)	Cry1F mCry3A	x		x	x	x	x	x					x	FAW SWCB WBC CRW	x	x	20%
VT Double PRO ^a	Cry1A.105 Cry2Ab2		x	x	x	x	x	x						CEW	x		^a 5%
VT Double PRO RIB Complete ^b																	^b 5% in bag
VT Triple PRO ^c	Cry1A.105 Cry2Ab2		x	x	x	x	x	x					x	CEW CRW	x		^c 20%
VT Triple PRO RIB Complete ^d	Cry3Bb1																^d 10% in bag
Yieldgard Corn Borer (YGCB)	Cry1Ab			x			x	x						SWCB	x		20%
Yieldgard Rootworm (YGRW)	Cry3Bb1												x	CRW	x		20%
Yieldgard VT Triple	Cry1Ab Cry3Bb1			x			x	x					x	SWCB CRW	x		20%

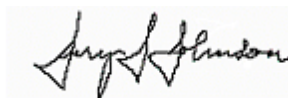
*Check with local extension educators and seed dealers to determine the status of Bt resistance in your particular region.

Colorado State University



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Extension

A handwritten signature in black ink, which appears to read "Jerry Johnson".

Jerry Johnson, Extension Specialist Crop Production

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