

2013 RESEARCH REPORT

SAGINAW VALLEY

RESEARCH & EXTENSION CENTER
and
RELATED BEAN - BEET RESEARCH



MICHIGAN STATE UNIVERSITY

AgBioRESEARCH

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SAGINAW VALLEY RESEARCH AND EXTENSION CENTER REPORT

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INTRODUCTION

The Michigan sugar beet grower cooperative, Michigan Sugar Company, and the Michigan dry bean growers and industry represented by the Michigan Bean Commission and Michigan Bean Shippers Association, donated the proceeds of the 120 acre Saginaw Valley Bean and Beet Research Farm, located in Saginaw County for 38 years, to Michigan State University in 2009. The Office of Land Management at MSU purchased and operates a 320 acre farm near Richville Michigan in Denmark Township. The site is being established as an AgBioResearch research center. Shop, offices and machinery storage have been built, infrastructure improvements including electricity, phone, wireless internet, irrigation and municipal water were established. Future infrastructure plans include fiber optic internet connection and natural gas hookup and the building of an Educational Center. The site is located on the southeast corner of Reese and Krueger Roads, address of 3775 South Reese Road, Frankenmuth, Michigan 48734. Field research was initiated in 2009 and the 2013 season was the Fifth season of research at the site. This research report is primarily a compilation of research conducted at the site in 2013. Most of the work represents one year's results, and even though multi-season results are included, **this work should be considered a progress report.**

Soil – The soil type on the farm is classified as a Tappan-Londo loam, these are very similar soil types separated by subsoil drainage classifications, the Tappan not being as naturally well drained as the Londo. The site was soil tested in spring 2009 at 2.5 acre increments. The soil pH averages 7.9, soil test phosphorus averages 56 pounds P/acre, soil test Potassium averages 294 pounds K/acre.

Weather – The monthly rainfall for 2013 collected with the automated rain gauge is given in Table 1. Monthly totals are given at the bottom of the table. June through September precipitation was below average and September was very dry. April and May had above average precipitation which helped carry most of the crops through to an average yield. Wheat yielded 90 bushels/acre, dry beans yielded 20-30 cwt/acre harvest being delayed by the drought. Earlier planted corn (180 bu/acre) yielded 30 bushels/acre more than later planted corn which ran out of moisture. Soybean yields were above average at 50 bushels/acre, also running out of moisture. Sugar beets averaged 25 tons/acre, later harvested beets gaining tons with the good fall rains. The rainfall total of 27.3" was lower than average. Maximum and minimum daily temperatures along with growing degree days (base 50) are given in Table 2. The 2013 season was average with 6 days above 90 degrees and 24 days above 85 degrees There was 2429 growing degree days for 2013 which was below the 5 year average but similar to the 30 year average.

MONTHLY PRECIPITATION, SAGINAW VALLEY RESEARCH FARM

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1981	0.29	1.73	0.53	3.43	3.52	3.09	2.41	3.83	9.09	2.74	2.21	0.68	33.56
1982	2.37	0.46	2.26	1.27	3.32	3.09	2.65	2.55	3.02	0.76	4.01	3.26	29.02
1983	0.89	0.90	3.29	4.55	6.15	3.55	1.91	2.50	5.11	2.95	3.06	2.00	36.86
1984	0.56	0.73	3.18	3.20	3.66	3.94	2.42	3.75	3.29	3.05	2.67	2.18	32.63
1985	1.85	2.12	4.08	3.96	2.30	1.87	2.38	7.02	4.38	3.08	4.66	1.05	38.75
1986	1.34	2.24	1.62	1.87	3.10	3.48	1.38	2.76	18.05	2.64	0.75	1.38	40.61
1987	1.11	0.82	1.03	2.03	0.67	4.11	1.35	3.92	5.03	1.88	2.13	2.63	26.71
1988	1.04	1.01	1.70	3.26	0.56	0.59	3.45	3.52	2.46	3.25	4.36	1.08	26.28
1989	1.09	0.34	1.40	2.05	5.03	6.25	1.06	2.92	4.43	1.72	3.24	0.48	30.01
1990	1.23	1.21	1.17	1.54	2.81	2.07	2.53	6.94	3.74	5.87	4.51	1.45	35.12
1991	0.85	0.60	3.68	6.61	3.71	2.66	4.53	2.61	1.50	3.52	2.04	1.24	31.58
1992	1.20	1.65	1.31	4.56	1.10	2.10	4.33	2.92	4.08	2.54	4.50	2.10	32.39
1993	2.72	0.47	0.87	4.08	2.76	3.03	2.46	4.62	4.00	3.70	1.99	0.53	31.23
1994	0.55	0.66	0.91	3.58	2.04	6.99	2.57	4.44	2.19	2.24	4.40	1.03	31.60
1995	1.67	0.35	1.38	2.72	1.44	1.96	1.29	5.00	1.33	2.39	4.05	0.79	24.37
1996	0.83	0.94	0.49	3.18	5.47	5.65	2.32	1.53	3.52	3.31	1.37	2.21	30.82
1997	1.51	4.25	1.32	1.38	3.00	0.69	2.44	3.61	3.46	1.31	1.03	0.36	24.36
1998	2.66	2.05	3.17	2.14	1.87	1.56	1.02	2.01	1.41	3.18	1.79	1.32	24.18
1999	2.75	0.41	0.62	5.01	2.33	3.07	5.02	3.01	2.52	1.12	1.04	1.90	28.80
2000	0.57	1.35	0.89	2.94	5.34	2.65	3.03	3.69	3.27	0.90	2.07	1.57	28.27
2001	0.33	3.16	0.11	2.38	4.42	2.45	0.53	3.52	4.34	4.90	1.76	1.61	29.51
2002	1.02	1.49	2.47	3.49	4.46	3.15	3.00	4.50	0.50	1.87	1.19	0.97	28.11
2003	0.27	0.21	1.66	0.36	4.19	2.04	2.49	1.33	1.99	1.09	5.35	1.20	22.18
2004	1.09	0.55	2.50	1.31	7.34	2.70	2.01	2.32	0.66	2.41	3.44	1.51	27.84
2005	2.90	0.71	0.62	1.32	1.74	4.97	3.20	0.72	0.72	1.30	3.83	1.49	23.52
2006	1.91	1.57	1.59	1.87	4.17	2.03	5.72	2.61	2.53	3.77	3.05	2.81	33.63
2007	1.11	0.35	1.27	3.02	2.20	1.06	2.59	4.80	2.64	2.86	0.89	1.93	22.52
2008	1.76	2.59	1.23	1.99	1.13	3.88	3.94	2.10	5.61	1.70	1.36	1.21	28.50
*2009	0.01	2.12	1.84	4.69	1.23	4.81	2.73	3.48	0.82	3.61	0.47	1.88	27.69
2010	0.14	0.20	0.40	2.15	3.36	2.71	0.89	1.27	3.11	1.94	1.97	0.42	18.56
2011	0.48	0.24	1.82	4.96	3.86	1.51	1.34	2.98	2.28	2.85	2.74	1.42	26.48
2012	1.86	0.76	1.41	1.19	3.92	1.10	3.62	4.03	1.60	4.29	0.38	1.41	25.57
2013	2.77	0.84	0.36	7.38	3.43	1.73	2.03	1.85	0.58	3.26	2.34	0.74	27.31
AVG.	1.29	1.18	1.58	3.01	3.13	2.93	2.56	3.29	3.43	2.67	2.57	1.45	29.11

**Station moved from Saginaw, MI to Richville, MI*

PRECIPITATION - SAGINAW VALLEY RESEARCH & EXTENSION CENTER- 2013

Day:	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1						0.07		0.01			0.15	0.01
2							0.01		0.04		0.17	
3												0.19
4										0.24		0.21
5										0.51		
6	0.04									0.40	0.32	
7			0.03				0.28	0.79	0.05	0.11		
8				0.61			0.02					
9	0.02	0.04		1.18			0.35					
10	0.11	0.12	0.01	0.48	0.61	0.23	0.08					
11	0.64		0.20	0.74	0.15						0.16	
12				0.49		0.03						
13	0.44			0.02		0.14						
14		0.05										
15				0.09					0.14	0.14		
16			0.04	0.40		0.31			0.01		0.03	0.03
17				0.49		0.20	0.08			0.40	1.33	
18				1.05						0.01	0.01	
19		0.11	0.01	0.69			0.06		0.12	0.04		0.01
20	0.03				0.22							0.21
21			0.01		0.01					0.06	0.10	
22		0.02			0.24			0.11			0.07	0.06
23		0.01		0.42	0.14		0.05					
24		0.01		0.39		0.06						
25				0.07		0.06						
26	0.05	0.01	0.03				0.10	0.22		0.15		
27		0.41				0.55	0.20	0.64				0.01
28	0.25	0.06		0.04	1.19	0.07	0.13	0.01				0.01
29	0.69			0.01	0.83	0.01	0.1	0.01	0.22	0.04		
30	0.50			0.21	0.04			0.06				
31			0.03				0.57			1.16		
TOTAL	2.77	0.84	0.36	7.38	3.43	1.73	2.03	1.85	0.58	3.26	2.34	0.74

Rainfall is measured in inches

2013 YEAR END TOTAL: 27.31 INCHES

**MAXIMUM-MINIMUM AIR TEMPERATURES (F)
SAGINAW VALLEY RESEARCH & EXTENSION CENTER - 2013**

DAY	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	24	14	18	10	28	21	33	22	83	55	89	65
2	24	15	17	1	25	18	38	18	80	58	67	47
3	27	18	18	2	27	11	41	17	76	57	68	40
4	33	24	20	2	31	8	54	23	73	51	68	44
5	33	13	26	-1	32	13	44	27	73	47	70	52
6	33	28	29	6	36	21	47	26	77	43	64	52
7	35	26	34	24	34	21	55	33	77	45	65	48
8	37	25	27	8	43	16	51	27	80	47	70	47
9	44	29	32	-4	44	25	44	37	80	47	78	53
10	42	24	37	11	54	35	38	35	64	40	70	57
11	51	33	42	31	52	36	36	32	61	36	78	59
12	56	41	31	25	36	28	41	31	46	32	78	60
13	42	24	34	25	32	23	39	34	53	28	76	60
14	25	12	39	28	37	22	46	30	62	42	74	55
15	26	9	28	18	37	29	68	37	79	51	77	51
16	32	11	24	12	30	23	56	40	79	49	80	62
17	31	13	21	4	27	18	53	34	65	42	78	56
18	34	6	41	12	32	18	73	41	78	52	69	50
19	41	33	45	17	33	20	59	31	86	49	74	43
20	34	11	21	14	26	16	36	27	89	63	80	49
21	14	1	21	13	30	16	49	23	80	63	85	57
22	7	-1	32	20	35	23	62	30	72	62	88	69
23	14	0	33	24	35	22	64	41	65	42	88	63
24	15	5	38	21	35	22	44	32	55	38	86	69
25	19	9	39	25	37	28	49	33	61	34	79	67
26	28	8	35	24	43	29	59	31	66	36	86	63
27	28	6	34	31	45	28	71	41	71	40	84	65
28	40	26	32	27	50	30	66	44	73	50	73	62
29	56	33			50	25	69	51	77	62	72	58
30	56	30			53	23	72	53	86	64	76	54
31	30	16			54	32			79	68		

**MAXIMUM-MINIMUM AIR TEMPERATURES (F)
SAGINAW VALLEY RESEARCH & EXTENSION CENTER - 2013 cont.**

DAY	JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	72	52	78	55	73	55	77	48	61	44	38	31
2	74	57	75	53	69	55	77	48	45	33	36	23
3	83	54	76	52	75	54	81	47	43	27	33	19
4	79	61	71	50	82	52	75	60	46	31	55	31
5	83	62	69	52	67	44	72	59	56	42	56	27
6	87	66	78	60	75	40	72	53	55	39	27	6
7	79	69	82	62	76	57	60	45	40	34	22	9
8	82	68	73	57	73	49	69	40	44	27	25	8
9	84	67	79	50	78	45	71	41	53	34	28	14
10	76	60	75	49	94	70	72	37	46	29	18	
11	79	54	77	51	87	65	72	37	40	25	18	2
12	79	49	75	60	77	57	77	41	33	19	19	1
13	84	55	68	52	58	39	65	45	40	19	22	16
14	89	60	71	45	68	34	60	36	49	29	20	10
15	93	66	74	44	61	48	67	33	51	35	21	6
16	93	70	79	46	59	36	61	49	55	31	18	
17	94	70	80	49	68	31	51	42	62	42	18	
18	93	71	80	49	78	37	62	39	45	33		
19	93	74	82	50	80	56	53	37	38	27		
20	85	61	85	57	77	65	56	36	43	25	31	
21	80	54	88	62	67	51	56	40	49	36	31	28
22	83	62	81	59	58	39	49	31	43	25	32	22
23	76	60	78	50	63	40	46	30	27	15	24	12
24	71	50	82	47	68	32	47	27	23	13	16	-5
25	77	44	87	55	72	35	48	26	31	19	22	-2
26	79	54	83	69	76	37	49	32	32	26	24	15
27	76	53	77	69	78	38	51	31	26	15	37	23
28	66	48	80	64	78	45	46	36	24	13	40	27
29	71	54	87	63	67	45	44	32	24	11	39	15
30	77	46	85	64	70	41	61	28	43	24	16	10
31	66	60	74	58			60	51			15	8

GROWING DEGREE DAYS - SAGINAW VALLEY RESEARCH FARM

	Base 50 (max + min / 2 - 50)							
	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
1977	140.50	398.00	389.00	675.00	485.00	344.00	43.00	2474.50
1978	4.00	316.50	474.50	571.50	588.50	393.50	75.00	2423.50
1979	47.50	228.50	458.50	577.50	479.00	330.00	116.00	2237.00
1980	34.00	281.50	369.00	617.50	606.00	317.50	33.50	2259.00
1981	55.50	187.00	491.00	579.50	312.00	265.00	13.50	1903.50
1982	54.50	428.50	365.50	626.00	476.00	298.00	156.00	2404.50
1983	16.00	118.50	491.00	716.00	645.00	369.50	97.00	2453.00
1984	67.50	164.50	506.00	558.50	627.00	282.00	114.50	2320.00
1985	183.50	306.00	388.00	603.50	523.00	394.50	100.00	2498.50
1986	124.50	310.00	435.00	664.00	459.50	370.00	96.50	2459.50
1987	84.00	336.50	566.50	725.50	537.50	334.00	19.50	2603.50
1988	35.50	290.50	544.50	739.50	667.50	283.00	48.00	2608.50
1989	21.50	202.00	456.50	648.00	535.00	315.00	167.00	2345.00
1990	165.50	146.00	493.50	587.50	553.50	332.50	100.50	2379.00
1991	144.00	423.50	541.00	641.00	567.50	289.50	114.00	2720.50
1992	56.00	241.50	367.00	446.50	403.50	257.50	41.50	1813.50
1993	23.50	208.00	430.00	642.00	613.50	184.50	25.00	2126.50
1994	95.50	227.50	526.50	613.50	501.50	380.00	115.00	2459.50
1995	3.00	221.00	536.00	698.50	745.00	225.00	125.50	2554.00
1996	41.00	157.00	486.00	572.00	611.00	357.50	91.50	2316.00
1997	27.00	48.00	534.00	596.50	443.00	299.50	134.50	2082.50
1998	46.00	267.00	505.50	623.50	648.00	456.00	114.00	2660.00
1999	49.50	299.00	578.50	684.50	500.00	339.00	67.50	2518.00
2000	17.00	284.00	474.50	509.50	544.50	289.00	157.00	2275.50
2001	78.00	289.50	504.00	649.50	654.00	282.00	114.00	2571.00
2002	123.00	141.50	535.00	710.00	575.00	443.00	99.00	2626.50
2003	66.50	147.50	410.00	606.00	608.00	312.50	82.00	2232.50
2004	89.00	240.50	429.50	561.00	450.50	421.50	69.00	2261.00
2005	58.00	145.00	623.00	647.50	611.50	429.00	130.00	2644.00
2006	79.00	283.50	470.50	661.00	555.50	260.00	38.50	2348.00
2007	53.50	277.00	534.00	564.00	594.00	393.00	231.00	2646.50
2008	110.00	116.50	512.00	620.00	532.50	343.00	56.50	2290.50
*2009	50.50	190.00	432.00	458.50	517.50	345.00	27.00	2020.50
2010	89.00	368.50	528.50	729.00	697.50	311.50	95.00	2819.00
2011	38.00	273.00	515.00	758.50	576.50	308.50	122.50	2592.00
2012	28.00	341.00	555.50	756.00	552.00	295.00	109.50	2637.00
2013	45.50	347.50	483.50	617.00	516.00	288.00	131.50	2429.00
AVERAGE	66.07	250.04	484.86	628.51	554.39	328.05	93.81	2405.74

* Station moved to from Saginaw, MI to Richville, MI

Control of *Rhizoctonia* crown and root rot with fungicides, 2013

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Sugar beet cv. ACH RR-824 was PAT-treated and planted at the Michigan State University Bean and Beet Farm, Richville, MI on 4 May. Seed was planted at 1" depth into four-row by 50-ft plots (ca. 4.375 in. between plants to give a target population of 275 plants/100ft. row) with 30" between rows replicated four times in a randomized complete block design. Fertilizer was drilled into plots immediately before planting, formulated according to results of soil tests (125 lb 46-0-0/A). No additional nitrogen was applied. All fungicides were applied with a hand held R&D spray boom delivering 10 gal/A (50 p.s.i.) and using one XR8003 nozzle per row in a 6" band at planting (A) or at GS 4-6 (B) or at GS 6-8 (C). Applications were made at planting (A); and banded applications on 30 May at GS 4-6 (B) and 4 Jun at GS 6-8 (C), respectively. *Cercospora* leaf spot was controlled with an application of Eminent 125SL (13 fl oz) + Koverall 75DF (1.5 lb) on 17 Jul and Inspire 2.08EC (7 fl oz) + Kocide 3000 46.1WG (2 lb) on 7 Aug. Weeds were controlled by cultivation and with Roundup Original Max 2.0 pt/A applied at GS2-4 and GS 6-8. Insects were controlled as necessary. Plant stand was rated 13, 21 and 30 days after planting (DAP) and relative rate of emergence was calculated as the Relative Area Under the Emergence Progress Curve [RAUEPC from 0 – 30 DAP, maximum value = 100]. Plots were inoculated on 3 Jun [30 days after planting (DAP)] by spreading *R. solani* Anastomoses Group 2.2 (IIIB) infested millet across all plants in each plot. Incidence of infected plants was evaluated on 60 and 123 DAP. Samples of 50 beets per plot were harvested 123 DAP (10 ft from start of each plot from two center rows) and assessed for crown and root rot (*R. solani*) incidence (%) and severity. Severity of crown and root rot was measured as an index calculated by counting the number of roots (n = 20) falling in class 0 = 0%; 1 = 1 - 5%; 2 = 6 - 10%; 3 = 11 - 15%; 4 = 15 - 25%; 5 = 25 - 50%; 6 = 50 - 100% surface area of root affected by lesions; and 7 = dead and/or extensively decayed root. The number in each class is multiplied by the class number and summed. The sum is multiplied by a constant to express as a percentage. Increasing index values indicated the degree of severity. The number of beets falling into classes 0 – 3 was summed and a percentage calculated as marketable beets. The trial was not harvested due to the high incidence and severity of crown and root rot. Meteorological variables were measured with a Campbell weather station located at the farm, latitude 43.3995 and longitude -83.6980 deg. Average daily air temperature (°F) was 60.7, 65.3, 70.4, 67.1, 58.8 and 51.1 (May, Jun, Jul, Aug, Sep, and Oct, respectively) and the number of days with maximum temperature >90°F over the same period was 0, 0, 5, 0, 1 and 0 (in 2012 there were 12 days for Aug). Average daily relative humidity (%) over the same period was 59.1, 66.1, 68.3, 63.1, 69.0, 68.1 and 70.1. Average soil temperature at 2" depth over the same period was 60.4, 69.2, 74.8, 71.7, 64.6 and 52.9. Average soil moisture (% of field capacity) at 2" depth over the same period was 33.5, 24.3, 28.3, 30.6, 23.4 and 30.4. Precipitation over the same period was 3.43, 1.73, 2.03, 1.85, 0.58 and 3.26".

Treatments with final plant stand greater than 90.0% were significantly different from the non-inoculated not-treated check (80.0%) in terms of plant stand. No treatments were significantly different from either check in terms of RAUEPC. Soil temperature and moisture conditions enhanced moderate development of crown and root rot throughout the season although severe symptoms did not appear until Aug. The initial evaluation of crown and root at harvest indicated that treatments with less 4.9% incidence of dead or dying plants were significantly different from the inoculated not-treated check (8.6%). The evaluation of crown and root incidence at harvest indicated that no treatments were significantly different from the inoculated not-treated check (100%) or the not-inoculated not-treated check (99%). No treatments had a significantly lower severity index of crown and root rot on the beetroots and ranged from 38.3 (Priaxor 4.17SC 0.55 fl oz/1000 ft. row applied at GS 4-6) to 61.4 (Proline 480SC 0.24 fl oz/1000 ft. row at GS 4-6) but were not significantly different to the inoculated not-treated check (47.9). There was background crown and root in the trial and the non-inoculated not-treated check treatments had a crown

and root rot severity index of 40.1. There were no differences among treatments in terms of marketable beetroots and due to the onset of severe *Rhizoctonia* root rot during the latter part of the season the range was from 35 to 59% marketable and the non-inoculated not-treated check inoculated not-treated check had 55 and 48% marketable beets, respectively. No phytotoxicity was observed from any treatments.

Table 1. Efficacy of fungicides against *Rhizoctonia* crown and root rot.

Treatment and rate/1000 ft. row	Plant stand ^a 26 DAP ^b (%)		RAUEPC ^c 0 – 26 DAP	Crown and root rot			Marketable beets (%)					
				Incidence 60 DAP (%)	Incidence 123 DAP (%)	Severity ^d 123 DAP (%)						
Topguard 1.04SC 0.96 fl oz (A ^e).....	84.6	a-e ^f	34.7	a	4.0	efg	89.0	a	41.4	a	57.0	a
Topguard 1.04SC 0.69 fl oz (A); Topguard 1.04SC 0.69 fl oz + Koverall 75DF 1.65 oz wt + NIS 100SL 4.2 fl oz (C).....	75.4	e	30.9	a	4.9	b-g	99.0	a	55.6	a	41.0	a
Topguard 1.04SC 0.69 fl oz + Koverall 75DF 1.65 oz wt + NIS 100SL 4.2 fl oz (BC).....	87.0	a-d	38.6	a	7.3	a-f	97.0	a	51.4	a	48.0	a
Proline 480SC 0.24 fl oz (A).....	94.8	a	35.8	a	5.0	b-g	99.0	a	57.4	a	40.0	a
Serenade Soil 1.34SC 4.4 fl oz (A)... Proline 480SC 0.24 fl oz + Serenade Soil 1.34SC 4.4 fl oz (A)..	84.1	b-e	38.0	a	7.8	a-e	93.0	a	44.7	a	49.0	a
Serenade Soil 1.34SC 4.4 fl oz (A); Proline 480SC 0.24 fl oz (B).....	90.0	abc	33.4	a	5.9	a-g	99.0	a	50.7	a	41.0	a
Proline 480SC 0.24 fl oz (B).....	89.3	abc	37.2	a	4.8	c-g	98.0	a	56.0	a	35.0	a
Evergol Prime 240FS 0.33 fl oz (A). Evergol Prime 240FS 0.33 fl oz (A); Proline 480SC 0.24 fl oz (B).....	77.0	de	34.6	a	3.8	fg	98.0	a	61.4	a	36.0	a
Proline 480SC 0.24 fl oz (B).....	83.9	b-e	34.0	a	5.4	b-g	96.0	a	50.7	a	45.0	a
Headline 2.09EC 0.62 fl oz (A).....	91.3	ab	44.1	a	2.5	g	100.0	a	55.1	a	35.0	a
Priaxor 4.17SC 0.55 fl oz (A).....	90.0	abc	35.3	a	4.4	d-g	95.0	a	56.7	a	39.0	a
Priaxor 4.17SC 0.55 fl oz (B).....	77.7	de	37.7	a	3.4	g	96.0	a	46.4	a	57.0	a
Priaxor 4.17SC 0.55 fl oz (A); Priaxor 4.17SC 0.55 fl oz (B).....	83.2	b-e	36.5	a	4.1	d-g	96.0	a	38.3	a	59.0	a
Priaxor 4.17SC 1.1 fl oz (A); Priaxor 4.17SC 1.1 fl oz (B).....	89.3	abc	37.4	a	8.5	abc	99.0	a	53.9	a	44.0	a
Quadris 2.08FL 0.6 fl oz (A).....	80.2	cde	34.8	a	3.0	g	91.0	a	49.6	a	49.0	a
Quadris 2.08FL 0.6 fl oz (B).....	88.8	abc	37.4	a	3.6	fg	99.0	a	50.7	a	39.0	a
Moncut 70DF 0.74 oz wt (A).....	95.0	a	39.8	a	7.9	a-d	97.0	a	57.0	a	35.0	a
A15457 100EC 3.2 fl oz (A).....	77.5	de	30.6	a	3.5	fg	96.0	a	47.6	a	48.0	a
A15457 100EC 2.4 fl oz (A).....	80.7	cde	35.8	a	4.3	d-g	97.0	a	45.0	a	51.0	a
A15457 100EC 1.6 fl oz (A).....	88.9	abc	36.5	a	4.4	d-g	95.0	a	43.0	a	58.0	a
Quadris 2.08FL 0.6 fl oz (A); Topsin 4.5FL 1.38 fl oz (B).....	81.3	b-e	33.2	a	5.5	a-g	100.0	a	57.1	a	42.0	a
Topsin 4.5FL 1.38 fl oz (B).....	81.4	b-e	33.4	a	9.3	a	84.0	a	42.3	a	56.0	a
Inoculated Not-treated Check.....	81.3	b-e	33.3	a	4.5	d-g	99.0	a	51.6	a	40.0	a
Not-inoculated Not-treated Check...	79.6	cde	33.1	a	8.6	ab	100.0	a	47.9	a	48.0	a
	80.0	cde	28.7	a	5.6	a-g	91.0	a	40.1	a	55.0	a

^a Plant stand expressed as a percentage of the target population of 275 plants/100ft. row from a sample of 2 x 50 ft rows per plot.

^b DAP = days after planting on 4 May.

^c Relative area under the emergence progress curve from planting to 26 days after planting.

^d Severity of crown and root rot was measured as an index calculated as described in the text.

^e Application dates; A= 4 May; B= 30 May; C= 4 Jun.

^f Means followed by same letter are not significantly different at $p = 0.05$ (Fishers LSD).

Efficacy of application of foliar fungicides for control of *Cercospora* leaf spot in sugar beet, 2013

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Sugar beet cv. ACH RR-824 was PAT-treated and planted at the Michigan State University Bean and Beet Farm, Richville, MI on 8 May. Seed was planted at 1" depth into four-row by 50-ft plots (ca. 4.375 in. between plants to give a target population of 275 plants/100ft. row) with 30" between rows replicated four times in a randomized complete block design. Fertilizer was drilled into plots immediately before planting, formulated according to results of soil tests (125 lb 46-0-0/A). No additional nitrogen was applied to the growing crop. Plots were inoculated by spraying a conidial suspension of *C. beticola* collected from infected sugarbeet foliar residue from the previous season on 16 Jun across all plots. Fungicides were applied starting after the 45 Beetcast disease severity values were recorded in the area on 1 Jul (Ontario Weather Network, Ridgeway, ON, Canada), applications were initiated on 12 Jul and three to five applications were made as specified in the table below. Fungicides were applied with a hand-held R&D spray boom delivering 25 gal/A (80 p.s.i.) and using three XR11003VS nozzles per row. Induce 480XL 0.25 % v/v was applied where indicated as "Induce" on the results table unless a different rate was indicated. Weeds were controlled by cultivation and with Roundup Original Max 2.0 pt/A applied at GS2-4 and GS 6-8. Insects were controlled as necessary. Foliar leaf spot severity (%) was measured on 24 Aug and 5 Sep using a 0 – 10 scale; 0= 0%; 1= 1 - 5, 0.1%; 2= 6 -12, 0.35%; 3= 13 - 25, 0.75%; 4= 26 - 50, 1.5%; 5= 51 - 75, 2.5%; spots/leaf or severity %; respectively; 6= 3% (proven economic damage); 7= 6%; 8= 12%; 9= 25%; and 10 \geq 50% severity. Beetroots were machine-harvested on 19 Sep and individual treatments were weighed. Sugar content was measured at the Michigan Sugar Company analytical service laboratory. Meteorological variables were measured with a Campbell weather station located at the farm, latitude 43.3995 and longitude -83.6980 deg. Average daily air temperature ($^{\circ}$ F) was 60.7, 65.3, 70.4, 67.1, 58.8 and 51.1 (May, Jun, Jul, Aug, Sep, and Oct, respectively) and the number of days with maximum temperature $>90^{\circ}$ F over the same period was 0, 0, 5, 0, 1 and 0 (in 2012 there were 12 days for Aug). Average daily relative humidity (%) over the same period was 59.1, 66.1, 68.3, 63.1, 69.0, 68.1 and 70.1. Precipitation over the same period was 3.43, 1.73, 2.03, 1.85, 0.58 and 3.26". There were 182 Beetcast DSV values accumulated in the Saginaw area from 1 May to 9 Sep at Richville, MI.

Weather conditions during the growing season at Richville, MI were very conducive for the development of *Cercospora* leaf spot (CLS) for most of the season and of note were the hot and humid conditions during Jul. During Aug, conditions were less conducive for CLS with no days in excess of 90° F. CLS reached an index of about 8.3, 8.8, 8.8, 9.8 and 10.0 in the not-treated control by 16, 23, 29 and 4 and 18 Aug, respectively (not all data not shown in table). CLS severity (%) reached 22.5, 32.5, 38.8, 65.0 and 87.5% in the not-treated control by 16, 23, 29 and 4 and 18 Aug, respectively (not all data not shown in table). Treatments with CLS severity (%) less than 80.0% had significantly less CLS than the not-treated control by 18 Aug. All treatments had significantly less CLS RAUDPC values than the not-treated control (47.9) by 18 Aug. Treatments with CLS indices less than 8.8 had significantly less *Cercospora* leaf spot than the not-treated control (10.0) by 18 Aug. Several treatments had substantial disease development [CLS indices >6 (proven economic impact)] by 4 Aug and many more by the end of the evaluation period. Treatments with yield greater than 18.0 t/A had significantly greater yield per acre than the untreated control (14.4 t/A). Treatments with recoverable white sucrose per acre greater than 5341 lb had significantly greater yield per acre than the untreated control (4215 lb/A). Transient and minor (~5% of leaf area) foliar phytotoxicity (leaf bronzing) was observed after the first application in some of the triazole treatments but not in subsequent treatments (data not shown).

Cercospora leaf spot

Treatment and rate/A	Severity (%)		RAUDPC ^b		Bayer		Yield (t/A)		RWSA ^d	
	18 Sep	19 DAFA ^a	(0-100)	29 Aug	0-10 scale ^c				(lb)	
Topguard 1.04SC 10 fl oz (ACEG) ^e	5.3	Kl ^f	8.6	j-n	5.5	h-l	22.2	a-f	6175	a-g
Eminent 11.6SL 13 fl oz (ACEG).....	4.3	kl	9.9	h-n	5.5	h-l	19.3	c-m	5061	f-o
Inspire XT 2.08SC 7 fl oz (ACEG).....	4.3	kl	7.0	lmn	4.3	l	20.4	a-j	5493	d-l
Super Tin 4L 8 fl oz (ACEG).....	38.8	efg	25.7	de	8.8	a-d	17.3	i-p	4699	k-o
Proline 480SC 5.7 fl oz (ACEG).....	3.8	l	7.5	k-n	4.5	kl	19.6	b-l	5483	d-m
Tilt 3.6EC 4 fl oz (ACEG).....	21.3	hi	14.6	f-j	8.0	b-e	19.4	b-m	5406	d-n
Enable 2F 8 fl oz (ACEG).....	37.5	fg	26.1	de	8.8	a-d	17.9	g-p	5008	g-o
Eminent 11.6SL 13 fl oz (AG); Super Tin 4L 8 fl oz + NIS ^g (C); Topsin 4.5FL 7.6 fl oz + Manzate 75WG 2 lb (E).....	12.5	i-l	16.0	f-i	7.0	e-h	18.5	g-o	4970	g-o
Roundup 3AS 32 fl oz + Koverall 75DF 2 lb (AE); Topguard 1.04SC 10 fl oz + Koverall 75DF 1.5 lb + NIS (CG).....	7.5	jkl	12.6	g-n	6.5	e-i	20.3	a-j	5520	d-l
Topguard 1.04SC 10 fl oz + Koverall 75DF 1.5 lb + NIS (AE); Koverall 75DF 2 lb + NIS (CG).....	5.5	kl	9.7	h-n	5.8	g-l	19.7	b-k	5709	b-k
Topguard 1.04SC 14 fl oz + CHA-064 4.17SC 15 fl oz (ACEG).....	7.5	jkl	12.1	g-n	6.5	e-i	21.3	a-h	5425	d-m
Inspire XT 2.08SC 7 fl oz + Dithane F45 4F 51 fl oz + NIS (A); Super Tin 4L 8 fl oz + NIS (C); Priaxor 4.17SC 7 fl oz + NIS (E); Enable 2F 8 fl oz + NIS (G).....	6.3	kl	10.5	h-n	6.3	f-j	19.9	b-k	5668	c-k
Inspire XT 2.08SC 7 fl oz + Dithane F45 4F 51 fl oz + NIS (A); Dithane F45 4F 51 fl oz + NIS (CE); Enable 2F 8 fl oz + NIS (G).....	6.3	kl	10.2	h-n	6.3	f-j	24.0	A	6149	a-h
Inspire XT 2.08SC 7 fl oz + Dithane F45 4F 51 fl oz + NIS (A); Dithane F45 4F 51 fl oz + Priaxor 4.17SC 7 fl oz + NIS (C); Dithane F45 4F 51 fl oz + NIS (E); Enable 2F 8 fl oz + Dithane F45 4F 51 fl oz + NIS (G).....	4.8	kl	7.3	lmn	5.3	i-l	17.1	j-p	4733	k-o
Inspire XT 2.08SC 7 fl oz + Dithane F45 4F 51 fl oz + NIS (A); Dithane F45 4F 51 fl oz + NIS (C,E); Enable 2F 8 fl oz + Dithane F45 4F 51 fl oz + NIS (G).....	7.5	jkl	9.8	h-n	6.5	e-i	20.2	b-k	5663	c-k
SA-0040104 100SL 13 fl oz + Koverall 75DF 1.5 lb (AG); Super Tin 4L 8 fl oz (C); Headline 2.09SC 9 fl oz (E).....	4.0	kl	6.3	n	5.3	i-l	19.3	c-m	4734	k-o
SA-0040104 100SL 13 fl oz + Super Tin 4L 8 fl oz (AG); Super Tin 4L 8 fl oz + Topsin 4.5FL 7.6 fl oz (C); Headline 2.09SC 9 fl oz (E).....	7.5	jkl	11.6	g-n	6.5	e-i	19.3	c-m	5231	d-o
SA-0040104 100SL 13 fl oz + Super Tin 4L 8 fl oz (A); Super Tin 4L 8 fl oz (C); Headline 2.09SC 9 fl oz (E).....	7.5	jkl	11.1	g-n	6.5	e-i	19.0	d-n	5199	e-o
SA-0040104 100SL 13 fl oz + Koverall 75DF 1.5 lb (A); Koverall 75DF 1.5 lb + Super Tin 4L 8 fl oz (C); Headline 2.09SC 9 fl oz (E).....	4.8	kl	6.6	mn	5.3	i-l	22.4	a-e	6056	a-j

Cercospora leaf spot

Treatment and rate/A	Severity (%)		RAUDPC^b		Bayer		Yield (t/A)		RWSA^d	
	18 Sep 19 DAFA^a		(0-100) 29 Aug		0-10 scale^c				(lb)	
SA-0040104 100SL 13 fl oz + Koverall 75DF 1.5 lb (A); Koverall 75DF 1.5 lb + Headline 2.09SC 9 fl oz (C); Super Tin 80WP 8 fl oz (E).....	10.0	i-l	10.2	h-n	7.0	e-h	20.6	a-j	5616	c-k
SA-0040104 100SL 13 fl oz + Super Tin 4L 8 fl oz (A); Super Tin 4L 8 fl oz + Headline 2.09SC 9 fl oz + Koverall 75DF 1.5 lb (C); Super Tin 4L 8 fl oz (E).....	67.5	b	38.8	b	10.0	a	15.5	Nop	4277	mno
SA-0040104 100SL 13 fl oz + Super Tin 4L 8 fl oz (A); Koverall 75DF 1.5 lb + Headline 2.09SC 9 fl oz (C); Topsin 4.5FL 7.6 fl oz + Super Tin 4L 8 fl oz (E).....	11.3	i-l	11.9	g-n	7.3	d-g	19.1	d-n	5424	d-m
SA-0040104 100SL 13 fl oz + Echo 720SC 16 fl oz (A); Echo 720SC 16 fl oz (C); Headline 2.09SC 9 fl oz (E).....	11.3	i-l	10.8	g-n	7.0	e-h	19.6	b-l	5778	b-k
SA-0040104 100SL 13 fl oz + Echo 100F 24 fl oz (A); Echo 100F 16 fl oz (C); Headline 2.09SC 9 fl oz (E).....	80.0	a	37.5	b	10.0	a	17.2	i-p	4853	j-o
SA-0040104 100SL 13 fl oz + Echo 100F 16 fl oz (A); Echo 100F 16 fl oz + Topsin 4.5FL 7.6 fl oz (C); Headline 2.09SC 9 fl oz (E).....	50.0	cde	25.9	de	9.5	ab	18.6	f-o	5399	d-n
SA-0040303 100SL 32 fl oz + Echo 100F 16 fl oz (A); Echo 100F 16 fl oz + Super Tin 4L 8 fl oz + Topsin 4.5FL 7.6 fl oz (C); Super Tin 4L 8 fl oz (E).....	10.0	i-l	11.9	g-n	7.0	e-h	20.1	b-k	5211	d-o
SA-0040303 100SL 24 fl oz + Koverall 75DF 1.5 lb (A); Super Tin 4L 8 fl oz + Topsin 4.5FL 7.6 fl oz (C); Super Tin 4L 8 fl oz + Koverall 75DF 1.5 lb (E).....	21.3	hi	16.0	f-i	7.8	c-f	18.8	e-n	5008	g-o
SA-0040104 100SL 13 fl oz + Super Tin 4L 8 fl oz (A); Super Tin 4L 8 fl oz + Topsin 4.5FL 7.6 fl oz (C); Headline 2.09SC 9 fl oz (E).....	41.3	efg	28.3	cd	8.8	a-d	23.1	Ab	6121	a-i
Echo 720SC 24 fl oz (ACEG).....	30.5	gh	21.1	ef	7.8	c-f	20.6	a-j	5633	c-k
Echo 720SC 18 fl oz (ABCDEFGF).....	12.5	i-l	14.8	f-j	7.3	d-g	17.8	h-p	4930	i-o
Inspire 2.08SC 7 fl oz + Manzate Prostick 75DF 2 lb (A); Manzate Prostick 75DF 2 lb (C); Super Tin 4L 8 fl oz + Manzate Prostick 75DF 2 lb (E).....	4.3	kl	6.5	mn	5.5	h-l	20.8	a-i	5627	c-k
Proline 480SC 5.7 fl oz + Manzate Prostick 75DF 2 lb (A); Manzate Prostick 75DF 2 lb (C); Super Tin 4L 8 fl oz + Manzate Prostick 75DF 2 lb (E).....	6.5	jkl	8.8	j-n	5.8	g-l	15.1	Op	4187	o

Cercospora leaf spot

Treatment and rate/A	Severity		RAUDPC^b		Bayer	Yield (t/A)	RWSA^d			
	(%)	(0-100)	(0-10)	scale^c				(lb)		
	18 Sep	29 Aug	0-10	scale^c	Yield (t/A)	RWSA^d	(lb)			
Eminent 11.6SL 13 fl oz + Manzate Prostick 75DF 2 lb (A); Manzate Prostick 75DF 2 lb (C); Inspire XT 2.08SC 7 fl oz + Manzate Prostick 75DF 2 lb (E).....	5.0	kl	7.9	k-n	6.0	g-k	18.0	g-p	4832	k-o
Super Tin 4L 8 fl oz + Manzate Prostick 75DF 2 lb (A); Manzate Prostick 75DF 2 lb (C); Inspire XT 2.08SC 7 fl oz + Manzate Prostick 75DF 2 lb (E).....	11.3	i-l	13.5	g-l	7.0	e-h	20.1	b-k	5626	c-k
Super Tin 4L 8 fl oz + Manzate Prostick 75DF 2 lb (A); Manzate Prostick 75DF 2 lb (C); Proline 480SC 5.7 fl oz + Manzate Prostick 75DF 2 lb (E).....	10.3	i-l	11.5	g-n	6.5	e-i	18.6	f-o	5561	d-k
Super Tin 4L 8 fl oz + Manzate Prostick 75DF 2 lb (A); Manzate Prostick 75DF 2 lb (C); Eminent 11.6SL 13 fl oz + Manzate Prostick 75DF 2 lb (E).....	18.8	hij	17.3	fg	7.8	c-f	18.9	e-n	5341	d-o
Inspire XT 2.08SC 7 fl oz (A); Manzate Prostick 75DF 2 lb (C); Cuprofix Ultra Disperss 40DF 2 lb (E); Inspire XT 2.08SC 7 fl oz (G).....	7.5	jkl	11.6	g-n	6.5	e-i	17.2	i-p	4813	k-o
Inspire 2.08SC 7 fl oz + Manzate Prostick 75DF 2 lb (A); Cuprofix Ultra Disperss 40DF 2 lb (E); Inspire 2.08SC 7 fl oz (G).....	6.3	kl	12.0	g-n	6.3	f-j	20.9	a-i	6266	a-f
Inspire XT 2.08SC 7 fl oz + Manzate Prostick 75DF 2 lb (A); Super Tin 4L 8 fl oz + Manzate Prostick 75DF 2 lb (C); Inspire XT 2.08SC 7 fl oz + Cuprofix Ultra Disperss 40DF 2 lb (G).	16.3	ijk	16.4	fgh	7.8	c-f	16.6	k-p	4609	k-o
CHA064 1.04SC 15 fl oz (ACEG).....	47.5	def	25.2	de	9.0	abc	17.8	h-p	5319	d-o
Headline 2.09SC 9 fl oz (ACEG).....	60.0	bc	27.7	cde	9.5	ab	15.9	l-p	4329	l-o
IR14360 1ME 13 fl oz (AG); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (C); Headline 2.09SC 9 fl oz (E).....	6.8	jkl	11.0	g-n	6.0	g-k	20.6	a-j	5626	c-k
IR14360 1ME 10 fl oz + Super Tin 4L 6 fl oz (A); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (C); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz (E); IR14360 1ME 10 fl oz (G).....	6.3	kl	11.8	g-n	6.3	f-j	22.9	abc	6885	ab
IR14360 1ME 13 fl oz + Super Tin 4L 8 fl oz (A); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (C); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz (E); IR14360 1ME 13 fl oz (G).....	5.0	kl	9.5	i-n	6.0	g-k	18.4	g-o	4955	h-o
IRF168 2.53L 22 fl oz (AG); Super Tin 4L 8 fl oz (C); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz (E).....	7.5	jkl	10.3	h-n	6.5	e-i	19.2	d-n	5684	b-k

Cercospora leaf spot

Treatment and rate/A	Severity (%)		RAUDPC^b (0-100) 29 Aug	Bayer 0-10 scale^c	Yield (t/A)	RWSA^d (lb)				
	18 Sep 19 DAFA^a									
ISF010F 1.5SC 17 fl oz + Super Tin 4L 8 fl oz (A); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (C); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz (E); ISF010F 1.5SC 17 fl oz (G).....	5.5	kl	8.5	j-n	5.8	g-l	22.7	a-d	6418	a-d
ISF010F 1.5SC 14 fl oz + Super Tin 4L 8 fl oz (A); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (AC); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz (E); ISF010F 1.5SC 14 fl oz (G).....	10.0	i-l	12.9	g-n	6.8	e-i	19.3	c-m	5548	d-k
Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (A); IR14360 1ME 13 fl oz + Super Tin 4L 8 fl oz (C); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz (E); IR14360 1ME 13 fl oz (G).....	12.5	i-l	15.8	f-i	7.3	d-g	21.3	a-h	6301	a-e
IR14360 1ME 13 fl oz + Super Tin 4L 8 fl oz (A); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (AC); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz + Badge 2.27L 32 fl oz (E); IR14360 1ME 13 fl oz (G).....	5.0	kl	10.3	h-n	6.0	g-k	19.8	b-k	5517	d-l
IR14360 1ME 13 fl oz + Super Tin 4L 8 fl oz (A); Super Tin 4L 8 fl oz + Badge 2.27L 32 fl oz + opsin 4.5FL 10 fl oz (C); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz + Badge 2.27L 32 fl oz (E); IR14360 1ME 13 fl oz (G).....	10.0	i-l	14.0	g-k	7.0	e-h	20.9	a-i	6266	a-f
IR14360 1ME 13 fl oz + Super Tin 4L 8 fl oz + Badge 2.27L 32 fl oz (A); Super Tin 4L 8 fl oz + Badge 2.27L 32 fl oz + Topsin 4.5FL 10 fl oz (C); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz + Badge 2.27L 32 fl oz (E); IR14360 1ME 13 fl oz (G).....	7.5	jkl	10.0	h-n	6.5	e-i	18.8	e-n	5647	c-k
IR14360 1ME 16 fl oz (AG); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (C); Headline 2.09SC 12 fl oz (E)	10.0	i-l	13.7	g-l	6.8	e-i	19.4	b-m	6097	a-i
IR14360 1ME 19.2 fl oz (AG); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (C); Headline 2.09SC 12 fl oz (E)	5.0	kl	8.2	j-n	4.8	jkl	21.6	a-g	6413	a-d

Cercospora leaf spot

Treatment and rate/A	Severity	RAUDPC ^b	Bayer	Yield (t/A)	RWSA ^d (lb)
	(%)	(0-100)	0-10 scale ^c		
	18 Sep 19 DAFA ^a	(0-100) 29 Aug	0-10 scale ^c		
IR14360 1ME 16 fl oz (A); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (C); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz + IRF160 100L 1 qt/a (E); IR14360 1ME 16 fl oz + IRF160 100L 1 qt/a (EG).....	7.5 jkl	13.1 g-m	6.5 e-i	19.5 b-m	5642 c-k
IR14360 1ME 13 fl oz (A); Super Tin 4L 8 fl oz + Topsin 4.5FL 10 fl oz (C); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz + IRF160 100L 1 qt/a (E); IR14360 1ME 13 fl oz + IRF160 100L 1 qt/a (EG).....	10.0 i-l	13.4 g-l	6.8 e-i	20.4 a-j	6284 a-e
Eminent 125SL 13 fl oz + Diffusion 60L 2 gal/a (A); Super Tin 4L 8 fl oz + Diffusion 60L 2 gal/a (C); Topsin 4.5FL 10 fl oz + Diffusion 60L 2 gal/a (E); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz + Diffusion 60L 2 gal/a (G).....	6.8 jkl	11.6 g-n	6.0 g-k	24.0 a	6812 abc
Eminent 125SL 13 fl oz + Diffusion 60L 2 gal/a (A); Super Tin 4L 8 fl oz + Diffusion 60L 2 gal/a (C); Topsin 4.5FL 10 fl oz + Diffusion 60L 2 gal/a (E); Headline 2.09SC 12 fl oz + Manzate Prostick 75DF 32 oz + Diffusion 60L 2 gal/a (G).....	8.8 jkl	13.6 g-l	6.8 e-i	22.7 a-d	7105 a
Not treated check.....	87.5 a	47.9 a	10.0 a	14.4 p	4215 no

^a DAFA= Days after final fungicide application

^b RAUDPC = The relative area under the percentage late blight disease progress curve calculated for each treatment from the date of the first evaluation to 29 Aug, a period of 33 days (Max = 100)

^c Foliar leaf spot severity; 0 - 10 scale; 0= 0%; 1 = 1 - 5, 0.1%; 2 = 6 - 12, 0.35%; 3 = 13 - 25, 0.75%; 4 = 26 - 50, 1.5%; 5 = 51 - 75, 2.5%; spots/leaf or severity %; respectively; 6 = 3% (proven economic damage); 7 = 6%; 8 = 12%; 9 = 25%; and 10 ≥ 50% severity

^d RWSA = Recoverable White Sucrose per Acre (Ton/A* Recoverable White Sucrose per Ton of sugarbeet)

^e Application dates: A= 12 Jul; B= 19 Jul; C= 26 Jul; D= 2 Aug; E= 9 Aug; F= 16 Jul; G= 23 Aug; H= 30 Aug. Underlined letters indicate that Diffusion 60L was applied immediately after and separately from the fungicide

^f Means followed by same letter are not significantly different at $p = 0.05$ (Fishers LSD)

^g Induce applied at 0.25% v/v

Michigan Sugar Company Research

Official Variety Trial: This trial was planted at eight locations and six were usable for the variety approval process.

Purpose: To evaluate the production differences in varieties. Tons per acre, sugar content, and purity are measured and used to figure Recoverable Sugar per Ton (RWST) and Sugar per Acre (RWSA).

Results: Results were good from the locations we used. The traits for tons per acre, sugar content and tolerance to diseases and pests vary between varieties. The Official Variety Trials and the nurseries evaluate these differences. The results from our trials provide the information needed to approve the best varieties to be sold and give the growers the information they need to select the best varieties for their farm.

Rhizoctonia Nursery: We planted two locations and one was usable giving good results.

Purpose: The Rhizoctonia nursery is conducted to evaluate resistance in the varieties. The test is inoculated. Knowledge of varietal differences is important to help the growers select the best varieties for their conditions.

Results: There are a few varieties containing a level of tolerance to Rhizoctonia and many that have very little or no tolerance to the disease.

Cercospora Leafspot Nursery:

This nursery was planted at four locations and one gave us good results.

Purpose: The Cercospora Leafspot nursery is conducted to evaluate resistance in the varieties. These are two row plots and a susceptible variety is planted which helps spread the disease evenly. The entire plot area is inoculated with Cercospora.

Results: The results of this nursery indicates which varieties have a level of resistance that is acceptable in our growing region. The most tolerant variety had a rating of 2.5 and the most susceptible variety had a rating of 6.8 on a scale of 0-9.



Official Variety Trial

Average of 6 - 2013

Variety	\$/A	RWSA	RWST	T/A	% Sugar	% CJP
BTS-12RR2N	\$1,772	9058	265	34.1	17.6	95.9
BTS-19RR1N	\$1,737	8890	259	34.3	17.3	95.7
C-G333NT	\$1,732	8878	260	34.2	17.4	95.4
BTS-18RR4N	\$1,718	8801	266	33.2	17.8	95.5
C-RR059	\$1,700	8718	270	32.4	18.1	95.4
BTS-135N	\$1,684	8622	258	33.5	17.3	95.5
C-RR074NT	\$1,662	8511	256	33.3	17.4	95.0
BTS-1380	\$1,640	8403	256	32.9	17.3	95.3
C-G318	\$1,640	8412	256	32.9	17.2	95.3
SX-RR1233N	\$1,634	8339	243	34.3	16.4	95.4
SX-RR1235	\$1,632	8356	260	32.1	17.4	95.7
BTS-133N	\$1,623	8303	254	32.8	17.2	95.0
BTS-1399	\$1,618	8299	261	31.8	17.5	95.6
C-G351NT	\$1,613	8278	276	30.0	18.4	95.4
SX-1212RR	\$1,588	8131	259	31.3	17.3	95.7
BTS-1397	\$1,587	8136	257	31.6	17.2	95.6
C-RR202	\$1,585	8153	269	30.2	18.0	95.6
BTS-17RR32	\$1,577	8084	250	32.4	16.9	95.1
SX-1211N RR	\$1,571	8017	253	31.7	17.0	95.4
SX-1228RR	\$1,559	7977	262	30.5	17.4	95.9
C-RR288	\$1,520	7789	260	30.0	17.3	95.7
HM-28RR	\$1,516	7767	250	31.0	16.9	95.5
MA-116RR	\$1,510	7750	250	31.0	17.0	95.0
HM-173RR	\$1,510	7741	255	30.3	17.2	95.2
SX-RR1236	\$1,505	7677	254	30.1	17.0	95.9
SX-1229RR	\$1,502	7691	259	29.7	17.3	95.8
HM-131RR	\$1,482	7612	264	28.8	17.8	95.2
SX-RR1234N	\$1,480	7543	242	30.9	16.3	95.5
M-206RR	\$1,476	7576	266	28.4	17.9	95.2
HM-NT403RR	\$1,455	7449	244	30.6	16.8	94.5
C-G390	\$1,455	7453	251	29.7	16.8	95.7
SX-1291RR	\$1,453	7436	248	30.0	16.7	95.4
HM-50RR	\$1,445	7407	266	27.9	17.9	95.3
SX-1226RR	\$1,439	7357	257	28.7	17.2	95.7
M-304RR	\$1,436	7326	246	29.9	16.8	94.8
HM-NT425RR	\$1,416	7252	257	28.3	17.6	94.6
M-301RR	\$1,400	7177	257	27.9	17.5	94.9
BTS-10RR34	\$1,398	7177	259	27.6	17.4	95.6
HM-9533RR	\$1,396	7157	272	26.3	18.4	94.9
SX-1260RR	\$1,394	7135	249	28.7	16.8	95.4
M-303RR	\$1,393	7100	232	30.6	15.9	94.8
HM-NT9511RR	\$1,357	6941	241	28.9	16.6	94.4
HM-NT9526RR	\$1,350	6908	257	26.7	17.2	95.9
HM-NT9502RR	\$1,338	6841	241	28.4	16.3	95.2
Average	\$1,534	7855	256	30.7	17.3	95.4
LSD 5%	138.5	725.4	9.7	2.3	0.6	0.4
CV %	8.0	8.2	3.3	6.6	3.1	0.3

\$/A: Dollars per acre using a \$50 payment



Cercospora Leafspot Nursery

Blumfield, MI - 2013

Planted: May 5
Inoculated: July 11
Evaluated: Aug 30 to Sept 18
Plot Size: 2 rows X 17.5 ft, 5 reps

Variety	Cerc* Rating 0-9
C-G390	2.5
HM-NT9526RR	2.6
C-RR288	2.7
BTS-1399	2.9
HM-131RR	3.3
BTS-10RR34	3.4
HM-173RR	3.5
HM-NT425RR	3.6
HM-NT403RR	3.7
RESISTANT	3.7
C-RR202	3.7
HM-9511RR	3.7
HM-50RR	3.8
C-G351NT	3.8
HM-28RR	3.9
SX-1291RR	3.9
SX-1260RR	4.0
C-RR059	4.1
SX-1211N RR	4.3
BTS-18RR4N	4.4
SX-1226RR	4.5
BTS-133N	4.5
HM-9533RR	4.6
BTS-1397RR	4.7

Variety	Cerc* Rating 0-9
SX-1228RR	4.7
SX-1212RR	4.8
BTS-12RR2N	4.9
SX-RR1234N	5.0
SX-1229RR	5.0
C-G318	5.0
C-G333NT	5.0
BTS-19RR1N	5.1
SX-RR1233N	5.1
C-RR074NT	5.1
SX-1235RR	5.2
BTS-17RR32	5.3
BTS-1380RR	5.3
SUSCEPTIBLE	5.4
HM-NT9502RR	5.4
SX-RR1236	5.4
M-301RR	5.4
M-304RR	5.5
BTS-135N	5.5
M-303RR	5.5
MA-116RR	6.1
M-206RR	6.8
Average	4.5
LSD 5%	0.3
CV %	6.1

* Lower number is better on a 0-9 scale. 0 = no spots, 3 = 3% leaf desiccation, 5 = up to 25% desiccation, 6 = up to 50% desiccation, 9 = 100% dead leaves.



Rhizoctonia Nursery

Blumfield, MI - 2013

Planted: May 4
Rated: October 2

Variety	Root Rating 0-7	Foliar Rating 0-10	Canopy Count % Dead or Dying
BTS-10RR34	2.2	7.3	6.9
HM-NT9526RR	2.3	7.3	10.4
BTS-133N	2.3	7.5	11.5
C-G390	2.3	8.1	6.4
BTS-1397	2.4	7.3	13.3
HM-NT9502RR	2.4	7.5	11.6
C-RR059	2.4	7.9	11.4
BTS-1399	2.5	7.6	8.5
SX-1226RR	2.6	7.2	17.1
HM-50RR	2.6	7.3	15.2
Resistant Check	2.6	6.5	20.5
HM-173RR	2.6	6.9	19.8
HM-NT403RR	2.6	6.8	20.8
C-RR202	2.6	7.5	13.7
MA-116RR	2.7	6.9	20.2
SX-1291RR	2.7	6.8	20.4
C-RR288	2.7	7.4	17.0
HM-NT425RR	2.7	7.0	26.0
BTS-135N	2.8	7.3	15.4
SX-1211N RR	2.8	7.2	21.7
BTS-1380	2.9	7.1	18.2
SX-1229RR	2.9	6.8	21.7
C-G333NT	2.9	7.5	18.8
HM-9533RR	2.9	6.9	23.4
HM-131RR	2.9	7.3	26.7

Variety	Root Rating 0-7	Foliar Rating 0-10	Canopy Count % Dead or Dying
C-G351NT	2.9	7.2	21.8
SX-RR1234N	2.9	6.9	25.6
C-G318	3.1	6.9	25.4
BTS-18RR4N	3.1	7.0	22.2
HM-NT9511RR	3.1	6.6	31.5
SX-1212RR	3.1	6.4	28.3
SX-RR1233N	3.1	6.3	34.1
SX-RR1236	3.2	6.8	28.0
C-RR074NT	3.2	6.9	28.4
BTS-19RR1N	3.2	6.8	21.5
HM-28RR	3.3	6.6	32.3
SX-1228RR	3.3	6.4	34.6
BTS-17RR32	3.4	6.3	33.1
BTS-12RR2N	3.4	6.3	35.0
M-301RR	3.4	6.5	31.7
SX-RR1235	3.5	6.6	34.8
M-303RR	3.7	5.3	39.5
M-206RR	3.7	5.7	38.0
SX-1260RR	3.9	5.9	40.5
M-304RR	4.1	5.7	49.2
Susc Check	4.7	5.0	60.9
Average	3.0	6.9	24.2
LSD 5%	0.6	0.7	12.9
CV %	16.7	8.8	47.0

Root Rating: 0 = no disease, 1 = very minor symptoms, 2 = minor symptoms (<5% rot), 3 = up to 25% rot, 4 = up to 50% rot, 5 = up to 75% rot, 6 = up to 95% rot, 7 = completely rotted

Foliar Rating: 0 to 10 scale with 0 = all plants dead or dying, 10 = all plants healthy

Canopy Count % Dead or Dying: % of plants with canopy collapsing or dead

Sugar beet activities of the USDA-ARS East Lansing conducted in cooperation with Saginaw Research & Extension Center during 2013

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USDA – Agricultural Research Service, East Lansing, MI

Evaluation and rating plots were planted at the Saginaw Valley Research & Extension Center (SVREC) in Frankenmuth, MI in 2013 that focused on *Cercospora* leaf spot and *Rhizoctonia* seedling disease performance of a wide range of *Beta vulgaris* materials. Leaf spot trials were conducted in conjunction with Beet Sugar Development Foundation (BSDF) and included USDA-ARS cooperator germplasm. All trials were planted following normal fall and spring tillage operations with a USDA-ARS modified John Deere / Almaco research plot planter. The BSDF evaluation nursery was planted on May 3, 2013, and the other evaluation and breeding nurseries on May 6 and 7. A randomized complete-block design with one to four replications was used, depending on the specific test. All plots were 4.5 m (15 ft) long, with 51 cm (20 in) between rows. Azoxystrobin was applied in a band in furrow at planting to control *Rhizoctonia* damping-off and crown and root rot, except in the *Rhizoctonia* nursery. All entries in the BSDF *Cercospora* nursery were RoundUp Ready, thus weeds were controlled with glyphosate in this nursery. For other nurseries, weed seedlings were controlled with with ethofumesate on 9 May, three times with mixtures of phenmedipham, desmedipham, triflurosulfuron methyl, and clopyralid (27 May, 8 June and 3 July), once with S-metolachlor (12 June), and hand weeding was done to control larger weeds as needed. The beet crop was thinned to stand by hand with the generous help of Michigan Sugar Cooperative. Bolting beets were removed throughout the season.

The official BSDF cooperative *Cercospora* leaf spot evaluation nursery had entries from two companies, with a total of 188 entries evaluated. This nursery was 2-row, 4 replications conducted in a double-blind fashion. The nursery was inoculated on July 11 with a liquid spore suspension of *Cercospora beticola* (approximately 10^3 spores/ml as determined by counting with a hemocytometer). Visual evaluations were taken from plot appearance using a standardized disease index (DI) which has a scale from 0 (no symptoms), 1 (a few scattered spots), 2 (spots coalescing or in large numbers on lower leaves only), 3 (some dieback on lower leaves, but leaves not entirely dead), 4-8 (increasing amounts of dead and diseased tissue), 9 (mostly dead with few remaining living leaves with large dead patches), and 10 (all leaves dead). Disease severity peaked by early September, after which regrowth started to outpace new disease development, so that disease ratings for several accessions remained constant or decreased after that rating, thus ratings are not given after this date. At our September 12 rating, means of the resistant and susceptible internal control for the entire nursery were 3.1 and 5.2, respectively.

USDA-ARS cooperator germplasm evaluations included 20 USDA-ARS germplasm entries from Fargo, ND, 11 entries from Kimberly, ID, and 247 entries from Ft. Collins, CO (replicated, randomized), along with 68 open-pollinated entries (replicated, non-randomized, Table 1) from the East Lansing program. East Lansing materials were generated from a wide sample of sugar beet germplasm undergoing selection for various traits important for Michigan [Table 1, Breeding Goal (not mutually exclusive)]. *Cercospora* values 4.0 or less are promising.

Table 1: Cercospora reaction and agronomic values of germplasm releases and potential germplasm releases for open-pollinated USDA-ARS East Lansing germplasm.

Entry	Seed No.	Breeding Goal	N Rows	Mean Aug 29	Std Dev	Mean Sept 12	Std Dev
2029	EL-A021482	Cercospora R check	8	1.1	0.4	3.1	0.4
2033	EL-A12-00002	Cercospora	4	1.8	0.5	3.8	0.5
2035	EL-A12-00022	Cercospora	11	3.0		3.9	0.3
1125	EL-A029735	Cercospora	3	3.3	0.6	4.0	0.0
1135	EL-A021739	Cercospora	3	3.0	0.0	4.0	0.0
1143	EL-A024956	Cercospora	3	3.0	0.0	4.0	0.0
1147	EL-A029711	Cercospora	3	3.7	0.6	4.0	0.0
1148	EL-A029714	Cercospora	3	4.0	0.0	4.0	0.0
1122	EL-A029729	Cercospora	3	2.7	1.5	4.3	0.6
1132	EL-A022460	Cercospora	3	3.7	0.6	4.3	0.6
2030	EL-A029819	Cercospora S check	8	2.8	0.5	4.4	0.5
2031	EL-A022809	Cercospora	2	2.5	0.7	4.5	0.7
2034	EL-A029686	Cercospora	30	3.5	1.0	4.5	0.5
2032	EL-A029687	Cercospora	26	3.7	0.8	4.7	0.7
1124	EL-A029734	Emergence	3	3.7	0.6	5.7	0.6
1153	EL-A029713	Nematode	3	4.0	0.0	4.0	0.0
1154	EL-A029738	Nematode	3	4.0	0.0	4.3	0.6
1155	EL-A029739	Nematode	3	4.0	0.0	4.3	0.6
1116	EL-A029770	Nematode	22	4.0	0.9	4.5	0.5
1150	EL-A027150	Nematode	3	4.0	0.0	4.7	0.6
1152	EL-A029712	Nematode	3	3.3	0.6	4.7	0.6
2038	EL-A029769	Nematode	22	4.0	0.8	5.1	0.6
1103	EL-A027019	Nematode	8	4.0	0.0	5.3	0.5
1126	EL-A013491	Rhizoctonia	3	3.3	1.2	4.0	0.0
1136	EL-A021740	Rhizoctonia	3	3.7	0.6	4.0	0.0
1138	EL-A027158	Rhizoctonia	3	3.0	0.0	4.0	0.0
1144	EL-A024957	Rhizoctonia	3	3.0	0.0	4.0	0.0
1146	EL-A029710	Rhizoctonia	3	3.0	0.0	4.0	0.0
1301	EL-A12-00007	Rhizoctonia	3	3.7	0.6	4.0	0.0
1302	EL-A12-00031	Rhizoctonia	3	4.0	0.0	4.0	0.0
1303	EL-A027149	Rhizoctonia	3	3.7	0.6	4.0	0.0
1304	EL-A027006	Rhizoctonia	3	3.0	0.0	4.0	0.0
1305	EL-A024968	Rhizoctonia	3	3.3	0.6	4.0	0.0
1307	EL-A024953	Rhizoctonia	3	3.0	0.0	4.0	0.0
1308	EL-A029704	Rhizoctonia	3	2.7	0.6	4.0	0.0
1313	EL-A12-00003	Rhizoctonia	3	2.7	0.6	4.0	0.0
1309	EL-A029715	Rhizoctonia	22	3.1	0.5	4.0	0.2
1123	EL-A029730	Rhizoctonia	3	3.0	1.0	4.3	0.6
1130	EL-A022404	Rhizoctonia	3	3.0	1.4	4.3	0.6
1133	EL-A021733	Rhizoctonia	3	3.7	0.6	4.3	0.6
1145	EL-A024961	Rhizoctonia	3	3.3	0.6	4.3	0.6
1151	EL-A12-00004	Rhizoctonia	3	3.0	0.0	4.3	0.6
1300	EL-A027154	Rhizoctonia	3	4.0	0.0	4.3	0.6
1312	EL-A029736	Rhizoctonia	3	3.3	0.6	4.3	0.6
1141	EL-A12-00005	Rhizoctonia	3	4.0	0.0	4.7	0.6
1156	EL-A027015	Rhizoctonia	3	4.3	0.6	4.7	0.6
1310	EL-A029732	Rhizoctonia	3	4.3	0.6	4.7	1.2
1311	EL-A029733	Rhizoctonia	3	4.0	0.0	4.7	0.6
1157	EL-A12-00021	Rhizoctonia	3	4.0	0.0	5.0	0.0
1158	EL-A12-00001	Rhizoctonia	3	4.0	0.0	5.0	0.0
1118	EL-A029719	Smooth-root	3	3.7	0.6	4.0	0.0
1119	EL-A029724	Smooth-root	3	3.0	0.0	4.0	0.0
1120	EL-A029725	Smooth-root	3	4.0	0.0	4.0	0.0
1131	EL-A022447	Smooth-root	3	3.0	0.0	4.0	0.0
1137	EL-A027156	Smooth-root	3	2.3	0.6	4.0	0.0
1142	EL-A024954	Smooth-root	3	3.3	0.6	4.0	0.0
1149	EL-A029766	Smooth-root	3	4.0	0.0	4.0	0.0
1306	EL-A12-00009	Smooth-root	3	3.3	0.6	4.0	0.0
1139	EL-A12-00012	Smooth-root	3	3.3	0.6	4.3	0.6
1110	EL-A024975	Smooth-root	22	3.7	0.6	4.5	0.5
1127	EL-A013492	Smooth-root	3	4.0	0.0	4.7	0.6
1134	EL-A021841	Smooth-root	3	4.0	0.0	4.7	0.6
1140	EL-A12-00018	Smooth-root	3	4.0	0.0	4.7	0.6
2039	EL-A024983	Smooth-root	22	4.0	0.8	4.9	0.6
1128	EL-A013493	Smooth-root	3	4.0	0.0	5.0	0.0
1129	EL-A013496	Smooth-root	3	4.0	0.0	5.0	0.0
1121	EL-A029728	Smooth-root	3	4.0	0.0	5.3	0.6
1092	EL-A022808	Storage	10	0.0	0.0	3.9	0.3
Mean				3.49		4.40	
F value				5.3***		4.8***	
LSD (0.05)				1.07		0.76	
CV				25.80		13.98	

Thirty Plant Introductions (PIs) from the USDA-ARS National Plant Germplasm System (NPGS) *Beta* Collection were evaluated for resistance to *Cercospora beticola* (Table 2). Internal controls included a moderately susceptible commercial check and a resistant check, EL50/2 (PI 664912). Nine accessions (Ames 2633, PI 467873, PI 467880, PI 46788, PI 527307, PI 558515, PI 590732, PI 614827 and PI 663212) were not significantly different from the resistant control at the first rating, but all were significantly different from the resistant control at all other rating dates. One of these accessions, PI 590732, had average ratings significantly lower than the susceptible control at all rating dates. Three other accessions (Ames 2633, PI 467872, and PI 467881) had average ratings significantly lower than the susceptible control three of the four additional rating dates. In contrast, one accession, PI 470095, had average ratings that were significantly higher than the susceptible control three of the five rating dates, and another accession, PI 505830, was significantly higher at two rating dates. Seven accessions (Ames 2632, PI 467872, PI 470089, PI 470096, PI 608797, PI 612768, and PI 612769) required removal of seed stalks (bolters) from at least one replicate during the season. Materials that produced good roots were collected and will be crossed with East Lansing elite germplasm in 2014.

Table 2: *Cercospora* leaf spot reaction of 30 Plant Introductions.

Entry	Identification		Disease Index*					
	Donor's ID	subsp.	Origin	16 Aug	22 Aug	29 Aug	5 Sep	12 Sep
Ames 2632	IDBBNR 4774	<i>vulgaris</i>	United States.....	3.3	4.0	4.5*	5.5*	5.5*
Ames 2633	IDBBNR 4775	<i>vulgaris</i>	United States.....	2.0	3.0	3.7	3.7	4.3
	VERHNIACSK	<i>vulgaris</i>	Ukraine.....	3.0	3.7	4.7	5.0	6.3
PI 355959	AJA 031							
	PERVONIAJSK	<i>vulgarisa</i>	Ukraine.....	2.3	3.7	4.3	5.3	5.7
PI 355960	AJA 028							
PI 414934	IDBBNR 4621	<i>vulgaris</i>	South Africa.....	3.3	4.3	4.3	5.3	5.7
PI 467872	Gong nong 1	<i>vulgaris</i>	China.....	2.3	3.3	3.7	4.0	4.7
PI 467873	Nei meng 5	<i>vulgaris</i>	China.....	2.0	3.0	3.7	4.3	5.0
PI 467880	Tao yu 2	<i>vulgaris</i>	China.....	2.0	3.7	4.0	4.7	5.0
PI 467881	Tien yen 5	<i>vulgaris</i>	China.....	2.0	2.7	4.0	4.0	4.7
PI 470089	IDBBNR 5520	<i>vulgaris</i>	Germany.....	2.7	4.0	4.3	5.3	6.0
PI 470090	IDBBNR 5521	<i>vulgaris</i>	United Kingdom.....	2.7	4.0	5.3	5.7	6.7
PI 470093	IDBBNR 5524	<i>vulgaris</i>	Hungary.....	3.0	4.7	5.3	6.0	6.0
PI 470094	IDBBNR 5525	<i>vulgaris</i>	United States.....	3.7	4.3	5.3	6.0	6.3
PI 470095	IDBBNR 5526	<i>vulgaris</i>	Hungary.....	3.3	4.7	5.7	6.3	6.7
PI 470096	IDBBNR 5527	<i>vulgaris</i>	United Kingdom.....	2.7	4.0	4.0	4.7	5.3
PI 505830	KP 24	<i>vulgaris</i>	Former Soviet Union.....	3.3	4.7	4.7	6.0	6.3
PI 518165	Ch-2	<i>vulgaris</i>	China.....	2.7	3.3	4.3	4.7	5.7
PI 518780	AD-2	<i>vulgaris</i>	United States.....	2.7	3.7	4.0	4.3	5.0
PI 527307	F1009	<i>vulgaris</i>	United States.....	2.0	3.7	4.0	5.0	6.3
PI 558515	FC 403	<i>vulgaris</i>	United States.....	2.3	3.0	4.0	4.3	5.3
PI 590730	MELANGE S	<i>vulgaris</i>	France.....	3.3	4.0	4.7	5.7	6.0
PI 590731	MELANGE T	<i>vulgaris</i>	France.....	3.0	4.0	4.3	5.0	6.0
PI 590732	MELANGE U	<i>vulgaris</i>	United States.....	1.7	2.7	3.3	4.0	4.0
PI 608797	A77-48	<i>vulgaris</i>	Chile.....	2.7	4.0	4.7	4.7	5.0
PI 608800	A78-32	<i>vulgaris</i>	United States.....	3.0	4.0	4.0	4.7	5.3
PI 608802	A80-16	<i>vulgaris</i>	Chile.....	2.7	3.7	4.0	5.0	5.3
PI 612768	AT3993-5	<i>vulgaris</i>	United States.....	2.3	3.0	4.0	4.7	5.7
PI 612769	AT3994-3	<i>vulgaris</i>	United States.....	3.3	4.3	4.3	5.0	6.3
PI 614825	AT3984A	<i>vulgaris</i>	United States.....	2.7	4.0	5.0	5.3	6.0
PI 614827	AT3993-4	<i>vulgaris</i>	United States.....	2.0	3.0	4.0	4.3	5.0
PI 663212	EL57	<i>vulgaris</i>	United States.....	2.0	3.7	4.0	4.7	5.0
Leaf Spot Susceptible Check [†] (CE).....	USA.....			3.0	3.7	4.7	5.3	6.0
Leaf Spot Resistant Check [*] (EL50/2).....	USA.....			1.0	1.0	1.7	2.0	2.7
	LSD _{0.05}			1.02	0.90	0.92	0.94	1.10
Trial Mean				2.6	3.6	4.3	4.9	5.5

*Disease Index is based on a scale where 0=healthy to 10=all leaves dead.

[†]The Leafspot Susceptible Check is kindly provided by Syngenta seeds.

^{*}The Leafspot Resistant Check is EL50/2 (PI 664912).

^{*}Numbers based on average from two plots as insufficient leaf tissue remained of one of the replicates after seed stalks were removed to rate.

A Rhizoctonia seedling disease trial was conducted for the first time at the SVREC in 2013. Ground barley-infested Rhizoctonia inoculum was applied on June 5, at the 2- to 4-leaf stage. Pre-disease stand counts were done on June 26. Post-disease stand counts were performed July 17.

Table 3: Stand counts of replicated materials pre- and post-disease expression for Rhizoctonia.

entry	ID	Breeding Goal	N Rows	Mean - pre	Std Dev	Mean - post	Std Dev	Mean - post/pre
1122	EL-A029729	Cercospora	3	34.0	4.0	6.3	1.5	0.19
1315	EL-A12-00029	Cercospora	3	37.3	6.4	10.0	10.4	0.27
1135	EL-A021739	Cercospora	3	37.3	7.5	10.3	6.1	0.28
1148	EL-A029714	Cercospora	2	28.5	9.2	9.0	1.4	0.32
1147	EL-A029711	Cercospora	3	30.3	2.1	10.0	7.5	0.33
1143	EL-A024956	Cercospora	3	41.7	4.0	15.0	3.6	0.36
1314	EL-A12-00029	Cercospora	3	40.3	7.2	19.7	3.8	0.49
1142	EL-A024954	Cercospora	3	30.0	3.6	18.7	4.9	0.62
1131	EL-A022447	Cercospora	3	35.7	2.5	51.0	61.7	1.43
1317	EL-A12-00033	Fusarium	3	30.7	8.1	7.0	4.6	0.23
1155	EL-A029739	Nematode	3	29.7	3.2	6.3	4.0	0.21
1151	EL-A12-00004	Nematode	3	28.0	4.6	7.3	4.9	0.26
1152	EL-A029712	Nematode	2	28.0	11.3	8.5	2.1	0.30
1153	EL-A029713	Nematode	3	35.7	4.7	13.7	8.3	0.38
1154	EL-A029738	Nematode	3	38.7	2.1	16.7	6.5	0.43
1149	EL-A029766	Rhizoctonia	3	17.3	0.6	0.0	0.0	0.00
1123	EL-A029730	Rhizoctonia	3	31.0	3.6	4.0	1.0	0.13
1316	EL-A12-00031	Rhizoctonia	3	41.0	2.6	7.7	3.5	0.19
1126	EL-A013491	Rhizoctonia	3	23.3	7.1	4.3	1.2	0.19
1132	EL-A022460	Rhizoctonia	3	46.0	6.6	9.0	1.7	0.20
1134	EL-A021841	Rhizoctonia	3	35.7	8.4	6.7	1.2	0.19
1124	EL-A029734	Rhizoctonia	3	25.0	8.5	5.3	4.2	0.21
1302	EL-A12-00031	Rhizoctonia	3	41.7	1.5	9.3	6.7	0.22
1136	EL-A021740	Rhizoctonia	3	38.3	4.7	10.3	2.3	0.27
1311	EL-A029733	Rhizoctonia	3	11.3	6.1	3.0	1.7	0.26
1307	EL-A024953	Rhizoctonia	2	35.0	7.1	12.5	3.5	0.36
1156	EL-A027015	Rhizoctonia	2	25.0	4.2	8.5	4.9	0.34
1310	EL-A029732	Rhizoctonia	3	23.3	8.0	6.7	7.6	0.29
1150	EL-A027150	Rhizoctonia	3	26.0	14.2	7.7	1.2	0.29
1144	EL-A024957	Rhizoctonia	3	26.7	3.1	10.7	2.9	0.40
1133	EL-A021733	Rhizoctonia	3	31.0	13.5	11.7	2.1	0.38
1145	EL-A024961	Rhizoctonia	3	37.0	4.4	15.3	0.6	0.41
1306	EL-A12-00009	Rhizoctonia	3	46.0	11.1	23.7	28.0	0.51
1301	EL-A12-00007	Rhizoctonia	3	15.7	8.6	7.7	5.7	0.49
1300	EL-A027154	Rhizoctonia	3	26.3	4.2	11.7	3.5	0.44
1312	EL-A029736	Rhizoctonia	2	29.5	2.1	15.5	6.4	0.53
1308	EL-A029704	Rhizoctonia	3	32.0	8.0	17.3	6.8	0.54
1309	EL-A029715	Rhizoctonia	3	40.0	3.6	21.7	3.5	0.54
1146	EL-A029710	Rhizoctonia	3	34.3	2.1	19.0	2.6	0.55
1157	EL-A12-00021	Rhizoctonia	3	20.7	6.0	11.3	1.5	0.55
1303	EL-A027149	Rhizoctonia	12	32.4	5.5	18.3	4.9	0.56
1313	EL-A12-00003	Rhizoctonia	3	27.3	6.7	15.7	5.9	0.57
1305	EL-A024968	Rhizoctonia	3	33.7	9.8	19.0	7.0	0.56
1158	EL-A12-00001	Rhizoctonia	3	25.0	2.6	15.0	2.6	0.60
1304	EL-A027006	Rhizoctonia	3	31.0	23.9	18.7	10.3	0.60
1119	EL-A029724	Smooth-root	3	35.3	5.0	7.3	2.1	0.21
2032	EL-A029687	Smooth-root	14	38.4	7.5	8.9	5.3	0.23
1121	EL-A029728	Smooth-root	3	33.7	7.8	8.7	2.1	0.26
1139	EL-A12-00012	Smooth-root	3	34.7	4.7	11.3	7.5	0.33
1127	EL-A013492	Smooth-root	3	20.7	4.0	7.0	1.0	0.34
2033	EL-A12-00002	Smooth-root	2	17.5	0.7	6.0	7.1	0.34
1140	EL-A12-00018	Smooth-root	3	39.3	3.2	14.0	1.7	0.36
1138	EL-A027158	Smooth-root	3	25.3	1.5	9.3	3.8	0.37
1128	EL-A013493	Smooth-root	3	31.0	6.0	10.7	5.1	0.34
1117	EL-A022804	Smooth-root	3	36.7	6.8	13.0	7.2	0.35
1129	EL-A013496	Smooth-root	3	23.3	7.4	8.3	3.2	0.36
1137	EL-A027156	Smooth-root	3	14.0	1.7	6.3	3.8	0.45
1118	EL-A029719	Smooth-root	3	33.0	3.5	14.7	3.8	0.44
2034	EL-A029686	Smooth-root	12	29.9	16.7	11.1	4.7	0.37
1120	EL-A029725	Smooth-root	3	29.3	7.6	14.7	5.0	0.50
1125	EL-A029735	Smooth-root	3	27.7	2.1	14.7	1.5	0.53
1141	EL-A12-00005	Smooth-root	3	27.3	4.6	18.0	4.6	0.66
1130	EL-A022404	Smooth-root	3	7.3	3.1	6.7	1.5	0.91
1025	EL-A12-00005	Storage	2	29.0	5.7	4.5	2.1	0.16
1092	EL-A022808	Storage	2	41.5	6.4	8.0	0.0	0.19
1069	EL-A029709	Storage	12	33.3	8.1	12.8	6.5	0.38
2037	EL-A12-00030	Rhizoctonia R control	9	42.6	24.0	19.6	11.0	0.46
1072	EL-A015028	Rhizoctonia S control	7	30.9	11.1	5.9	4.3	0.19

The *Rhizoctonia* seedling inoculated trial was done to evaluate the feasibility of conducting a seedling *Rhizoctonia* disease nursery and to gauge whether results would be useful. All but three of the 71 replicated (non-randomized) entries were East Lansing materials, along with a series of Recombinant Inbred Lines (see below). Results (Table 3) indicate stand establishment was generally good to excellent. Post-disease expression stand counts reflect loss to seedling disease, and were generally quite severe, with less than half of the pre-disease stand counts remaining, on average. Germplasm varied markedly in the proportion of stand remaining, ranging from 0 to 143% of pre-disease stand, and at the higher levels we suspect that the results were confounded in that germplasm tested was relatively lower vigor and emerged slowly. We have seen similar results on the East Lansing farm but have not precisely determined the reasons. However, this seemed to affect only two entries (with proportions > 0.90, Table 3; Mean post/pre). Entries with values greater than EL51 (*Rhizoctonia* R control = 0.46, Table 3) would be considered as promising germplasm release candidates. The four entries with >60% stand survival appeared useful, and include breeding derivatives of SR98 that was released for genetic control of seedling (and adult) *Rhizoctonia* diseases. These four entries also had 15 or more plants surviving, which is perhaps another indicator of selection potential to meet *Rhizoctonia* disease challenges genetically, and an additional 12 entries met this criterion. All plots were harvested October 10, and only 17 entries had harvestable (but small) roots since the disease continued to take a toll on the entries during the intervening period. Of these, Entries 1303, 1308, and 1309, all derivatives of SR98, yielded the highest number of roots from the *Rhizoctonia* nursery, and these will be intercrossed for new seed production in 2014.

Breeding goals are introduced in Tables 1 and 3, and generally refer to the prime trait of the original germplasm donor. Each entry under one of the six major categories generally shares various genetic contributions with other category, and this is desirable to recombine traits to create germplasm that will meet, in the current and near future environments, the needs of the Great Lakes and Midwest growing regions. Inherent in these definitions is a base line of performance that primarily requires emergence and stand establishment, and secondarily production traits such as sucrose content and yield, and preservation traits such as disease resistance. Thus, each germplasm tested generally performs to this baseline, to which is added new traits. Traits such as nematode and *Fusarium* resistance, are being introduced from non-Michigan adapted germplasm, and consequently are deficient in traits such as seedling disease (e.g., *Aphanomyces*) and *Cercospora* leaf spot resistances, which then require improvement through backcrossing to well-adapted Michigan germplasm. This process has been realized to date with smooth-root traits as well as *Rhizoctonia* crown and root.

Sugar beet is naturally an open pollinated crop, unlike many of our traditional row crops. Self-infertility creates an additional challenge to bringing new varieties to market since breeding progress is slower; that is it is more difficult to remove deleterious traits and increase desirable characters due to the breeding system of the crop. A self-fertility character was discovered in the 1950's, and its use is becoming more prevalent. Changing a breeding system may have greater challenges since virtually all traits need to be incorporated in the self-fertility background, but progress and opportunities may be expanded using such a system. To this end, we have brought self-fertility into the East Lansing germplasm for a couple of reasons. One is the promise of greater breeding efficiency, but another is rapid removal of deleterious traits from breeding populations and, downstream, hybrid varieties, as well as the relative ease in which genetic characterization is afforded by self-fertile populations in discovering the actual genes for traits such as disease resistance and sucrose yield.

Also in the 2013 SVREC field trials, we advanced inbred populations derived from crosses between sugar and fodder (157 entries), table (180 entries), chard (166 entries), and wild (447 entries) beets, primarily to advance these materials to the next generation. In the *Rhizoctonia* nursery, 187 F6-generation inbred lines (RILs) derived from a cross of C869 sugar beet (susceptible) and EL51 (resistant) were scored for emergence and stand persistence under severe seedling *Rhizoctonia* pressure, as above. Results were similar to the open pollinated populations in the pre- and post-disease expression stand counts, and these distributions appear normally distributed.

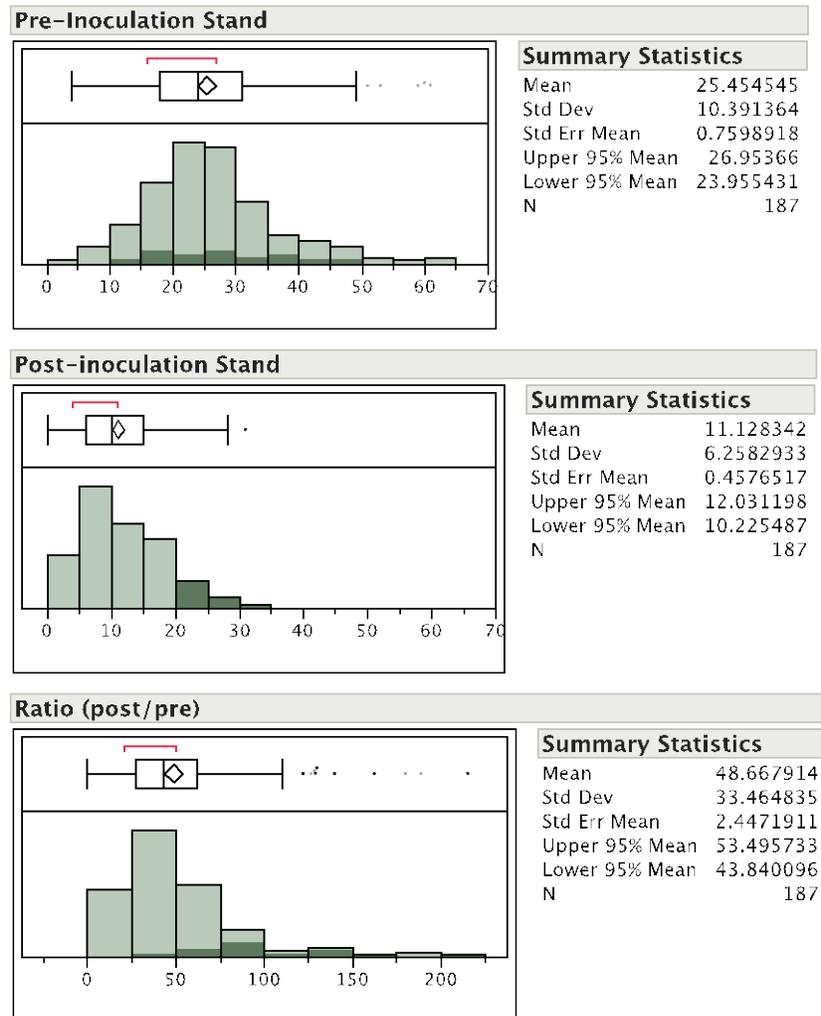


Figure 1: Distribution of RIL performance under severe *Rhizoctonia* seedling pressure. X-axis is stand (number of seedlings) and Y-axis is the number of entries with X stand (187 entries). Dark bars indicate high stand persistence RILs.

We extend our gratitude to Paul Horny and Dennis Fleischmann for their essential help with nursery and farm operations, to Michigan Sugar for help with thinning and agronomic evaluations, and to MSU undergrads Nick Boerman and the Bli sisters, Bridgett and Brittany, for their help throughout the field season.

Sugarbeet Nitrogen Response Following Wheat
Kurt Steinke and Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center	Tillage: Conventional
Planting Date: May 2, 2013 (Harvest 10/18/13)	N Rates: See below
Soil Type: Clay loam; 2.7 OM; 7.8 pH; 38 ppm P; 203 ppm K	Population: 4 ¼ in. spacing
Variety: Hilleshog 9042 Roundup Ready	Replicated: 4 replications

N Trt. (Total lb. N/A)	RWSA	RWST	Tons/A	% Sugar	% CJP	NH ₂	Amino-N
0 – Check	7208	304	23.7	20.0	95.9	57	3.3
40	8028	295	27.2	19.7	95.3	73	4.5
80	8264	296	27.9	20.0	94.9	94	5.5
120	7326	279	26.3	19.0	94.4	141	8.4
160	8537	287	29.7	19.4	94.8	144	8.7
200	8632	287	30.1	19.4	94.7	110	6.4
240	8835	278	31.9	19.0	94.4	175	10.5
LSD_(0.10)^a	894	14	2.7	0.8	0.5	32	2.0

^a LSD, least significant difference between means within a column at ($\alpha = 0.10$).

N Trt. (Total lb. N/A)	Gross Grower Payment (\$/A)	Net Economic Return Minus N Costs (\$/A) ^b	Net Economic Return Minus N Costs and Trucking (\$/A) ^c
0 – Check	1316	1316	1227
40	1465	1446	1344
80	1508	1470	1365
120	1337	1280	1181
160	1558	1481	1370
200	1575	1479	1367
240	1613	1497	1378
LSD_(0.10)^a	163	163	155

^a LSD, least significant difference between means within a column at ($\alpha = 0.10$).

^{b, c} Gross grower payment and net economic returns based upon a \$51/ton payment, an average RWST equal to the company average, an N price of \$0.48/lb., and trucking costs of \$3.75/T.

Summary: Trial was conducted to more accurately determine sugarbeet nitrogen fertilizer needs and nitrogen response following wheat. All treatments received 40 lbs. N/A as 28%, 20 lbs. P₂O₅/A, 50 lbs. K₂O/A. and 2 lbs. Mn/A as starter placed 2x2 on May 2 (check plots did not receive any N). The 40 lb. N/A treatment received no supplemental N beyond the starter application. Sidedress N (urea) applications were completed on June 11 and were coated with Agrotain to avoid N volatilization.

Wet, cool spring conditions delayed planting, caused uneven emergence, and slowed beet seedling development for 4-6 weeks after planting. These conditions also resulted in about a 30-40 lb N/A loss across a large portion of the state. Keep this 30-40 lb N loss in mind when evaluating 2013 N rates against other years. Treatments consisting of 160 lb. N or more tended to yield greater but when factoring in the economics of N price and trucking, 40 lbs. N as a 2x2 at planting may have been the best option given the shortened, wet season. The tendency of both NH₂ and amino-N concentrations to increase up to 160 lbs N, decrease at 200 lbs N, and again increase at 240 lbs N was similar this year as in 2012 and 2011. This may indicate that treatments consisting of 160 or more lbs N/A were set-up to do well in the field but likely ran short on bulking time. Given a few extra weeks of growing season, 160 lbs N/A or greater treatments may have added significant tonnage to significantly impact net economic returns.

So what can growers take away from a less than stellar sugarbeet season? In wet seasons with significant planting delays, 40 lbs N/A as a 2x2 may be the only and most economical investment in N. Net economic return is based on a \$51/ton payment, an average RWST equal to the company average, an N price of \$0.48/lb., and trucking costs of \$3.75/T.

Impacts of Organic Sources of Nitrogen on Sugarbeet Production

Kurt Steinke and Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center	Tillage: Conventional
Planting Date: May 2, 2013 (Harvest 10/18/13)	N Trts: See below
Soil Type: Clay loam; 2.7 OM; 7.8 pH; 38 ppm P; 203 ppm K	Population: 4 ¼ in. spacing
Variety: Hillehog 9042 Roundup Ready	Replicated: 4 replications

N Trt. 160 lb N/A Total	RWSA	RWST	Tons/A	% Sugar	% CJP	NH ₂	Amino-N	% Total N (12 lf.)
40 UAN 2x2 120 Urea Sd	8524	287	29.7	19.4	94.8	144	8.7	3.9
1 T/A Biotic 40 UAN 2x2 13 Urea Sd	8632	283	30.5	19.1	94.8	118	7.1	5.0
1 T/A Herbrucks 40 UAN 2x2 66 Urea Sd	9645	282	34.2	19.2	94.6	119	7.0	4.4
2 T/A Herbrucks 40 UAN 2x2 13 Urea Sd	8868	278	31.9	18.9	94.4	153	9.1	4.7
LSD_(0.10)^a	----	15	3.7	0.8	0.5	38	2.5	0.4

^a LSD, least significant difference between means within a column at ($\alpha = 0.10$).

Summary: Trial was conducted to determine the effects of organic spring-applied sources of N on sugarbeet production and quality. All treatments received 40 lbs. N/A as 28%, 20 lbs. P₂O₅/A, 50 lbs. K₂O/A. and 2 lbs. Mn/A as starter placed 2x2 on May 2. A biotic (8-5-5, mycorrhizae-inoculated) fertilizer and Herbrucks pelleted chicken manure (4-3-2) were applied pre-plant incorporated the day of planting at 1 or 2 T/A The 100% soluble N treatment was applied as urea sidedress on June 11, other than 40 lbs N in 2x2 starter which all treatments received. Nitrogen applications in all treatments were equalized at 160 lbs of first-year mineralizable N/A.

At 1 T/A, the Herbrucks product produced significantly greater tonnage and greater RWSA as compared to other treatments. The organic-based products did not suffer large decreases in % sugar at the 1 T/A rate and had similar NH₂ and amino-N concentrations as the industry-standard 100% soluble N treatment. At 2 T/A, the Herbrucks product began to show signs of increased N impurities, lower tonnage, and decreased RWST. The economics of organic N applications will need to be further investigated but in 2013 the fear of these products reducing beet quality was not substantiated.

Polymer-Coated Urea Blending Ratios for Sugarbeet Production

Kurt Steinke and Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center	Tillage: Conventional
Planting Date: May 2, 2013 (Harvest 10/18/13)	N Trts: See below
Soil Type: Clay loam; 2.7 OM; 7.8 pH; 38 ppm P; 203 ppm K	Population: 4 ¼ in. spacing
Variety: Hillehog 9042 Roundup Ready	Replicated: 4 replications

160 lb N/A Total (%PCU:%Urea)	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N	Gross Grower Payment (\$/A) ^b
100:0	9112	289	31.6	19.3	95.3	95	5.6	1663
75:25	7884	282	28.0	19.2	94.4	154	9.2	1439
50:50	7394	276	26.8	18.9	94.2	137	8.2	1349
25:75	7899	268	29.5	18.5	93.9	137	8.5	1442
0:100	8537	287	29.7	19.4	94.8	144	8.7	1558
LSD_(0.10)^a	1365	13	4.7	0.6	0.8	45	2.7	249

^a LSD, least significant difference between means within a column at ($\alpha = 0.10$).

^b Gross grower payment based upon a \$51/ton payment and an average RWST equal to the company average.

Summary: Trial was conducted to determine how to best utilize polymer-coated urea (PCU) in sugarbeet production. All treatments received 40 lbs. N/A as 28%, 20 lbs. P₂O₅/A, 50 lbs. K₂O/A. and 2 lbs. Mn/A as starter placed 2x2 on May 2. PCU and urea were applied in 5 blending ratios consisting of 100:0, 75:25, 50:50, 25:75, and 0:100 (%PCU : %urea) for a total of 160 lbs N/A (minus 40 lbs N/A as 2x2 starter). All treatments containing PCU (and the associated percentage of urea) were applied pre-plant incorporated the day of planting. The 100% urea treatment was applied at sidedress on June 11. The source of PCU was ESN, Environmentally Smart Nitrogen.

Wet, cool spring conditions likely increased the time period of N loss yet few significant differences were noticed between treatments. Either 100% PCU or 100% urea produced the greatest yield and % sugar with a slight advantage to 100% PCU for RWSA and gross grower payment. The 100% PCU treatment did produce lower NH₂ and amino-N concentrations as compared to treatments including urea but this may be due to greater residual soil nitrate after harvest (data still being analyzed). Slow emergence and delayed spring plant development may have hindered treatment differences as a few additional weeks of bulking may have added significant tonnage to further separate out treatment differences. Net economic return is based on a \$51/ton payment and an average RWST equal to the company average.

Best management practices for Warrant in Roundup Ready sugarbeet

Christy Sprague and Gary Powell, Michigan State University

Location: Saginaw Valley Research and Extension Center	Tillage: Conventional
Planting Date: May 2, 2013	Herbicides: see treatments
Soil Type: Clay loam; 3.2 OM; pH 8.0	Varieties: HM-173RR
Replicated: 4 times	Population: 48,000 seeds/A

Table 1. Sugarbeet injury, weed control, sugarbeet yield and recoverable white sugar per acre (RWSA) for various herbicide programs.

Herbicide treatments ^a	Injury ^b — % —	WEED CONTROL (at Harvest)		SUGARBEET	
		Common lambsquarters % control	Redroot pigweed % control	Yield - ton/A -	RWSA - lb/A -
Roundup - applied 2X (32 oz fb. 22 oz)	0	99	99	20.5	5893
Roundup + Warrant fb. Roundup	2	99	99	21.0	6184
Roundup + Outlook fb. Roundup	3	99	99	21.4	6299
Roundup + Dual II Magnum fb. Roundup	1	99	99	20.5	6100
Roundup + Betamix (3 pt) fb. Roundup	15	99	99	20.2	5999
Roundup fb. Roundup + Warrant	0	99	99	21.3	6431
Roundup fb. Roundup + Outlook	2	99	99	19.9	6049
Roundup fb. Roundup + Dual II Magnum	0	99	99	20.9	6412
Norton (PRE) fb. Roundup + Warrant fb. RUP	14	99	99	20.8	6238
Norton (PRE) fb. Roundup fb. RUP + Warrant	3	99	99	20.6	6097
LSD_{0.05}^c	7	n.s.	n.s.	n.s.	n.s.

^a POST herbicides were applied when sugarbeet were at the 2- and 6-leaf stages. Roundup PowerMax was applied at 32 fl oz/A for the 2-leaf application and 22 fl oz/A for the 6-leaf application. All POST treatments included ammonium sulfate at 17 lb/100 gal. See recommendations in the MSU Weed Control Guide for Field Crops.

^b Injury was evaluated June 13 (10 d after the 2-leaf application timing)

^c Means within a column greater than least significant difference (LSD) value are different from each other.

Summary: Warrant is a new encapsulated acetochlor product that is being examined as a potential tank-mix partner with glyphosate in Roundup Ready sugarbeet. This trial was conducted to determine best management practices with Warrant and to compare it to other commercialized products. Early in the season there was significant sugarbeet injury when Betamix was applied with Roundup and from Norton PRE followed by Roundup + Warrant applied to 2-leaf sugarbeet. There initially were some differences in weed control between the herbicide treatments; however by harvest overall weed control was excellent with all treatments. Sugarbeet yield and recoverable white sugar per acre (RWSA) was similar for all treatments. Overall there were no difference between the different treatments. For the different tank-mixtures, including other products once sugarbeet was past the two-leaf stage has generally had little effect on yield. However in the future, different tank-mix partners may need to be included in earlier applications depending on different herbicide-resistant weed situations. Tank-mixture combinations with the 2nd glyphosate application may help reduce the risk of the development of herbicide-resistant weeds.

Replanted sugarbeet tolerance to Warrant

Christy Sprague and Gary Powell, Michigan State University

Location: Saginaw Valley Research and Extension Center	Tillage: Conventional
Planting Dates: see treatments	Herbicide Application Date: May 2, 2013
Soil Type: Clay loam; 3.2 OM; pH 8.0	Varieties: HM-173RR
Replicated: 4 times	Population: 48,000 seeds/A

Table 1. Main effect of herbicide for sugarbeet planted in to herbicide residues at various weeks after application. Stand counts were taken 6 wks after planting and at harvest, yield, and recoverable white sugar per acre (RWSA) are also presented.

MAIN EFFECT ^a	STAND (6 WAT)	STAND (FINAL)	YIELD	RWSA
HERBICIDE ^b	— plants/100 ft —	— plants/100 ft —	— ton/A —	— lb/A —
No herbicide	213 A ^c	196 A	19.3 B	5525 B
Warrant 3 pt	196 B	189 AB	19.3 B	5505 B
Warrant 6 pt	183 C	184 B	19.6 AB	5657 AB
Dual Magnum	199 B	190 A	19.7 A	5728 A

^a Main effect of herbicide are averaged over planting dates; sugarbeet were planted weekly for 7 weeks, including the day of application.

^b Herbicides were applied on May 2 into a weed-free seed bed; the application rate of Dual Magnum was 1.33 pt/A.

^c Means within a column with different letters are significantly different from each other.

Table 2. Main effect of planting date for sugarbeet planted in to herbicide residues at various weeks after application. Stand counts were taken 6 wks after planting and at harvest, yield, and recoverable white sugar per acre (RWSA) are also presented.

MAIN EFFECT ^a	STAND (6 WAT)	STAND (FINAL)	YIELD	RWSA
PLANTING DATE ^b	— plants/100 ft —	— plants/100 ft —	— ton/A —	— lb/A —
Week-0	225 B ^c	212 B	20.2 A	6182 A
Week-1	195 C	187 C	20.3 A	6154 A
Week-2	225 B	213 B	20.1 A	6005 A
Week-3	92 E	93 D	18.5 D	4923 D
Week-4	180 D	178 C	18.9 BC	5256 C
Week-5	253 A	232 A	19.3 B	5530 B
Week-6	216 B	212 B	18.8 CD	5179 CD

^a Main effect of planting dates are averaged over herbicides; herbicides were applied on April 4 into a weed-free seed bed; the application rate of Dual Magnum was 1.33 pt/A.

^b Sugarbeet were planted weekly for 7 weeks, including the day of application.

^c Means within a column with different letters are significantly different from each other.

Summary: Warrant is a new encapsulated acetochlor product that is being examined as a potential tank-mix partner with glyphosate in Roundup Ready sugarbeet. Preemergence applications of Warrant have been shown to cause significant sugarbeet injury and in some cases reductions in yield. If sugarbeet needs to be replanted after a lay-by application of Warrant sugarbeet injury, reductions in stand, and potential reductions of yield may be a concern. This study was conducted to determine the time interval needed between Warrant applications and replanting sugarbeet. In 2011, if sugarbeet were planted into the 1X rate of Warrant or Dual Magnum prior to the 4 week after application planting, sugarbeet stand was significantly lower than the no herbicide treatment. For the 2X Warrant application rate sugarbeet stand was lower until the 5 week planting. Sugarbeet stand averaged over all planting dates was reduced by Warrant (1X and 2X) in 2012. This year early sugarbeet stand was reduced by all herbicide treatments. But these applications did not affect yield or RWSA compared to the no herbicide control either year. Averaged over all herbicide applications, planting date significantly affected sugarbeet stand, yield, and RWSA. There was not a planting date by herbicide application interaction in 2012 or 201, and replanting sugarbeet into Warrant residues did not significantly reduce yield or RWSA compared with the no herbicide control. However, under conditions with more moisture this may be more apparent similar to the 2011 results.

Evaluation of V-10206 in Roundup Ready sugarbeet

Christy Sprague and Gary Powell, Michigan State University

Location: Saginaw Valley Research and Extension Center	Tillage: Conventional
Planting Date: May 2, 2013	Herbicides: see treatments
Soil Type: Clay loam; 3.2 OM; pH 8.0	Varieties: HM-173RR
Replicated: 4 times	Population: 48,000 seeds/A

Table 1. Sugarbeet injury, weed control, sugarbeet yield and recoverable white sugar per acre (RWSA) for various herbicide programs.

Herbicide treatments ^a	INJURY		WEED CONTROL (at Harvest)		SUGARBEET	
	10 DAT	30 DAT	Common lambsquarters	Redroot pigweed	Yield	RWSA
	%		% control		ton/A	lb/A
Roundup (32 oz)	0	0	71	99	21.1	6299
Roundup + Warrant (3 pt)	3	2	84	99	21.0	6212
Roundup + Dual II Magnum (1.33 pt)	2	1	92	99	21.3	6374
Roundup + V-10206 (1.5 oz)	21	4	96	99	19.7	5780
Roundup + V-10206 (2.0 oz)	23	4	96	99	21.2	6299
Roundup + V-10206 (2.5 oz)	24	5	92	99	20.6	6345
Roundup + V-10206 (3.0 oz)	26	7	99	99	19.7	5585
Untreated	0	0	0	0	15.7	4603
LSD_{0.05} ^b	4	2	9	n.s.	3.4	977

^a POST herbicides were applied when sugarbeet were at the 2-leaf stage and weeds were 2-inches tall. Roundup PowerMax was applied at 32 fl oz/A and treatments included ammonium sulfate at 17 lb/100 gal.

^b Means within a column greater than least significant difference (LSD) value are different from each other.

Summary: V-10206 (pyroxasulfone) is a new active ingredient that is commercially available in corn and soybean. This trial was conducted to determine if there is a potential fit for V-10206 for lay-by applications in sugarbeet. This product would be potentially used similarly to Dual II Magnum in sugarbeet. We compared one POST application of each of these products with four rates of V-10206. The key objective was to compare sugarbeet injury and yield and determine the residual activity on these products. Initially when V-10206 was tank-mixed with Roundup PowerMax there was over 20% sugarbeet injury. By 30 DAT sugarbeet had recovered, however sugarbeet injury was still significant with these treatments ranging from 4 to 7%. Residual control of common lambsquarters was greater with tank-mixtures with Dual II Magnum or V-10206 at any rated compared to Roundup alone or in some cases the tank-mixture with Warrant. Yield and RWSA was only reduced by the untreated plot which was 26% lower for yield and 28% lower for RWSA than the highest yielding treatment. V-10206 may be a new potential herbicide option; however more research needs to be conducted to determine if that injury will equate to reduced yield under different environments.

Volunteer corn effects on Roundup Ready sugarbeet yield and quality planted in wide- and narrow-rows

Amanda Harden and Christy Sprague, Michigan State University

Location:	East Lansing/SVREC (Richville)	Row widths:	30- & 15-inches
Planting Dates:	May 2 (EL); May 3 (SVREC)	Volunteer corn:	'F ₂ ' DeKalb 46-61 "SmartStax"
Soil Type:	Loam (EL); Clay loam (SVREC)	Tillage:	Conventional
Herbicides:	Roundup PowerMax (22 fl oz/A) + AMS	Population:	52,000 seeds/A
Variety:	HM-173RR, Roundup Ready	Replicated:	4 times

Table 1. Main effect of row width on sugarbeet yield and recoverable white sugar per acre (RWSA) averaged over volunteer corn populations.

ROW WIDTH	EAST LANSING		SVREC	
	Yield —tons/A—	RWSA —lbs/A—	Yield —tons/A—	RWSA —lbs/A—
Wide (30-inches)	30.1 A ^a	7785 A	14.0 A	4170 B
Narrow (15-inches)	30.4 A	7739 A	15.7 A	4769 A

^a Means within a column with different letters are significantly different from each other

Table 2. Main effect of volunteer corn population on sugarbeet yield and recoverable white sugar per acre (RWSA) averaged over row widths.

VOUNTEER CORN POPULATION — plants/150 ft ² —	EAST LANSING		SVREC	
	Yield —tons/A—	RWSA —lbs/A—	Yield —tons/A—	RWSA —lbs/A—
0	29.1 BC ^a	7058 C	17.1 A	5088 A
3	31.9 AB	8360 AB	18.0 A	5321 A
6	34.1 A	8890 A	17.0 A	5199 A
12	31.0 AB	7721 BC	15.2 A	4621 A
24	29.1 BC	7722 BC	11.4 B	3174 B
48	26.0 C	6820 C	10.5 B	3413 B

^a Means within a column with different letters are significantly different from each other

Summary: This trial was conducted to determine: 1) the effect volunteer glyphosate-resistant corn has on glyphosate-resistant sugarbeet yield and quality, and 2) how row width affects corn competition with sugarbeet. Sugarbeet were planted in 15" and 30" row widths. A range of volunteer corn populations were planted the same day using 'F₂' seed. Due to poor germination, volunteer corn was replanted at the 2-leaf stage of sugarbeet at East Lansing. All plots were kept weed-free with applications of glyphosate. Canopy closure was quicker in narrow rows at both locations (data not shown). At SVREC, narrow rows resulted in higher RWSA. Sugarbeet yields were similar for narrow and wide rows at both locations in 2013. At East Lansing, volunteer corn growth was delayed and sugarbeet were able to withstand volunteer corn populations of 24 plants per 150 ft². Sugarbeet yields were similar between 0 and 12 plants per 150 ft² at SVREC. Glyphosate-resistant volunteer corn needs to be controlled at populations greater than 12 plants per 150 ft² in order to maximize sugarbeet yield and quality.

Control of volunteer Roundup Ready corn in Roundup Ready sugarbeet

Amanda Harden and Christy Sprague, Michigan State University

Location:	East Lansing/SVREC (Richville)	Variety:	HM-173RR, Roundup Ready
Planting Dates:	May 2 (EL); May 3 (SVREC)	Volunteer corn:	'F ₂ ' DeKalb 46-61 "SmartStax"
Soil Type:	Loam (EL); Clay loam (SVREC)	Tillage:	Conventional
Replicated:	4 times	Population:	52,000 seeds/A

Table 1. Effect of application timing on volunteer corn control and sugarbeet yield and quality at SVREC.

Removal Timing ^a	DAP ^b	Volunteer corn		Sugarbeet	
		Control ^c	Final biomass	Yield	RWSA
		— % —	— g/A —	— tons/A —	— lbs/A —
No corn	0	--	0 C	21.9 A	6729 A
V2	32	99 A ^d	0 C	20.2 AB	6063 AB
V4	42	99 A	0 C	19.8 B	6012 B
V6	47	99 A	0 C	19.4 B	5979 B
V8	55	91 B	0 C	19.3 B	5875 B
V11	76	39 C	1358 B	14.4 C	4396 C
Untreated	--	0 D	3398 A	13.7 C	4103 C

^a Weeds were controlled at these volunteer corn stages using SelectMax or Assure II + Roundup PowerMax (22 fl oz/A) + AMS (17 lb/100 gal). There were no differences between the different herbicide treatments so results were combined.

^b Days after planting, application time.

^c Control was evaluated 2 weeks after the last application timing.

^d Means within a column with different letters are significantly different from each other.

Table 2. Effect of application timing on volunteer corn control and sugarbeet yield and quality at East Lansing.

Removal Timing ^a	DAP ^b	Volunteer corn		Sugarbeet	
		Control ^c	Final biomass	Yield	RWSA
		— % —	— g/A —	— tons/A —	— lbs/A —
No corn	0	--	0 C	31.7 A	8469 A
V2	55	99 A ^d	0 C	30.6 A	7723 ABC
V4	59	99 A	0 C	30.5 A	7898 AB
V6	66	97 A	0 C	30.4 A	7906 AB
V8	78	71 B	102 C	29.0 AB	7478 BC
V10	97	43 C	483 B	28.7 AB	7375 BC
Untreated	--	0 E	1154 A	27.4 B	6993 C

^a Weeds were controlled at these volunteer corn stages using SelectMax or Assure II + Roundup PowerMax (22 fl oz/A) + AMS (17 lb/100 gal). There were no differences between the different herbicide treatments so results were combined.

^b Days after planting, application time.

^c Control was evaluated 2 weeks after the last application timing.

^d Means within a column with different letters are significantly different from each other.

Summary: This trial was conducted to determine the impact of different volunteer corn control timings with Assure II and SelectMax on volunteer corn control, sugarbeet yield and recoverable white sugar per acre. Volunteer corn was planted at 24 plants per 150 ft². Volunteer corn was controlled at various stages with either Assure II or SelectMax. Assure II and SelectMax were equally effective at controlling volunteer corn so results were combined. At East Lansing, volunteer corn was replanted at the 2-leaf stage of sugarbeet due to poor initial germination. Delayed corn growth significantly improved sugarbeet competitiveness with volunteer corn. Sugarbeet yield and quality were reduced if volunteer corn was not controlled. At SVREC, sugarbeet yield and quality were significantly reduced at the V4 corn growth stage. Early-season control resulted in complete removal of volunteer corn. Volunteer corn needs to be controlled prior to the V4 growth stage to maximize removal, sugarbeet yield and recoverable white sugar per acre.

Harvest aid effects on black bean desiccation and yield with early planting

Amanda Goffnett and Christy Sprague, Michigan State University

Location: Richville (SVREC)	Tillage: Conventional
Planting Date: June 13, 2013	Variety: see summary
Replicated: 4 times	Population: 106,000 seeds/A
Soil Type: Clay loam, 4.1% OM, pH 7.7 (SVREC)	Row width: 30-inch

Table 1. Effect of preharvest treatment on black bean desiccation 3 and 7 days after treatment (DAT) and yield for early planting.

Treatment	Desiccation				Yield ^a	
	%				cwt/A	
	3 DAT ^b		7 DAT		Early	Late
	Early	Late	Early	Late		
Gramoxone (2 pt/A) + NIS	96 A ^c	98 A	99 A	99 A	20.3 B	22.7 A
Sharpen (2 fl oz/A) + MSO + AMS	85 B	98 A	99 A	99 A	17.7 C	23.6 A
Roundup (22 fl oz/A) + AMS	73 C	95 A	96 AB	98 A	23.3 A	24.1 A
Untreated	73 C	94 A	89 B	97 A	23.6 A	24.5 A

^a Yield obtained by direct harvest

^b Days after treatment

^c Means within a column with different letters are significantly different from each other

Summary: This study was conducted to evaluate the effects of preharvest herbicide applications on black bean desiccation and yield with two application timings at an early planting date. Desiccation treatments of Gramoxone, Sharpen, and Roundup were applied to three varieties: ‘Zorro’, ‘B10244’, and ‘Eclipse’ at an early application timing (50% yellow pod), and a standard application timing (80% yellow pod). The early application was to evaluate differences in treatments and simulate green areas in a field that may be present during standard applications of harvest aids. Data were averaged over all varieties. Differences in black bean desiccation between the application timings were greatest 3 DAT, with Gramoxone demonstrating the quickest desiccation at the early timing. By 7 DAT, desiccation for all preharvest treatments was above 95%. Lower yields were observed with Gramoxone and Sharpen from early applications. Overall, the speed of desiccation and yield were influenced by application timing and desiccation treatment. Early applications of Gramoxone and Sharpen can lead to reductions in yield, which may be due to the quicker speed of activity halting continued development of the dry bean. This research was supported by MSU Project GREEN, Michigan Dry Bean Commission, and the Michigan Department of Agriculture Specialty Crops grant.

Harvest aid effects on black bean desiccation and yield with late planting

Amanda Goffnett and Christy Sprague, Michigan State University

Location: Richville (SVREC)	Tillage: Conventional
Planting Date: June 26, 2013	Variety: see summary
Replicated: 4 times	Population: 106,000 seeds/A
Soil Type: Clay loam, 4.1% OM, pH 7.7 (SVREC)	Row width: 30-inch

Table 1. Effect of preharvest treatment on black bean desiccation 3 and 7 days after treatment (DAT) and yield for late planting.

Treatment	Desiccation				Yield ^a	
	%				cwt/A	
	3 DAT ^b		7 DAT		Early	Late
	Early	Late	Early	Late		
Gramoxone (2 pt/A) + NIS	78 CD ^c	91 AB	90 B	98 A	15.5 B	15.9 B
Sharpen (2 fl oz/A) + MSO + AMS	95 A	98 A	99 A	99 A	15.5 B	17.7 A
Roundup (22 fl oz/A) + AMS	77 D	90 AB	85 B	98 A	17.4 A	16.3 AB
Untreated	68 E	85 BC	78 C	97 A	16.4 AB	16.7 AB

^a Yield obtained by direct harvest

^b Days after treatment

^c Means within a column with different letters are significantly different from each other

Summary: This study was conducted to evaluate the effects of preharvest herbicide applications on black bean desiccation and yield with two application timings at a later planting date. Desiccation treatments of Gramoxone, Sharpen, and Roundup were applied to three varieties: ‘Zorro’, ‘B10244’, and ‘Eclipse’ at an early application timing (50% yellow pod), and a standard application timing (80% yellow pod). The early application was to evaluate differences in treatments and simulate green areas in a field that may be present at the standard application timing. Data were averaged over all varieties. The greatest difference in black bean desiccation between application timings was seen at 3 DAT, with Sharpen demonstrating rapid desiccation at the early application timing. By 7 DAT, desiccation for all herbicide treatments was at sufficient levels. All herbicide treatments applied at later timing provided excellent desiccation. Lower yields were observed with Gramoxone and Sharpen at the early application timing. Overall, the speed of desiccation and yield for the later planted dry beans were influenced by application timing and desiccation treatment. Sharpen showed the quickest desiccation in the early application timing for the later planting date, while Gramoxone had the fastest desiccation in the earlier planting. Early applications of Gramoxone and Sharpen may lead to reductions in yield, which may be due to the quicker speed of activity stopping continued development of dry beans. This research was supported by MSU Project GREEN, The Michigan Dry Bean Commission, and the Michigan Department of Agriculture Specialty Crops grant.

MSU Weed Science Research Program

Black and small red bean tolerance to NAI-1333 tank-mixtures

Trial ID: DB03-13 Study Dir.: Sprague, Powell
 Conducted: SVREC Investigator: Christy Sprague

Date Planted: Jun/13/2013 **Row Spacing:** 30 IN
Variety: see comments **No. of Reps:** 4
Population: see comments **% OM:** 4.1
Soil Type: Clay loam **pH:** 7.7
Plot Size: 10 X 30 FT **Design:** RANDOMIZED COMPLETE BLOCK

Tillage: Fall moldboard plow. Spring field cultivate, spring soil finish.
 Previous crop corn.

Crop	Code	Common Name
1.	PHSVX	BEAN, DRY

Application Description

Application Timing: A POST
Date Treated: Jul /03/2013
Time Treated: 11:30 AM
% Cloud Cover: 25
Air Temp., Unit: 72 F
% Relative Humidity: 75
Wind Speed/Unit/Dir: 4 mph NE
Soil Temp., Unit: 73 F
Soil/Leaf Surface M: 5 5
Soil Moist (1=w 5=d): 3

Crop Stage at Each Application

Crop Name: A PHSVX
Height (In.): 3-7 (5)
Stage (L): V1-V2

Application Equipment

Appl	Sprayer	Speed	Nozzle	Nozzle	Nozzle	Nozzle	Boom			
A	Type	MPH	Type	Size	Height	Spacing	Width	GPA	Carrier	PSI
A	cup	3.8	AirMix	11003	24"	20"	100"	19	water	30

Comments: Variety: Zorro planted at 106,000 seeds/A
 Merlot planted at 90,000 seeds/A

Summary: This study was conducted to examine the effects of a potential new herbicide 'NAI-1333' on bean tolerance and yield of black and small red beans. It is proposed that tank-mixing Basagran with NAI-1333 will safen dry bean from NAI-1333. In this trial, we examined proposed labeled rates and twice the rates with varying amounts of Basagran. Even with the addition of Basagran there was 15-20% injury to black beans and 20-26% injury to small red beans with the proposed NAI-1333 rate and increasing the rate of Basagran did not improve crop safety. Twice the proposed rates of NAI-1333 always provided greater crop injury. Injury affect dry bean maturity at the end of the season. Even though there was significant injury and differences in maturity, by the end of the season yield was not significantly impacted compared with the non-treated control.

MSU Weed Science Research Program

Black and small red bean tolerance to NAI-1333 tank-mixtures

Trial ID: DB03-13 Study Dir.: Sprague, Powell
 Conducted: SVREC Investigator: Christy Sprague

Weed Code	PHSVX injury percent Jul/10/13	PHSVX injury percent Jul/17/13	PHSVX injury percent Jul/31/13	PHSVX maturity percent Sep/06/13	PHSVX maturity percent Sep/12/13
Crop Code	7 DA-A	14 DA-A	28 DA-A	65 DA-A	71 DA-
Type					
Date					
Trt-Eval Interval					

Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Grow Stg	Appl Code	PHSVX injury percent Jul/10/13	PHSVX injury percent Jul/17/13	PHSVX injury percent Jul/31/13	PHSVX maturity percent Sep/06/13	PHSVX maturity percent Sep/12/13
1	'Zorro' blacks							19	19	16	53	82
	NAI-1333 2.5% EC	0.2	EC	1	fl oz/a	POST	A					
	Basagran	4	L	32	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
2	'Zorro' blacks							16	16	11	63	82
	NAI-1333 2.5% EC	0.2	EC	1	fl oz/a	POST	A					
	Basagran	4	L	16	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
3	'Zorro' blacks							24	26	21	41	66
	NAI-1333 2.5% EC	0.2	EC	2	fl oz/a	POST	A					
	Basagran	4	L	32	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
4	'Zorro' blacks							28	30	24	38	64
	NAI-1333 2.5% EC	0.2	EC	2	fl oz/a	POST	A					
	Basagran	4	L	16	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
5	'Zorro' blacks							3	0	1	71	91
	Raptor	1	L	4	fl oz/a	POST	A					
	Basagran	4	L	12	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
6	'Zorro' blacks							0	0	0	75	90
	Untreated											
7	'Merlot' small reds							26	19	13	26	65
	NAI-1333 2.5% EC	0.2	EC	1	fl oz/a	POST	A					
	Basagran	4	L	32	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
8	'Merlot' small reds							23	16	11	26	64
	NAI-1333 2.5% EC	0.2	EC	1	fl oz/a	POST	A					
	Basagran	4	L	16	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
9	'Merlot' small reds							33	31	18	20	59
	NAI-1333 2.5% EC	0.2	EC	2	fl oz/a	POST	A					
	Basagran	4	L	32	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
10	'Merlot' small reds							30	25	16	26	60
	NAI-1333 2.5% EC	0.2	EC	2	fl oz/a	POST	A					
	Basagran	4	L	16	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
11	'Merlot' small reds							8	6	6	40	75
	Raptor	1	L	4	fl oz/a	POST	A					
	Basagran	4	L	12	fl oz/a	POST	A					
	Surfactant		L	0.25	% v/v	POST	A					
12	'Merlot' small reds							0	0	0	45	78
	Untreated											
LSD (P=.05)								4.8	5.1	6.5	7.7	9.5
CV								19.11	22.72	39.53	12.16	9.03

Means followed by same letter do not significantly differ (P=.05, LSD)

MSU Weed Science Research Program

Weed Code		
Crop Code	PHSVX	PHSVX
Rating Data Type	moisture	yield
Rating Unit	percent	cwr/acre
Rating Date	Oct/02/2013	Oct/02/2013
Trt-Eval Interval	91 DA-A	at 18% M
# Subsamples, Dec.	1	1

Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Grow Stg	Appl Code		
1	'Zorro' blacks							16.1	28.8
	NAI-1333 2.5% EC	0.2	EC	1	fl oz/a	POST	A		
	Basagran	4	L	32	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
2	'Zorro' blacks							15.9	27.8
	NAI-1333 2.5% EC	0.2	EC	1	fl oz/a	POST	A		
	Basagran	4	L	16	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
3	'Zorro' blacks							16.0	26.3
	NAI-1333 2.5% EC	0.2	EC	2	fl oz/a	POST	A		
	Basagran	4	L	32	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
4	'Zorro' blacks							16.1	26.2
	NAI-1333 2.5% EC	0.2	EC	2	fl oz/a	POST	A		
	Basagran	4	L	16	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
5	'Zorro' blacks							15.9	28.6
	Raptor	1	L	4	fl oz/a	POST	A		
	Basagran	4	L	12	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
6	'Zorro' blacks							16.0	27.9
	Untreated								
7	'Merlot' small reds							14.3	22.4
	NAI-1333 2.5% EC	0.2	EC	1	fl oz/a	POST	A		
	Basagran	4	L	32	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
8	'Merlot' small reds							14.4	22.7
	NAI-1333 2.5% EC	0.2	EC	1	fl oz/a	POST	A		
	Basagran	4	L	16	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
9	'Merlot' small reds							14.5	22.0
	NAI-1333 2.5% EC	0.2	EC	2	fl oz/a	POST	A		
	Basagran	4	L	32	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
10	'Merlot' small reds							14.4	22.1
	NAI-1333 2.5% EC	0.2	EC	2	fl oz/a	POST	A		
	Basagran	4	L	16	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
11	'Merlot' small reds							14.1	24.4
	Raptor	1	L	4	fl oz/a	POST	A		
	Basagran	4	L	12	fl oz/a	POST	A		
	Surfactant		L	0.25	% v/v	POST	A		
12	'Merlot' small reds							14.0	23.9
	Untreated								
LSD (P=.05)								0.39	3.03
CV								1.81	8.32

Means followed by same letter do not significantly differ (P=.05, LSD)

2013 DRY BEAN YIELD TRIALS

J.D. Kelly, E. Wright, N. Blakely, and J. Heilig

Plant, Soil and Microbial Sciences

The dry bean breeding program initiated its fifth season on the new 320 acre Saginaw Valley Research & Extension Center (SVREC) research farm near Frankenmuth in 2013. A total of 3,960 yield trial plots (24 tests) and approximately 2300 single plant selections were made in the early generation nurseries. Yield trials at SVREC included 42-entry standard navy test; 56-entry standard black test; 56-entry prelim navy test; 36-entry prelim black test; 24-entry standard GN; 25-entry standard pinto test; 36-entry standard red/pink test; 84-entry prelim GN test; 36-entry prelim red/pink test; 40, 80 and 56 entry prelim red tests; and 49-entry Co-op and regional test that includes pinto, GN, red and pinks. At Montcalm Research Farm (MRF) yield trials included 56-entry kidney test; 16-entry preliminary kidney test; 25-entry standard bush cranberry test; 20-entry prelim bush cranberry; 16-entry mayacoba test; 3-entry Fabada large white kidney test; 64-entry white mold test; two 96-entry drought trials, grown with and without irrigation. On campus a 130-entry nitrogen fixation (BNF) test was grown; and two 36-entry certified organic trials in Tuscola county. All trials were direct harvested except for the drought, and BNF trials that were rod pulled in order to measure plant biomass. This is the first season that we direct harvested large seeded and white mold trials at Montcalm.

The season in Frankenmuth proved to be dry once again. Annual rainfall was 1.8” below the 30 year average but rainfall totals for the months June-September was only 6.2” or 6” below the 30-year average. The major savior was the temperature as the demand for moisture was moderate. Growing degree days were near normal at just over 2400. Temperatures only exceeded 90F on five days in mid July otherwise the moderate temperatures reduced the need for more rainfall. Over the last decade, annual rainfall has fallen below the 30-year average of 29.1” in nine of the last ten years. The drought resulted in overall lower yields but allowed for selection of those bean lines that yield under these drought stressed conditions. As a result of the drought many of the pinto, great northern and small red lines lost their upright plant structure as a result of the regrowth making them difficult to harvest and reducing yields. The pink lines matured normally under these conditions and out-yielded the small red lines. Navy and black bean lines maintained their upright architecture but the drought dwarfed the black lines more dramatically than the navy lines. Overall maturities of most materials were delayed in the 5-7 day range. All trials were direct harvested at SVREC.

The plots at Montcalm received a total of 9.9” of rainfall and an additional 4” was provided through irrigation over the same 4-month growing season, 4.5” fell in August alone. The irrigated plots had excellent yields over 35 cwt/acre were recorded in the kidney and white mold trials. White mold infection developed well in 2013 and exceeded the low levels observed in 2011. In the drought study the non stress irrigated trial in contrast to the drought trial (that received only rainfall) developed very high levels of white mold infection due in large part to decumbent growth habit of many of the entries. As a result the non irrigated trial outperformed the irrigated trial, suggesting that beans have moderate levels of drought tolerance and do not require excessive levels of precipitation to produce optimum yields. Data on white mold allowed for a genetic analysis to locate regions in the genome that may condition resistance to the disease.

The data for all tests are included in an attached section. Procedures and details on nursery establishment and harvest methods are outlined on the first page. Since the data collected on each test are basically the same, a brief discussion of each variable measured is presented below for clarification purposes.

1. Yield is clean seed weight reported in hundredweight per acre (cwt/acre) standardized to 18% moisture content. Dry beans are commercially marketed in units of 100 pounds (cwt).
2. Seed weight is a measure of seed size, determined by weighing in grams a pre-counted sample of 100 seeds, known as the 100-seed weight. To convert to seeds per 100g (10,000/100 seed wt); for example 100-seed weight of 50 converts to 200 seeds per 100 g (used in marketing).
3. Days to flower are the number of days from planting to when 50% of plants in a plot have one or more open flowers.
4. Days to maturity are the actual number of days from planting until date when all the plants in a plot have reached harvest maturity.
5. Lodging is scored from 1 to 5 where 1 is erect while 5 is prostrate or 100% lodged.
6. Height is determined at physiological maturity, from soil surface to the top of plant canopy, and is recorded in centimeters (cm).
7. Desirability score is a visual score given the plot at maturity that takes into consideration such plant traits as; moderate height, lodging resistance, good pod load, favorable pod to ground distance, uniformity of maturity, and absence of disease, if present in the nursery. The higher the score (from 1 to 7) the more desirable the variety, hence DS serves as a subjective selection index.

At the bottom of each table, the mean or average of all entries in a test is given to facilitate comparisons between varieties. In order to better interpret data, certain statistical factors are used. The LSD value refers to the Least Significant Difference between entries in a test. The LSD value is the minimum difference by which two entries must differ before they can be considered significantly different. Two entries differing in yield by 1 cwt/acre cannot be considered as performing significantly different if the LSD value is greater than 1 cwt/ acre. Such a statement is actually a statement of "probable" difference. We could be wrong once in 20 times ($p=0.05$) on the average, depending on the level of probability. The other statistic, Coefficient of Variation (CV), indicates how good the test was in terms of controlling error variance due to soil or other differences within a location. Since it is impossible to control all variability, a CV value of 10% or less implies excellent error control and is reflected in lower LSD values. Under the pedigree column, all released or named varieties are **bolded** and always preceded by a comma (,); when preceded by a slash (/), the variety was used only as a parent to produce that particular breeding line.

Expt. 3101: Standard Navy Bean Yield Trial

This 42-entry trial included standard commercial navy bean varieties, and advanced lines from the MSU breeding program, which carry the N-prefix. Yields ranged from 14.7 to 28.0 cwt/acre with a mean of 23.3 cwt/acre. The trial was fairly uniform and variability was well controlled (CV=10.9%) and the LSD needed for significance was 3.0 cwt/acre. Only three entries significantly out-yielded the test mean and included two new half-sib lines and Vista variety. The surprise was the overall lower performance of N11283 that showed high potential in 2011 and 2012. The line continues to dry down well and was rated high on DS score. Varieties Rexeter, Medalist, Hyland and Indi were all mid pack in terms of performance. Overall performance of this test was disappointing compared to the preliminary test 3103 and only Merlin showed consistent performance at 25 cwt/acre in both tests. Canning tests will be conducted on all new MSU breeding lines before being considered for release.

Expt. 3102: Standard Black Bean Yield Trial

This 56-entry trial included the standard commercial black bean varieties and advanced breeding lines. Yields ranged from 7.5 to 27.4 cwt/acre with a test mean of 22.2 cwt/acre. Variability was moderate in this test, (CV=11.2%) and the LSD was 2.9 cwt/acre. Seven entries significantly outyielded the test mean and these included a new shiny seeded line ND081157 from NDSU. Zorro fell outside this group and below Loreto, Shania, Jaguar, and Black Velvet in performance. Eclipse performed below the test mean. The top yielding entry B10244 was the top yielder in 2011 and 2012 and exhibits an excellent combination of high yield potential, erectness, dry down and superior canning quality. A few lines from Colorado with CO-code did not perform well under local stress conditions.

Expt. 3103: Preliminary Navy Bean Yield Trial

This 56-entry trial included new navy bean lines and check varieties. Yields ranged from 16.3 to 29.3 cwt/acre with a mean of 22.3 cwt/acre. Variability was moderate in this 3-rep test (CV=10.4%) and the LSD was 3.1 cwt/acre and overall yields were better than advanced navy trial 2101. Five lines significantly outyielded the test mean and included N11283. Merlin was the highest yielding variety ahead of Medalist in the trial. The top yielding entry N11283 was almost 3 cwt better than the second entry, underscoring its yield potential (these results were similar to test 2104 in 2012). It was 6 cwt better than its parent, Medalist. Future advances of many of the new breeding lines will largely depend on disease reactions and canning quality of the entries.

Expt. 3104: Preliminary Black Bean Yield Trial

This 36-entry trial included new black bean lines and check varieties. Yields ranged from 8.0 to 23.9 cwt/acre with a mean of 17.0 cwt/acre. Variability was moderate in this 3-rep test (CV=11.1%) and the LSD was 2.6 cwt/acre. Twelve lines significantly outyielded the test mean and the top yielding entry B10244 was the same line as in test 3102. No varieties fell in this group. Two lines from Puerto Rico (PR-prefix) with high levels of disease resistance underperformed despite their Zorro parentage. The two checks, Shania and Zorro were similar in the mid group. Many of these lines

carry anthracnose resistance but future advances of any new breeding lines will largely depend on confirmation of disease reactions and canning quality of the entries.

Expt. 3105: Standard Great Northern Bean Yield Trial

This 24-entry trial included MSU great northern breeding lines (G-prefix) and standard commercial check varieties and a small group of new otebo bean lines. The test ranged in yield from 10.8 to 25.0 cwt/acre with a mean yield of 16.9 cwt/acre. Variability was moderate (CV= 11.0%) resulting in a high LSD value (2.2 cwt/acre) needed for significance. Five breeding lines significantly outperformed the test mean and included three otebo breeding lines G12901-903 and two GN lines with G11-prefix.

The new Powderhorn variety yielded equivalent to the test mean and ahead of Matterhorn. Two lines from USDA-WA, GN9-4 and PS02- performed below the test mean. In the otebo class, G12901 showed superior performance, 5 cwt ahead of the next entry and 14 cwt ahead of the Fuji check. G12901 is the first upright type-II otebo bean as previous varieties like Fuji are bush types. It shows outstanding performance and would be suitable for direct harvest. The line will continue to be tested for yield and quality traits, and its suitability in 'An' paste prior to any decision on release.

Expt. 3106: Standard Pinto Bean Yield Trial

This 25-entry trial included standard commercial pinto bean varieties and advanced breeding lines from the MSU breeding program with the P-prefix. The trial ranged in yield from 13.9 to 22.8 cwt/acre with a mean of 17.8 cwt/acre. Variability was low (CV=8.6%) in this trial and the LSD needed for significance was 1.8 cwt/acre. Five entries significantly out-yielded the test mean and these included the varieties Eldorado, and La Paz. Eldorado formerly tested as P07863 was the highest yielding pinto in the white mold trials in Montcalm in 2007, 2008 and 2009 was 2nd in this test in 2010 and 1st in 2011, 2012. Other varieties Medicine Hat fell below the test mean and only those high-yielding entries with more upright architecture and canning quality equivalent to Othello will be advanced in 2014.

Expt. 3107: Standard Pink and Small Red Bean Yield Trial

This 36-entry trial included small red and pink breeding lines from MSU (R-small red; S-pink prefix), in addition to standard commercial check varieties. The test ranged in yield from 10.6 to 29.7 cwt/acre with a mean yield of 21.4 cwt/acre. Variability was moderate (CV=9.2%) resulting in a LSD value (2.3 cwt/acre) for significance. Eight breeding lines including Sedona variety significantly outperformed the test mean. The two top lines SR9304 and SR9303 were private lines that performed very well. SR9304 lodged badly and would not be suitable for direct harvest, whereas SR 9303 was more erect but had a small seed (25g compared to 33 g for Merlot). Other lines in this group were sister lines R12844 and R12845 that need to be evaluated for canning quality. Rosetta pink yielded above the test mean whereas, small red variety Merlot and Rio Rojo yielded significantly below the test mean. Merlot had an overall poor performance year combined with delayed maturity in many locations similar to 2011 and 2012. The lowest yielding entry was a small red line from Puerto Rico that has good levels of root rot resistance. Progress in small red breeding program has been limited by a lack of useful variability and inability to combine performance with upright architecture and suitable canning quality in new lines.

Expt. 3108: Preliminary Great Northern Bean Yield Trial

This large 84-entry trial included new great northern bean lines and otebo lines along with check varieties. Yields ranged from 13.1 to 31.2 cwt/acre with a mean of 20.3 cwt/acre. Variability was controlled in this 3-rep test (CV=8.9%) and the LSD was 2.5 cwt/acre. Fifteen lines significantly out-yielded the test mean and Eldorado pinto was a parent in 14/15 top entries, illustrating its potential to enhance yields in the GN class. Test 3108 was the top yielding trial in 2013. Matterhorn and Powderhorn yielded above the test mean, whereas all new otebo lines fell below the test mean but better than Fuji at the bottom of the trial. These lines significantly outyielded the Fuji check variety. Future advances of many of the new breeding lines will largely depend on disease reactions and canning quality of the entries.

Expt. 3109: Preliminary Small Red Bean Yield Trial

This 42-entry trial included new small red and pink bean lines along with check varieties bred to ensure they had adequate levels of resistance to BCMV. Yields ranged from 13.3 to 28.9 cwt/acre with a mean of 20.2 cwt/acre. Variability was low in this 3-rep test (CV=7.9%) and the LSD was 2.2 cwt/acre. Fifteen lines significantly out-yielded the test mean including the Merlot variety, and SR9303 from test 3107. Many of the new lines originate from diverse crossing to introduce more genetic variability into this class that includes resistance to anthracnose and BCMV. The overall appearance of the new lines was disappointing based on low DS scores (>5). Only two lines had an improved DS score. This underscores the challenge in developing high yielding upright small red beans with good canning quality. Future advances of many of the new breeding lines will largely depend on their reaction to BCMV, seed quality, color and canning quality of the entries.

Expts. 3110, 3111, 3112: Small Red Bean Yield Genetic Trials

The three genetic studies were conducted as yield trials to evaluate three recombinant inbred line (RIL) populations consisting of 40 (3110); 80 (3111) and 56 (3112) individuals. The populations were derived from crosses between Merlot and SER95 (3110); SER48 (3111); and SER94 (3112). The SER lines were developed at CIAT Colombia as sources of drought tolerance in the small red seed type. Yields ranged from 7.4 to 25.6 cwt/acre with a mean of 16.3 cwt/acre in test 3110. Variability was moderate in this 3-rep test (CV=11.3%) and the LSD was 2.5 cwt/acre. Seventeen lines significantly out-yielded the test mean including the Merlot variety. The SER lines yielded below the test mean. Yields ranged from 7.8 to 26.4 cwt/acre with a mean of 16.2 cwt/acre in test 3111. Variability was moderate in this 3-rep test (CV=12.2%) and the LSD was 2.7 cwt/acre. Twenty-three lines significantly out-yielded the test mean but did not include the Merlot variety. The SER lines yielded below the test mean. Yields ranged from 6.1 to 25.3 cwt/acre with a mean of 16.0 cwt/acre in test 3112. Variability was moderate in this 3-rep test (CV=12.8%) and the LSD was 2.8 cwt/acre. Sixteen lines significantly out-yielded the test mean including the Merlot, Rosetta varieties and a single plant selection out of Merlot. The SER lines and the small red PR line 10IS-2423 yielded below the test mean. All these lines mature very early and do not yield up to the Merlot check, despite possessing drought tolerance. The entries in all three tests behaved very similarly and data will be analyzed to identify QTL associated with yield under stress in all three populations. Some lines with acceptable seed quality will be entered in the preliminary small red yield trials in 2014.

Expt. 3113: Combined Midwest Regional Performance Nursery (MRPN) & Cooperative Dry Bean Nursery (CDBN) Yield Trial

The MRPN is conducted annually in cooperation with North Dakota (ND-prefix), Nebraska (NE-prefix) and Colorado (CO-prefix) in order to test new pinto and great northern lines from all four programs and assess their potential in the different regions. The CDBN is a national trial and includes all classes but only medium-sized entries were included in this trial. The 49-entry trial ranged in yield from 13.0 to 24.8 cwt/acre with a mean of 19.8 cwt/acre. Variability was moderate (CV=9.4%) resulting in a LSD value (2.5 cwt/acre) for significance. As a result eleven lines were significantly higher in yield than the test mean including the new MSU varieties, Eldorado, Rosetta and Powderhorn. In the top group were pinto, small red, pink, and great northern lines from Idaho, USDA-WA, NDSU and UC Davis. Two new slow darkening pintos PT11-61 and PT1030 yielded below the test mean. As in tests in previous years, Buster was the lowest yielding entry suggesting that it does not tolerate drought stress. This cooperative trial continues to be valuable as it allows an evaluation of potential new lines prior to release in other states and confirmed performance of new MSU varieties released in 2014.

Expts. 3914 & 3915: Organic Dry Bean Yield Trials

Two 36-entry navy and black trials were conducted on certified organic grower farms (Findlay - 3914; Sattleburg – 3915) under organic production systems, with no fertilizer, no chemical seed treatments or weed or insect control, no harvest aid chemicals using seed inoculated with native Rhizobium to evaluate new breeding lines, and current varieties for potential production under this management system. Test 3915 was not harvested as the plants were under moisture stress most of the season and they developed strange abnormal growth due to factors of disease (virus) or pollution that resulted in small plants and low yields. In test 3914, yields ranged in yield from 10.8 to 24.4 cwt/acre with a mean of 17.5 cwt/acre. Variability was moderate (CV=15.2%) resulting in a LSD value (3.1 cwt/acre) for significance. Only five lines were significantly higher in yield than the test mean and this included the advanced black bean B10244 being considered for release as a new variety. Zorro was the top yielding variety followed by Merlin, Vista, Medalist and Shania. The non-nodulating check R99 that cannot fix nitrogen was the lowest yielding entry suggesting that nitrogen may be a limitation in these organic systems and require bean varieties that are high N-fixers. A group of high nitrogen fixating lines derived from Puebla 152 was included, but one of these lines fell in the top 5-group. Since organic growers may choose to save seed as organic seed is not widely available, resistance to seed-borne CBB would be an important criterion in their selection of bean varieties to grow. A number of the entries in this trial have high levels of resistance to CBB. The trial will be repeated in 2014 with a different mix of breeding lines. The trial was bordered with new pinto bean variety Eldorado which yielded 19.3 cwt/acre.

Expt. 3216: Standard Kidney Bean Yield Trial

This 56-entry trial was conducted on the Montcalm Research Farm (MRF) to compare the performance of standard and new light red kidney (LRK), dark red kidney (DRK) and white kidney (WK) bean varieties from MSU and CDBN under supplemental irrigation (7x total 4"). Yields ranged from 13.1 to 37.8 cwt/acre with a mean of 26.9 cwt/acre. Variability was moderate

(CV=11.6%) resulting in a large LSD value (4.2 cwt/acre) needed for significance. Fourteen breeding lines significantly out-yielded the test mean, including 10 WK lines and the four varieties, Snowdon, CELRK, Clouseau and Majesty. White kidney lines continue to out-yield red kidney lines in this trial with yields in excess of 32cwt/a, whereas the highest yielding LRK lines ranked just outside the top group. Varieties that yielded above the test mean included Red Hawk and Red Rover whereas Chinook, Beluga, Yeti, Montcalm and Inferno were below the mean. Unlike 2012 season when there was a high incidence of CBB in the trial, little disease pressure was observed in 2013. New DRK line ND061210 and LRK line ND061106 from NDSU were late maturing and yielded below the test mean similar to Montcalm. Since canning quality is vital in kidney beans, only those DRK lines equivalent in canning quality to Red Hawk, LRK lines equal or better than CELRK and WK lines equivalent to Beluga will be advanced in 2014.

Expt. 3217: Preliminary Kidney Bean Yield Trial

This small 16-entry trial was conducted on the MRF to compare new and standard white kidney bean varieties under supplemental irrigation (7x total 4"). Yields ranged from 20.1 to 34.0 cwt/acre with a mean of 28.3 cwt/acre. Variability was low (CV=7.0%) in this 3-rep test and the LSD needed for significance was 2.8 cwt/acre. Four lines significantly out-yielded the test mean and included Snowdon and Clouseau, similar to test 3216. The top entry K13902 WK showed excellent growth and vigor, dry down and plant structure in a white kidney seed smaller than Snowdon (69 vs 81 g/100 seeds). Two sister lines of K13902 were in the top 5 entries, suggesting the yield potential of the cross. Only those entries with improved yield and equivalent to Beluga in seed size, earlier maturity and canning quality will be advanced in 2014.

Expt. 3218: Standard Bush Cranberry Bean Yield Trial

This 25-entry trial was conducted on the MRF to compare new and standard bush cranberry bean varieties under supplemental irrigation (7x total 4"). Yields ranged from 21.0 to 30.9 cwt/acre with a mean of 25 cwt/acre. Variability was low (CV=8.7%) and the LSD needed for significance was 2.6 cwt/acre. Four lines significantly out-yielded the test mean, including the Etna check which topped the trial. No CBB was observed in the trial so there was no negative effect on the yield of Etna, whereas Capri yielded below the test mean. Etna had the largest seed size at 74 g/100 seed. The trial represented a broad array of genotypes with different genetic background and a wide range in maturity, lodging resistance and yield potential among entries. Only those entries equivalent to Etna in seed size with improved yield, earlier maturity and canning quality will be advanced in 2014.

Expt. 3219: Preliminary Bush Cranberry Bean Yield Trial

This 20-entry trial was conducted on the MRF to compare new and standard bush cranberry bean varieties under supplemental irrigation (7x total 4"). Yields ranged from 12.4 to 32.2 cwt/acre with a mean of 21.4 cwt/acre. Variability was moderate (CV=13.2%) in this 3-rep test and the LSD needed for significance was 3.9 cwt/acre. Four lines significantly out-yielded the test mean, including the Etna check which topped the trial as in test 3218. C11266 was in the top group as in test 3218, but it had a smaller seed size (56g) than Etna at 74 g/100 seed. The small seed size of many of the entries is a concern and few lines showed any potential over Etna in seed size or performance.

Expt. 3220: Yellow Mayacoba Bean Yield Trial

This 16-entry trial was planted at the MRF to identify potential new bush mayacoba (yellow) bean varieties that might be suited for production in Michigan. Materials included one yellow line Y11405, and a yelloweye line from MSU, 12 canario lines from Puerto Rico and two checks Snowdon and Red Hawk. The 12 lines from PR flowered very late and did not mature, so only the checks and Y11405 were harvested. Y11405 yielded 23.4 cwt/a; Red Hawk yielded 23.1 cwt/a; and Snowdon yielded 33.4 cwt/a. In the absence of CBB, Y11405 yielded equivalent to Red Hawk and produced an attractive yellow (mayacoba) seed in an upright bush habit. The line is under consideration for release.

Expt. 3221: Large White Fabada Bean Yield Trial

A small trial of large white seeded lines was planted separately at the MRF as the seed is too large to plant with machine. The trial included three large seeded white lines that range in size and shape from 85 to 105 g/100seeds. Yields ranged from 18.5 to 19.1 cwt/acre with a mean of 18.9 cwt/acre. Variability was moderate (CV=11.8%) in this 3-rep test and the LSD needed for significance was 3.9 cwt/acre. The large fabada line K11925 yield 18.5 cwt/a with a seed size of 105 g/100seeds. In an adjacent plot Snowdon yielded 33.4 cwt/a with a seed size of 80 g/100 seeds. The data underscore the difficulty of combining high yield with large seed size. Other lines tested included K11802, round marrowfat line (88g/100seeds) and K12824 (85g) which will be discarded due to seed quality problems. The fabada line K11925 is under consideration for release.

Expt. 3222: National White Mold Variety Yield Trial

This 64-entry trial was conducted at Montcalm to evaluate a range of diverse dry bean varieties and breeding lines for reaction to white mold under natural field conditions. Genotypes included commercial navy and black bean cultivars, elite MSU lines, and new sources of white mold resistance entered as part of the National *Sclerotinia* Initiative (NSI) Nursery. Lines in the National trial were developed at MSU, OSU, CSU, Cornell, NDSU and USDA-WA. Entries were planted in two row plots with two rows of susceptible spreader variety Matterhorn between plots and were direct harvested. Supplemental overhead irrigation was applied 9 times for a total of 5.75" to maintain adequate levels of moisture for favorable disease development at the critical flowering period. Natural white mold infection occurred across the entire trial and was extremely severe in certain plots. White mold was rated on a per plot basis on a scale of 1 to 9 based on disease incidence and severity where 9 had 90+% incidence and high severity index. White mold ranged from 18.5 to 99% and pressure was high with a mean value of 46.3% in 2013. The test ranged in yield from 6.6 to 38.9 cwt/acre with a mean yield of 25.1 cwt/acre. Variability was moderate (CV=13.6%), thus a high LSD value (4.6 cwt/acre) was needed for significance. As a result 18 lines significantly out-yielded the test mean and included the Rosetta, Eldorado, Zorro and Merlin varieties and the new pinto line 37-2 from USDA-WA for the fourth year. The new GN variety Powderhorn just fell outside the top group and Snowdon was the highest yielding kidney bean. As in past years pintos and reds dominated the entries at the top of trial, followed by blacks, navy and pink lines and large seeded kidney were among the lowest yielding in the test. Many of the standard entries from NSI trial were among the lowest yielding lines and yielded below the susceptible check Beryl. Past experience using low-yielding white mold resistant germplasm as parents has not proved

useful in breeding for white mold resistance. Overall the trial confirmed results from previous years (susceptible check-Beryl rated 99% WM) and this trial will continue to be part of the breeding effort to improve tolerance to white mold.

Expts. 3223 & 3224: BeanCAP Drought Yield Trials

Two 96-entry trials were conducted in adjacent fields one was irrigated (test 3223) and the other (test 3224) received only rainfall reported earlier in this report. The purpose of the trial was to evaluate drought stress on performance and root traits of diverse group of genotypes. Agronomic, yield, harvest index and root data were collected on both trials. The study is part of student research project supported by Beancap and USDA-NIFA grant. The irrigated trial received supplemental water from seven irrigations totaling 4" and yields ranged from 4.7 to 38.4 cwt/acre with a mean of 23.4 cwt/acre. White mold developed in this trial due to additional irrigation resulting in greater variability in this 3-rep test was slightly higher (CV=17.5%) and the LSD needed for significance was 5.5 cwt/acre. Eighteen entries significantly out-yielded the test mean and included varieties Eldorado, and Santa Fe known to possess avoidance to white mold; Rosetta, Medicine Hat, Lariat, and Jaguar. In the non irrigated trial, yields ranged from 17.6 to 36.2 cwt/acre with a mean of 27.0 cwt/acre, higher than the irrigated trial. The trial was fairly uniform but variability was high due to the prolonged drought (CV=16.8%) and the LSD needed for significance was 6.1 cwt/acre. Only eight entries significantly out-yielded the test mean and included varieties such as Sedona, Roza and Merlot, and Sierra known to possess drought tolerance. Other lines SER48 and BAT477 known to possess drought tolerance performed below the test mean. As in 2012 the higher performance in the non irrigated trial again suggesting that the delayed rainfall (4.5" in August) was sufficient to produce a successful bean crop as the additional irrigation promoted white mold development among the decumbent genotypes in the non stress/irrigated trial.

Expt. 3425: Biological Nitrogen Fixation – BNF Yield Trial

This 130-entry trial was grown for third season in East Lansing to measure nitrogen fixation and yield of RIL population grown in a low N (0.03%; normal range 0.05-0.1%) site as only those lines that fix more N will produce more yield under these conditions. The black bean population was developed from cross of Zorro with Puebla 152 line selected as a high nitrogen fixer. Yield ranged from 14.7 to 39.4 cwt/acre with a mean of 28.6 cwt/acre. Variability was moderate (CV=10.6%), and a LSD value of 4.1 cwt/acre was needed for significance. As a result 23 lines significantly exceeded test mean and these lines exceeded the performance of the Zorro parent and check varieties. Only line B11567 that ranked third was second in 2011 as the data from the 2012 season was inconsistent and damaged by stress. The top yielding check was PR0443-151 selected for yield under low soil fertility levels in Puerto Rico. The non-nodulation check, R99 was among the lowest yielding entries, suggesting that N was limiting in this trial. The trial received favorable rainfall over the growing season as reflected in the high yields obtained. At harvest plant biomass was also recorded to measure harvest index (HI). Harvest index ranged from low of 15% in lowest yielding unadapted entries to 40% in higher yielding entries and these values were lower than in past years. The lower yielding entries tended to be late maturing entries combined with viney prostrate types that did not partition into the seed, hence lower HI. There is a strong correlation between HI and yield and results are similar to those observed in other trials. Selecting for high yield must be accompanied with partitioning into the seed. Bean lines with enhanced BNF would be useful trait

for organic bean producers who cannot apply conventional fertilizers to increase yield and a few of these lines were evaluated in the organic trial, test 3914.

Early Generation Breeding Material grown in Michigan in 2013

F3 through F5 lines

Navy and Black - 224 lines

Pinto - 55 lines

GN - 70 lines

Pinks and Reds - 56 lines

Kidneys (DR, LR, White) - 54 lines

Cranberry (bush, vine) – 6 lines

F2 populations

Navy and Black -269 populations

Pinto - 58 populations

GN - 75 populations

Pinks and Reds - 47 populations

Kidneys (DR, LR, White) – 50 populations

Cranberry (bush, vine) – 49 populations

F1 populations: 589 different crosses among ten contrasting seed types.

2013 DRY BEAN YIELD TRIALS

EXPERIMENT	TITLE	PLANTING DATE	LOCATION	ENTRIES	DESIGN	REPS	HARVEST METHOD
3101	STANDARD NAVY BEAN YIELD TRIAL	06/05/13	SVR&EC	FRANKENMUTH 42	REC. LATTICE	4	DIRECT HARVESTED
3102	STANDARD BLACK BEAN YIELD TRIAL-1	06/05/13	SVR&EC	FRANKENMUTH 56	REC. LATTICE	4	DIRECT HARVESTED
3103	PRELIMINARY NAVY BEAN YLD TRIAL	06/06/13	SVR&EC	FRANKENMUTH 56	REC. LATTICE	3	DIRECT HARVESTED
3104	PRELIMINARY BLACK BEAN YLD TRIAL	06/06/13	SVR&EC	FRANKENMUTH 36	SQ. LATTICE	3	DIRECT HARVESTED
3105	STANDARD GREAT NORTHERN YLD TRIAL	06/06/13	SVR&EC	FRANKENMUTH 36	SQ. LATTICE	4	DIRECT HARVESTED
3106	STANDARD PINTO BEAN YIELD TRIAL	06/06/13	SVR&EC	FRANKENMUTH 25	SQ. LATTICE	4	DIRECT HARVESTED
3107	STANDARD PINK & SMALL RED YLD TRIAL	06/06/13	SVR&EC	FRANKENMUTH 36	SQ. LATTICE	4	DIRECT HARVESTED
3108	PRELIMINARY GREAT NORTHERN YLD TRIAL	06/06/13	SVR&EC	FRANKENMUTH 84	ALPHA LATTICE	3	DIRECT HARVESTED
3109	PRELIM. PINK & SMALL RED YLD TRIAL	06/07/13	SVR&EC	FRANKENMUTH 42	REC. LATTICE	3	DIRECT HARVESTED
3110	PRELIMINARY RED GENETIC YIELD TRIAL-106/07/13	06/07/13	SVR&EC	FRANKENMUTH 40	ALPHA LATTICE	3	DIRECT HARVESTED
3111	PRELIMINARY RED GENETIC YIELD TRIAL-206/07/13	06/07/13	SVR&EC	FRANKENMUTH 80	ALPHA LATTICE	3	DIRECT HARVESTED
3112	PRELIMINARY RED GENETIC YIELD TRIAL-306/07/13	06/07/13	SVR&EC	FRANKENMUTH 56	REC. LATTICE	3	DIRECT HARVESTED
3113	MIDWEST & CO-OP. REGIONAL TRIAL	06/07/13	SVR&EC	FRANKENMUTH 49	SQ. LATTICE	3	DIRECT HARVESTED
3914	ORGANIC YIELD TRIAL-NAVY & BLACK	06/20/13		CARO 36	SQ. LATTICE	4	DIRECT HARVESTED
3216	STANDARD KIDNEY YIELD TRIAL	06/19/13	ENTRICAN	MONTCALM 56	REC. LATTICE	3	ROD PULLED
3217	PRELIMINARY BUSH KIDNEY YIELD TRIAL	06/19/13	ENTRICAN	MONTCALM 16	SQ. LATTICE	3	ROD PULLED
3218	STANDARD CRANBERRY YIELD TRIAL	06/19/13	ENTRICAN	MONTCALM 25	SQ. LATTICE	4	ROD PULLED
3219	PRELIMINARY CRANBERRY YIELD TRIAL	06/19/13	ENTRICAN	MONTCALM 20	REC. LATTICE	3	ROD PULLED
3220	PRELIMINARY MAYACOBIA YIELD TRIAL	06/19/13	ENTRICAN	MONTCALM 16	SQ. LATTICE	3	HAND PULLED
3221	PRELIMINARY FABADA YIELD TRIAL	06/19/13	ENTRICAN	MONTCALM 3	RCBD	3	HAND PULLED
3222	WHITE MOLD NATIONAL YIELD TRIAL	06/19/13	ENTRICAN	MONTCALM 64	SQ. LATTICE	3	DIRECT HARVESTED
3223	IRRIGATED DROUGHT TRIAL	06/18/13	ENTRICAN	MONTCALM 96	REC. LATTICE	3	ROD PULLED
3224	NON-IRRIGATED DROUGHT TRIAL	06/18/13	ENTRICAN	MONTCALM 96	REC. LATTICE	3	ROD PULLED
3425	BNF YIELD TRIAL	06/04/13	CAMPUS	E. LANSING 130	ALPHA LATTICE	3	ROD PULLED

SVR&EC: SAGINAW VALLEY RESEARCH & EXTENSION CENTER

PROCEDURE: PLANTED IN 4 ROW PLOTS, 20 FEET LONG, 20 INCH ROW WIDTH, 4 SEEDS/FOOT, 15 FOOT SECTION OF CENTER 2 ROWS WAS HARVESTED AT MATURITY.

FRANKENMUTH:FERTILIZER BROADCAST: 400 POUNDS OF 15-5-13 + S, ZN, MN, CU PRIOR TO PLANTING.

HERBICIDES APPLIED: 1.0 PT DUAL + 1.5 QT. EPTAM APPLIED PPI.

3 OZ. RAPTOR/0.75 PT REFLEX/1 PT BASAGRAN ON 7/11/13.

PESTICIDES APPLIED: 3.0 OZ. WARRIOR ON JULY 11.

ENTRICAN: FERTILIZER BROADCAST: 200 POUNDS OF 19-10-19 PRIOR TO PLANTING. 50 POUNDS 46-0-0 SIDE DRESSED ON JULY 24.

HERBICIDES APPLIED: 2 PT. SONALAN/1.25 QT EPTAM/2PT. DUAL PPI. 3 OZ. RAPTOR/0.75 PT REFLEX/1 PT BASAGRAN ON 7/24/13.

PESTICIDES APPLIED: 9 OZ. ASANA ON JULY 24.

IRRIGATION APPLIED: 5.75 INCHES ON WHITE MOLD TRIALS - 9 APPLICATIONS; 4.0 INCHES ON STANDARD YIELD TRIALS - 7 APPLICATIONS

E. LANSING: FERTILIZER: NONE.

HERBICIDES APPLIED: 2 PT. SONALAN + 1.25 QT EPTAM + 2PT. DUAL APPLIED PPI. 3 OZ. RAPTOR/0.75 PT REFLEX/1 PT BASAGRAN APPLIED 7/18/13.

PESTICIDES APPLIED: 4.0 OZ. WARRIOR ON JULY 18.

EXPERIMENT 3101 STANDARD NAVY YIELD TRIAL

PLANTED: 6/5/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
N12440	N09056/N09175	39	28.0	19.0	46.0	101.0	1.5	53.0	4.5
N12454	B09174/N09056	38	26.8	18.7	43.0	101.0	2.0	55.0	4.5
I92002	C-20*3//GTS-0801/Seafarer, VISTA	21	26.3	20.1	46.0	105.0	2.0	52.5	4.0
N11264	N08003/MEDALIST	11	26.0	20.6	43.0	104.0	1.5	51.5	4.0
N12456	B09174/N09056	35	26.0	17.6	46.0	99.0	1.5	51.5	4.0
I11264	COOP 03019, MERLIN	4	25.8	19.3	44.0	105.0	1.0	54.5	4.0
N12447	B09174/N09056	28	25.7	19.2	45.0	100.0	2.0	51.0	4.3
N12466	N08010/N08007	30	25.7	16.7	50.0	100.0	1.0	55.0	5.5
N11225	N05311*/B05044	18	25.4	20.3	47.0	104.0	1.5	52.0	4.0
N12467	N08010/N08007	34	25.3	16.6	47.0	99.0	1.0	53.0	5.8
N11231	N05311//BMD12/B04587	15	25.2	17.7	45.0	100.0	1.0	52.5	4.0
N12458	B09174/N09056	33	25.1	17.6	44.0	98.0	1.5	50.5	4.0
N12457	B09174/N09056	37	25.0	18.0	44.0	99.0	1.0	51.5	4.8
N12468	N08010//B04349/B05044	25	24.9	17.2	47.0	99.0	1.5	52.0	5.0
I08902	HYLAND T9905	42	24.9	22.7	46.0	104.0	2.0	52.5	4.5
N11238	N07009//N05324/B04554	8	24.8	15.5	47.0	102.0	1.0	55.5	5.0
N11232	N05311//BMD12/B04587	7	24.7	18.2	45.0	101.0	1.0	52.0	4.3
N12453	N09065/N09050	27	24.5	19.6	45.0	99.0	1.0	57.0	5.0
N11258	N07009/MEDALIST	23	24.4	18.8	47.0	101.0	1.0	54.0	5.3
N11283	MEDALIST/N08003	3	24.2	19.2	46.0	102.0	1.0	54.0	5.5
N12442	N09060/N09175	26	24.1	22.9	45.0	101.0	1.0	54.0	5.5
N11298	MEDALIST//B05054/B04588	9	23.9	18.7	46.0	99.0	1.0	53.5	4.5
N11256	N07009/MEDALIST	14	23.8	17.8	46.0	100.0	1.0	52.0	5.8
N11257	N07009/MEDALIST	20	23.7	19.8	45.0	101.0	1.0	54.5	5.5
N11228	N05311//N07009/N05324	31	23.7	17.5	47.0	100.0	1.0	52.5	5.0
N11277	N08010/N08007	5	23.7	17.8	45.0	99.0	1.0	52.0	5.5
N11282	MEDALIST/N08003	13	23.6	20.0	44.0	100.0	1.0	52.5	4.8
N12441	N09060/N09175	29	23.0	22.5	47.0	101.0	1.5	52.0	4.8
N11230	N05311//BMD12/B04587	2	22.9	19.4	43.0	100.0	1.0	54.0	5.0
I10103	OAC 7-2, OAC REXETER	16	22.5	20.5	42.0	106.0	2.0	50.5	3.5
N11292	N08006/MEDALIST	6	22.2	19.0	43.0	100.0	1.0	53.5	4.3
I13438	GTS OB-1723-06	19	21.9	18.4	46.0	105.0	2.0	51.5	4.0
I08958	Mayflower/Avanti, MEDALIST	12	21.8	20.3	45.0	104.0	1.5	54.5	4.0
N11226	N05311*/B05044	24	21.6	19.0	48.0	102.0	1.0	51.0	4.3
N11284	MEDALIST/N08003	1	21.0	19.2	45.0	101.0	1.0	51.5	5.3
I13416	ND02-220-01N	41	20.6	20.1	47.0	99.0	1.0	51.0	4.0
I12301	INDI	22	20.0	18.6	43.0	100.0	1.0	54.0	4.0
N12461	Eclipse/N09056	32	18.8	17.4	45.0	99.0	1.5	49.0	4.3
N11296	MEDALIST//B05054/B04588	10	18.4	19.5	44.0	101.0	1.5	51.0	4.0
I10124	ND060514	40	17.7	23.0	45.0	99.0	2.5	47.5	3.5
N12446	B07554//X08106/X08102	36	14.9	17.0	42.0	99.0	1.0	48.5	4.3
I13437	GTS H96204	17	14.7	19.9	40.0	99.0	1.0	48.5	4.0
MEAN (42)			23.3	19.1	44.9	100.7	1.3	52.4	4.6
LSD (.05)			3.0	0.6	2.7	1.2	0.5	2.7	0.6
CV (%)			10.9	2.9	3.6	0.7	24.6	3.0	11.2

EXPERIMENT 3102 STANDARD BLACK YIELD TRIAL

PLANTED: 6/5/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
B10244	B04644/ZORRO	1	27.4	20.4	45.0	103.0	2.0	52.0	5.8
B11312	B04587//B05070/B05044	26	27.1	20.7	47.0	104.0	2.0	52.0	4.8
I13418	ND081157	52	25.3	18.2	49.0	103.0	2.5	51.5	3.8
B12710	B07554//Jaguar/B07554	40	25.3	20.7	47.0	103.0	1.0	53.5	5.5
B10215	B04587//ZORRO/DPC-1	7	25.3	19.0	47.0	103.0	1.5	53.5	5.5
B11343	B07554//ZORRO/B05044	15	25.2	18.0	44.0	102.0	2.5	49.0	4.0
B11371	B05055/B04587	23	25.1	18.2	47.0	102.0	2.0	51.0	4.3
B09165	B04554/B04587	11	25.0	19.1	49.0	103.0	2.0	52.5	5.3
B11334	N07009//B04349/B05044	6	24.8	17.2	43.0	103.0	1.0	51.5	5.8
B10213	B04587//ZORRO/DPC-1	4	24.8	19.3	47.0	101.0	1.0	52.5	5.5
B12712	B07554//Jaguar/B07554	39	24.5	19.2	48.0	102.0	1.5	53.0	5.0
B11304	N05324/B05055	28	24.5	19.1	47.0	101.0	1.5	53.0	4.3
I10102	Mackinac/Jaguar, LORETO	2	24.0	22.1	46.0	105.0	3.0	50.0	3.0
I07116	T-39/Midnight, SHANIA	20	23.9	20.3	48.0	105.0	1.0	53.5	4.0
B12711	B07554//Jaguar/B07554	50	23.9	19.1	44.0	103.0	1.0	53.5	5.8
I13417	ND071256	51	23.9	21.7	47.0	102.0	1.5	50.5	4.0
B12713	B07554//Jaguar/B07554	44	23.9	19.9	45.0	101.0	1.0	52.0	4.8
B12728	B09193/B09184	45	23.7	20.0	40.0	101.0	1.0	50.5	4.3
B12736	Eclipse/N09056	47	23.6	19.5	49.0	102.0	1.5	53.0	4.8
B95556	B90211/N90616, JAGUAR	16	23.4	18.1	45.0	100.0	1.0	50.5	4.5
I13436	GTS-1103	17	23.4	23.7	49.0	105.0	2.0	52.5	4.0
B12709	B07554//Jaguar/B07554	35	23.3	19.8	46.0	100.0	1.0	52.0	4.5
I08907	Midnight/Blackhawk, BLACK VELVET	21	23.3	21.8	47.0	105.0	1.0	54.0	4.0
B10238	ZORRO/B05055	18	23.1	17.3	48.0	100.0	1.0	50.5	5.3
B11364	B04644/B07554	13	23.0	20.2	46.0	102.0	1.5	50.0	4.5
B10210	N05324/B04431	14	23.0	21.5	45.0	103.0	2.0	54.5	5.5
B11363	B04644/B07554	3	22.9	18.1	47.0	101.0	1.0	53.5	5.3
B12720	B09175/Eclipse	36	22.9	21.3	45.0	103.0	1.0	53.5	5.0
B11311	B04587//ZORRO/DPC-1	24	22.7	19.3	48.0	103.0	1.5	52.5	5.3
B10214	B04587//ZORRO/DPC-1	12	22.7	18.5	46.0	102.0	1.0	52.5	5.3
B04554	B00103*/X00822, ZORRO	8	22.7	19.9	45.0	103.0	2.0	54.5	5.5
B12715	Zorro/N09056	43	22.5	17.5	49.0	102.0	1.0	51.0	4.5
I81066	SEL-BTS, T-39	22	22.3	19.5	48.0	104.0	3.5	44.0	3.0
B11370	B05055/B04265	27	22.2	18.2	46.0	100.0	1.0	50.0	4.8
B12724	B09184/B09135	42	22.1	18.2	45.0	101.0	1.0	51.5	4.8
B11310	B04587//ZORRO/DPC-1	25	22.0	19.8	47.0	101.0	1.5	51.5	4.3
B12729	B09201/B09135	49	21.9	16.1	48.0	100.0	1.0	50.5	4.5
B11259	N07009//B04349/B05044	10	21.8	17.2	46.0	101.0	1.5	52.5	4.5
B11372	B05055/B04587	32	21.8	17.1	49.0	101.0	2.0	49.0	4.0
B11302	N05311//B05055/B05053	30	21.7	19.3	43.0	102.0	1.0	54.5	4.8

EXPERIMENT 3102 STANDARD BLACK YIELD TRIAL

PLANTED: 6/5/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
B12721	B09175/Eclipse	37	21.5	20.9	44.0	102.0	1.0	54.5	5.3
B12723	B09184/B09135	48	21.3	17.8	44.0	102.0	1.0	52.5	4.8
B12707	B07554//X08106/X08102	38	21.2	17.8	47.0	101.0	1.0	51.5	4.5
B11356	JAGUAR/B04644	31	21.2	19.1	43.0	103.0	1.0	51.5	5.0
B12708	B07554//X08106/X08102	41	21.0	17.6	48.0	101.0	1.0	51.5	5.3
I13419	NDF09304	53	20.9	16.9	45.0	100.0	1.0	52.0	4.8
B12716	B09128/Eclipse	46	20.0	16.2	49.0	100.0	1.0	49.0	4.3
B11309	B04587//ZORRO/B05055	34	19.8	18.2	43.0	104.0	1.5	52.0	4.5
B11305	N05324/N04158	33	19.6	18.4	47.0	100.0	1.0	51.0	4.8
B10208	N05324/B05055	5	19.0	18.2	45.0	101.0	1.0	54.5	4.5
B10202	N05311/X06121	9	18.7	21.6	41.0	100.0	1.0	52.5	4.5
I03390	ND9902621-2, ECLIPSE	19	18.1	18.9	45.0	100.0	1.0	53.5	4.5
B11348	B04644//ZORRO/B05044	29	16.0	18.6	46.0	102.0	2.0	51.5	4.0
I13440	CO 07050-2	55	15.9	19.7	42.0	100.0	2.0	52.0	3.5
I13441	CO 07057-5	56	15.4	20.3	43.0	102.0	2.5	51.0	3.8
I13439	CO 07045-2	54	7.5	19.8	47.0	101.0	2.0	49.0	3.5
MEAN (56)			22.2	19.2	45.8	101.7	1.5	51.8	4.6
LSD (.05)			2.9	0.7	0.9	1.3	0.5	0.9	0.5
CV (%)			11.2	3.0	1.1	0.8	21.4	1.0	9.9

EXPERIMENT 3103 PRELIMINARY NAVY YIELD TRIAL

PLANTED: 6/6/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
N11283	MEDALIST/N08003	52	29.3	19.4	47.0	101.0	1.0	54.0	5.3
N13140	N05324/MEDALIST	40	26.4	19.7	45.0	100.0	1.0	54.5	5.0
N13124	N08007/N05324	24	25.9	16.4	45.0	100.0	1.0	56.5	5.0
N13139	N05324/MEDALIST	39	25.6	17.9	44.0	101.0	2.0	55.0	4.7
N13131	N09175/N08007	31	25.5	19.2	46.0	99.0	2.0	52.5	4.7
I11264	COOP 03019, MERLIN	55	25.3	19.1	43.0	105.0	1.0	55.5	4.0
N12442	N09060/N09175	54	25.0	23.1	44.0	101.0	1.0	57.0	5.0
N13102	N09056//MEDALIST/N09067	2	24.9	17.3	44.0	99.0	1.5	54.0	4.0
N13135	N10102/N09046	35	24.7	21.2	44.0	100.0	1.0	53.5	4.3
N13110	N08003/N05324	10	24.4	18.5	44.0	100.0	1.0	56.0	5.3
N13132	N09175/N08007	32	24.2	18.6	47.0	100.0	1.5	57.0	5.0
N13136	N10102/B09200	36	24.0	21.7	42.0	101.0	1.0	55.0	4.3
N13134	N09175/N08007	34	23.8	21.4	47.0	100.0	1.0	57.5	4.7
N11298	MEDALIST//B05054/B04588	53	23.7	19.1	45.0	102.0	1.5	54.0	4.0
N13142	N08007/N09046	42	23.6	17.8	47.0	101.0	1.5	55.5	4.7
N13133	N09175/N08007	33	23.6	19.3	46.0	99.0	1.0	55.0	4.0
N13104	VIGILANT//N09175/N09011	4	23.6	17.6	45.0	99.0	1.0	55.5	4.3
N13112	N08003/N05324	12	23.6	17.8	45.0	101.0	1.0	54.5	4.7
N13120	N08003/N05324	20	23.4	20.5	44.0	100.0	1.0	55.5	5.0
N13151	N08007//B05054/B04588	51	23.4	18.6	48.0	100.0	1.0	53.0	4.7
N13126	N08007/N05324	26	23.4	17.3	45.0	99.0	1.0	54.5	4.3
I08958	Mayflower/Avanti, MEDALIST	56	23.3	19.4	45.0	103.0	1.5	55.0	4.0
N13115	N08003/N05324	15	23.3	19.3	44.0	101.0	1.0	57.5	5.3
N13138	N09056//N09034/N06702	38	23.3	19.1	46.0	101.0	1.5	55.5	4.0
N13125	N08007/N05324	25	23.2	17.9	45.0	100.0	1.0	56.0	5.0
N13118	N08003/N05324	18	23.1	17.4	45.0	100.0	1.0	56.0	5.3
N13122	N08003/N05324	22	23.1	20.6	44.0	100.0	1.0	56.5	5.3
N13141	N05324/MEDALIST	41	22.7	17.8	44.0	99.0	1.0	51.5	4.7
N13108	VIGILANT//AVALANCHE/N09054	8	22.6	20.0	44.0	99.0	1.0	52.0	4.7
N13113	N08003/N05324	13	22.6	19.3	43.0	100.0	1.0	56.5	4.7
N13119	N08003/N05324	19	22.4	16.0	47.0	105.0	1.0	56.5	4.3
N13105	VIGILANT//N09175/N09011	5	22.3	19.5	44.0	99.0	1.0	57.0	4.3
N13109	VIGILANT//I06271/N09054	9	22.2	20.2	45.0	99.0	1.0	55.0	4.3
N13116	N08003/N05324	16	22.1	19.1	45.0	100.0	1.0	58.5	5.3
N13121	N08003/N05324	21	22.0	23.2	43.0	101.0	1.0	51.5	5.0
N13148	AVALANCHE/N09045	48	21.9	18.2	48.0	102.0	1.0	53.5	5.0
N13111	N08003/N05324	11	21.8	20.3	44.0	100.0	1.0	54.0	5.0
N13150	N04158//N04141/N05317	50	21.8	20.3	43.0	100.0	1.0	57.0	5.0
N13106	VIGILANT//N09175/N09011	6	21.6	20.0	45.0	100.0	1.0	55.5	5.0
N13101	N09056//MEDALIST/N09067	1	21.4	18.2	45.0	99.0	1.5	51.0	4.0

EXPERIMENT 3103 PRELIMINARY NAVY YIELD TRIAL

PLANTED: 6/6/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
N13137	I09215/N09020	37	21.3	22.1	45.0	100.0	2.0	52.5	4.0
N13103	N09056//MEDALIST/N09067	3	21.2	16.7	44.0	100.0	1.5	55.0	4.3
N13147	AVALANCHE/N09045	47	20.7	17.6	48.0	100.0	1.0	51.5	4.3
N13107	VIGILANT//N09175/N09011	7	20.4	17.8	44.0	99.0	1.0	53.5	4.0
N13117	N08003/N05324	17	20.3	16.7	43.0	102.0	1.0	56.0	5.0
N13146	VIGILANT/N09175	46	19.8	18.4	43.0	104.0	1.5	53.0	4.0
N13114	N08003/N05324	14	19.7	20.7	45.0	105.0	1.0	56.5	4.0
N13128	N08007/N10102	28	19.7	19.2	45.0	101.0	2.0	54.5	4.3
N13129	N09046/N08007	29	19.3	16.4	46.0	100.0	1.0	57.5	4.7
N13123	N08003/N05324	23	19.1	22.3	46.0	100.0	1.0	56.5	4.7
N13130	N09046/N08007	30	18.6	17.2	46.0	100.0	1.5	55.0	4.3
N13127	N08007/N10102	27	17.6	20.7	44.0	103.0	1.0	54.5	4.3
N13144	N10102/N05324	44	17.4	23.3	42.0	105.0	2.0	55.5	4.0
N13145	N10102/N05324	45	17.1	23.4	43.0	105.0	2.0	56.0	4.0
N13149	N04158//B04644/X08103	49	16.7	19.9	42.0	101.0	1.0	48.0	4.0
N13143	N10102/N05324	43	16.3	21.5	44.0	105.0	2.0	54.0	4.0
MEAN (56)			22.3	19.3	44.6	100.6	1.2	54.8	4.6
LSD (.05)			3.1	0.8	1.6	1.4	0.4	1.4	0.6
CV (%)			10.4	2.9	2.1	0.9	20.1	1.5	9.9

EXPERIMENT 3104 PRELIMINARY BLACK YIELD TRIAL

PLANTED: 6/6/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
B10244	B04610/N05346	34	23.9	20.1	47.0	98.0	1.0	51.4	5.0
B13225	PR0443-151/B09175	25	22.1	21.5	47.0	98.0	2.0	50.7	5.5
B13217	B09175/I09213	17	21.7	24.1	46.0	98.0	1.5	51.2	4.5
B13204	B09174/VCW54-1	4	21.2	23.0	46.0	98.0	1.0	49.8	4.5
B13228	B09175/JAGUAR	28	21.2	19.9	46.0	98.0	1.0	52.1	5.0
B13218	B09175/I09215	18	20.5	24.9	45.0	98.0	1.0	52.6	5.5
B13229	B09175/JAGUAR	29	20.3	19.2	46.0	98.0	1.0	50.9	5.0
B13220	B09175/TARS-MST1	20	20.3	19.6	44.0	97.0	1.5	49.3	5.0
B13203	B09174/VCW54-1	3	20.1	23.7	46.0	98.0	1.0	52.1	5.0
B13219	B09175/I09215	19	20.1	25.2	46.0	98.0	1.0	52.2	5.0
B13202	B09174/VCW54-1	2	19.8	23.1	46.0	98.0	1.0	51.0	5.0
B13223	PR0443-151/B09175	23	19.7	21.9	47.0	98.0	1.5	50.5	5.5
B04554	B00103*/X00822, ZORRO	35	19.2	18.7	47.0	98.0	1.5	50.7	5.0
B13213	B09175/JAGUAR	13	18.3	20.8	49.0	98.0	1.0	50.5	5.0
B13224	PR0443-151/B09175	24	18.1	22.1	47.0	98.0	2.0	50.4	4.5
B13214	B09175/JAGUAR	14	17.8	19.3	47.0	98.0	1.0	49.9	5.0
I07116	T-39/Midnight, SHANIA	36	17.3	20.5	48.0	99.0	1.5	52.4	4.0
B13211	JAGUAR/B09175	11	17.1	19.0	48.0	97.0	1.0	49.0	4.0
B13210	JAGUAR/B09175	10	16.9	19.9	47.0	97.0	1.5	49.7	4.5
B13227	ZORRO/B09204	27	16.6	19.4	47.0	97.0	1.0	48.8	4.0
B13208	JAGUAR/B09175	8	16.5	19.0	44.0	97.0	1.0	50.0	4.0
B13205	TACANA/VAX6//B09197	5	16.2	20.9	48.0	96.0	1.0	48.7	4.5
B13216	B09175/I09213	16	16.1	22.4	47.0	98.0	1.0	51.4	5.0
B13222	PR0443-151/B09175	22	15.6	19.7	46.0	98.0	1.0	49.5	5.0
B13230	I09215/JAGUAR	30	15.5	20.0	46.0	97.0	1.0	47.6	4.0
B13206	TACANA/VAX6//B09197	6	15.4	22.0	46.0	97.0	1.0	48.2	4.0
B13221	PR0443-151/B09175	21	15.3	19.0	46.0	97.0	1.0	51.8	4.5
B13215	B09175/I09213	15	14.7	23.2	49.0	98.0	1.0	48.7	4.0
B13209	JAGUAR/B09175	9	14.0	18.4	46.0	96.0	1.0	47.2	4.0
B13207	JAGUAR/B09175	7	13.8	18.9	46.0	96.0	1.0	48.6	4.0
B13231	I09215/B09175	31	13.7	19.1	46.0	97.0	1.0	49.3	4.0
B13212	JAGUAR/I09213	12	13.2	21.8	47.0	98.0	1.0	47.3	4.5
B13226	TACANA/VAX6//B09197	26	10.8	18.4	47.0	96.0	1.0	46.2	4.0
I13403	Zorro/DPC40, PR1165-3	33	9.9	20.7	45.0	97.0	1.0	47.8	4.0
I13402	Zorro/DPC40, PR1165-2	32	9.2	20.5	45.0	98.0	1.0	49.6	4.0
B13201	ZORRO//TACANA/VAX6	1	8.0	18.1	46.0	97.0	1.0	49.0	4.0
MEAN (36)			17.0	20.8	46.2	97.3	1.1	49.9	4.6
LSD (.05)			2.6	0.8	0.9	0.7	0.3	1.3	0.6
CV (%)			11.1	2.7	1.2	0.4	15.2	1.5	7.9

EXPERIMENT 3105 STANDARD GREAT NORTHERN YIELD TRIAL

PLANTED: 6/6/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
G12901	G07321/FUJI	17	25.0	28.6	42.0	105.0	1.5	51.5	5.5
G12902	G07321/FUJI	18	19.7	24.8	40.0	102.0	2.0	49.5	4.3
G12903	G07321/FUJI	16	19.7	24.7	40.0	103.0	2.0	50.5	4.3
G11438	G07309/P08401	1	19.6	35.1	42.0	100.0	1.5	48.5	4.5
G11429	G07309//G05241/B04588	6	19.4	29.1	47.0	101.0	2.0	51.0	5.3
G12904	G07321/FUJI	19	18.8	24.8	41.0	100.0	1.5	48.0	4.3
G11431	G07309//G05241/B04588	23	18.6	28.7	42.0	102.0	2.0	51.0	5.0
G11440	G07309/P08401	4	18.5	34.2	41.0	99.0	1.5	49.0	4.5
G12502	P08410/G07302	14	18.4	32.8	41.0	99.0	1.5	48.0	4.3
G11464	G07309//G07302/BMN13	5	18.3	39.7	42.0	101.0	2.0	48.5	3.5
G11463	G07309//G04207/I07130	12	17.5	38.0	43.0	100.0	2.5	47.5	3.5
G09303	G04207/P05437	24	17.2	29.5	40.0	100.0	2.0	50.5	4.0
G13480	ELDORADO/G08263	7	16.9	36.8	41.0	100.0	1.0	50.5	4.3
G08254	G04514/Matterhorn, POWDERHORN	2	16.8	31.3	40.0	100.0	1.5	49.5	4.5
G13484	P09406//ELDORADO/G09312	10	16.7	37.4	43.0	102.0	1.0	51.5	4.3
G12508	P08410/G08275	15	16.4	27.8	42.0	100.0	1.0	49.5	5.3
G11416	G05220/X07810	3	15.9	31.1	40.0	100.0	2.0	48.0	3.8
G93414	MATTERHORN	13	15.4	33.1	40.0	100.0	2.0	48.0	4.0
G11405	G05220//G04207/P05437	11	14.6	31.2	41.0	100.0	1.0	52.0	4.5
BC296	GN9-4	21	14.6	34.8	40.0	98.0	2.0	46.5	3.3
G11428	G07309//G07302/BMN13	9	13.9	34.2	42.0	99.0	2.0	49.0	3.8
I12321	PS02-028A-3-B2	22	12.3	34.4	40.0	99.0	2.5	46.0	3.0
G05922	HIME TEBO*4/MATTERHORN, FUJI	20	10.9	26.8	43.0	106.0	2.0	45.0	3.0
G13483	P09406//ELDORADO/G09312	8	10.8	36.9	43.0	102.0	1.0	50.0	4.5
MEAN (36)			16.9	31.9	41.2	100.5	1.7	49.1	4.2
LSD (.05)			2.2	1.8	1.9	2.3	0.7	2.1	0.6
CV (%)			11.0	4.7	2.6	1.3	23.2	2.5	12.3

EXPERIMENT 3106 STANDARD PINTO YIELD TRIAL

PLANTED: 6/6/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
P07863	AN-37/P02630, ELDORADO	1	22.8	41.7	41.0	105.0	2.0	54.0	5.0
P11519	SANTA FE/P07806	13	21.8	38.4	48.0	103.0	2.0	52.0	5.0
P12606	P07406/P08401	18	20.7	33.5	41.0	101.0	2.0	52.5	5.0
I07113	PNE-6-94-75/Kodiak, LAPAZ	8	20.5	35.0	44.0	101.0	1.5	52.0	4.0
P11518	SANTA FE/P07806	11	20.0	37.4	48.0	104.0	2.0	55.5	4.5
P11506	P06121/P05436	6	19.0	30.0	41.0	100.0	2.5	47.5	3.5
P08403	P05463/USPT-CBB-5	12	18.8	29.1	40.0	101.0	2.0	50.5	5.5
P08161	MATTERHORN/EMP 507	9	18.8	35.1	44.0	100.0	2.0	50.0	3.0
P12605	P07406/P08401	20	18.6	31.9	41.0	101.0	1.0	49.0	3.5
P12609	P08362/P08401	5	18.2	32.4	40.0	100.0	1.0	48.0	4.5
P11523	P04203/P06125	19	17.9	33.0	42.0	101.0	2.0	48.0	4.5
P13701	G09305/ELDORADO	21	17.5	35.9	43.0	102.0	1.5	50.5	4.0
P12604	P07406/P08401	10	17.5	34.0	42.0	102.0	2.0	49.5	4.5
P12603	P07406/P08401	7	17.3	29.0	40.0	100.0	2.0	49.0	4.0
P13704	ELDORADO*/P09401	24	17.0	37.1	42.0	103.0	2.0	49.0	4.5
I09123	Sierra/Buster, Medicine Hat	2	16.7	34.1	39.0	99.0	2.5	47.5	3.5
P09425	P00225/USPT-CBB-6	3	16.5	38.2	41.0	100.0	1.5	52.0	5.0
P11526	SANTA FE/P07806	16	16.4	34.6	41.0	102.0	2.5	46.5	4.0
P13703	ELDORADO*/P09401	23	16.2	35.0	39.0	101.0	2.0	49.0	4.0
P13702	G09305/ELDORADO	22	16.2	35.3	40.0	102.0	1.0	54.0	5.0
P12612	P08381/P08401	15	15.8	30.2	41.0	101.0	2.0	50.5	4.5
P11517	P06131//P06137/P05436	14	15.5	35.8	40.0	101.0	3.0	48.0	3.0
P12613	P08381/P08401	17	15.5	29.5	41.0	100.0	1.0	49.5	4.0
P12610	P08362/P08401	4	15.4	32.5	39.0	100.0	1.0	47.0	4.5
P13705	P08312/USPT-WM-12	25	13.9	36.3	42.0	100.0	1.0	46.0	3.5
MEAN (25)			17.8	34.2	41.6	100.9	1.8	49.9	4.2
LSD (.05)			1.8	1.2	1.1	1.2	0.2	0.2	1.0
CV (%)			8.6	3.0	1.5	0.7	7.6	0.2	12.8

EXPERIMENT 3107 STANDARD RED AND PINK YIELD TRIAL

PLANTED: 6/6/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
I13446	SR 09304	36	29.7	27.6	45.0	99.0	3.0	46.0	3.5
I13401	SR 09303	29	28.6	25.1	46.0	103.0	2.0	50.0	5.0
R11806FM	X07714/X07710	34	27.4	29.6	47.0	102.0	3.0	47.0	4.0
R12845	SR9-5/R09508	16	26.7	32.9	43.0	105.0	2.0	54.0	4.5
R12844	SR9-5/R09508	20	25.6	32.5	44.0	104.0	2.0	53.0	5.0
S00809	R94142/X94076, SEDONA	28	25.4	34.6	44.0	101.0	2.5	49.5	4.0
R11608		2	24.1	34.1	43.0	103.0	2.0	53.5	5.0
S12911	PK9-7/Rosetta	8	24.1	33.1	41.0	104.0	2.0	49.0	4.0
R12859	R08512/SR9-5	6	23.6	28.9	41.0	103.0	1.5	53.5	5.5
R12843	SR9-5/R09508	19	23.5	30.9	43.0	103.0	2.0	52.0	5.0
R11633	R06412//P06121/P05436	3	23.2	34.1	45.0	103.0	1.5	49.5	4.0
S12906	Rosetta/NDZ06209	13	23.0	32.3	41.0	102.0	1.5	49.0	5.0
R12857	R08512/SR9-5	14	22.8	30.6	43.0	101.0	1.5	53.5	5.5
R12860	R08512/SR9-5	9	22.7	29.3	41.0	102.0	1.5	54.0	5.5
S12910	PK9-7/Rosetta	5	22.5	33.1	40.0	102.0	2.0	50.5	5.0
S12909	PK9-7/Rosetta	12	22.2	33.6	41.0	104.0	2.0	50.5	4.5
S12904	Rosetta/PK9-4	11	22.1	32.1	42.0	100.0	2.0	48.0	5.0
S08418	S02754/S04503, ROSETTA	27	22.0	32.7	43.0	103.0	1.5	51.0	5.5
R12858	R08512/SR9-5	17	22.0	32.3	42.0	104.0	1.5	54.0	5.0
R12832	SR9-5/Merlot	7	22.0	35.6	41.0	103.0	1.5	51.5	4.0
R12805	Merlot/NDZ06209	22	21.8	29.5	45.0	104.0	2.0	50.5	4.5
R12802	Merlot/SR9-2	23	21.4	32.1	43.0	103.0	2.0	50.0	4.0
R98026	R94037/R94161, MERLOT	26	21.3	33.2	43.0	105.0	2.0	54.0	4.0
R12818	R08504/NDZ06249	24	20.7	30.9	43.0	104.0	2.0	51.0	4.5
R13859	R12859 Selection	31	20.5	28.3	42.0	102.0	1.5	51.0	5.0
S11703	R06418/S07809	1	19.2	29.0	39.0	101.0	2.5	46.5	3.5
R13026	Merlot SPS from ID	32	19.1	32.6	41.0	105.0	1.0	55.0	6.0
R12840	SR9-5/R02072	25	18.8	28.5	41.0	103.0	1.5	53.0	5.5
R12864	R02085/SR9-2	15	18.5	29.1	44.0	100.0	1.0	51.0	4.5
R11801FJ	X07712/X07721	33	18.3	31.0	39.0	98.0	3.0	45.5	3.5
S12908	PK9-4/S08410	18	17.3	35.2	42.0	102.0	2.0	49.0	4.0
R12828	R09505/NDZ06209	21	16.1	28.9	42.0	101.0	1.5	50.0	6.0
I09208	Buster/Vax3, RIO ROJO	35	15.2	27.5	42.0	99.0	2.0	47.0	3.0
R11604	R02189//R06414/RAB651	4	14.9	32.3	42.0	102.0	1.0	48.0	4.5
R12824	R09505/NDZ06209	10	13.7	31.1	44.0	100.0	1.5	47.0	3.5
I11271	10IS-2423	30	10.6	21.0	45.0	98.0	1.5	44.5	3.0
MEAN (36)			21.4	31.0	42.3	101.9	1.9	50.3	4.5
LSD (.05)			2.3	1.3	1.8	0.6	0.7	1.3	1.0
CV (%)			9.2	3.6	2.5	0.3	23.4	1.5	12.8

EXPERIMENT 3108 PRELIMINARY GREAT NORTHERN YIELD TRIAL

PLANTED: 6/6/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
G13467	X09107/P07863	67	31.2	37.7	45.0	102.0	1.5	56.0	5.3
G13466	X09107/P07863	66	30.8	37.6	45.0	102.0	2.0	43.5	5.0
G13465	X09107/P07863	65	26.0	34.2	45.0	100.0	1.0	54.0	4.7
G13412	G08254//G09301/P07863	12	26.0	29.3	42.0	100.0	2.0	54.0	4.3
G13424	G08254//P07863/G09312	24	25.8	31.9	44.0	101.0	2.0	53.0	4.7
G13404	G08254//G09301/P07863	4	25.5	33.8	43.0	102.0	2.0	55.5	4.3
G13406	G08254//G09301/P07863	6	24.7	32.7	41.0	102.0	2.0	52.5	4.3
G13481	P07863//G09301/I07142	80	23.9	33.3	44.0	103.0	2.0	54.0	4.7
G13408	G08254//G09301/P07863	8	23.9	33.4	42.0	101.0	1.5	52.5	4.0
G13410	G08254//G09301/P07863	10	23.7	33.7	40.0	100.0	2.0	49.5	4.0
G13417	G08254//G09305/P07863	17	23.7	34.0	43.0	103.0	1.5	53.5	5.0
G13479	P07863/G09312	79	23.3	26.0	42.0	100.0	1.0	53.5	4.7
G13478	P07863/G09312	78	23.2	28.5	41.0	103.0	1.5	55.0	5.3
G13482	P07863//G09301/I07142	81	23.0	35.6	41.0	103.0	2.0	52.0	4.3
G13450	G08217//P08372/P08410	50	22.8	31.3	42.0	101.0	1.0	51.5	5.7
G13401	G08254//G09301/P07863	1	22.6	34.7	41.0	102.0	1.5	55.0	4.3
G13416	G08254//G09305/P07863	16	22.5	33.8	41.0	101.0	1.0	52.5	5.0
G13414	G08254//G09305/P07863	14	22.4	36.3	41.0	101.0	1.0	55.0	4.7
G13468	G08259/X09101	68	22.4	34.4	44.0	104.0	1.5	54.0	4.7
G13425	G08254//P07863/G09312	25	22.4	32.4	40.0	101.0	1.5	51.5	4.7
G13444	G07302//G08274/P08410	44	22.1	32.2	40.0	99.0	2.0	50.5	5.0
G13442	G07302//G08274/P08410	42	21.8	29.0	40.0	99.0	1.0	50.5	4.7
G13411	G08254//G09301/P07863	11	21.8	30.6	44.0	100.0	1.0	53.0	4.7
G13469	G08259/X09101	69	21.7	35.1	42.0	103.0	2.0	51.0	4.3
G13443	G07302//G08274/P08410	43	21.7	29.9	43.0	100.0	2.0	49.0	4.7
G13456	G08217//P08372/P08410	56	21.6	31.5	42.0	100.0	1.0	53.0	5.0
G93414	MATTERHORN	84	21.6	32.9	42.0	100.0	2.0	48.0	3.7
G13477	P07863/G09312	77	21.6	25.7	39.0	100.0	1.0	50.5	5.0
G13462	G09312/P07863	62	21.5	25.1	42.0	102.0	1.0	43.5	5.7
G13423	G08254//P07863/G09312	23	21.5	31.7	42.0	103.0	2.0	51.5	4.3
G13402	G08254//G09301/P07863	2	21.2	34.9	43.0	102.0	1.5	51.5	4.0
G13452	G08217//P08372/P08410	52	21.2	30.4	42.0	99.0	1.0	51.0	5.3
G13418	G08254//P07863/G09312	18	21.2	32.1	42.0	99.0	1.5	72.5	4.0
G13463	G09312/P07863	63	21.2	25.2	44.0	100.0	1.0	52.0	5.7
G13407	G08254//G09301/P07863	7	21.2	33.4	43.0	103.0	1.5	55.0	4.7
G13458	G09301/P07863	58	21.1	34.6	40.0	103.0	2.0	50.0	4.3
G13457	G08217//P08372/P08410	57	21.0	31.1	43.0	99.0	1.0	49.0	4.7
G13426	G08254//P07863/G09312	26	21.0	30.8	41.0	100.0	1.5	53.0	4.7
G13409	G08254//G09301/P07863	9	20.8	30.6	41.0	100.0	2.0	53.0	4.3
G08254	G04514/Matterhorn, POWDERHORN	83	20.7	32.1	39.0	100.0	2.0	52.0	4.7
G13447	G08217//G08215/P07407	47	20.6	28.5	42.0	102.0	1.5	53.0	5.0
G13428	G09320//G09302/P07863	28	20.6	35.1	40.0	101.0	2.0	54.5	4.0
G13415	G08254//G09305/P07863	15	20.5	34.8	42.0	102.0	1.5	54.0	4.3
G13448	G08217 // G08215 / P07407	48	20.4	28.3	40.0	100.0	1.0	55.0	5.0
G13451	G08217//P08372/P08410	51	20.4	28.5	43.0	100.0	1.0	52.0	5.7

EXPERIMENT 3108 PRELIMINARY GREAT NORTHERN YIELD TRIAL

PLANTED: 6/6/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
G13403	G08254//G09301/P07863	3	20.1	34.1	38.0	102.0	1.0	50.0	4.3
G13471	G05922/G09312	71	19.9	29.0	44.0	105.0	1.5	53.0	5.0
G13421	G08254//P07863/G09312	21	19.9	31.9	41.0	99.0	2.0	47.5	3.3
G13464	G09312/P07863	64	19.9	25.5	44.0	101.0	1.0	54.0	5.3
G13440	G07302//G08274/P08410	40	19.7	29.1	41.0	100.0	1.0	51.5	5.0
G13405	G08254//G09301/P07863	5	19.6	33.6	39.0	101.0	2.0	51.5	4.3
G13413	G08254//G09305/P07863	13	19.6	33.5	43.0	100.0	1.5	54.0	4.7
G13455	G08217//P08372/P08410	55	19.5	29.0	41.0	101.0	1.0	52.0	5.3
G13475	G09312/G05922	75	19.4	29.4	44.0	104.0	1.0	52.5	4.0
G13439	G09330*/G08259	39	19.3	32.4	41.0	101.0	2.0	51.0	4.3
G13441	G07302//G08274/P08410	41	19.2	29.3	40.0	100.0	2.0	50.0	5.0
G13432	G09330//G09308/X09101	32	19.1	33.6	42.0	100.0	2.0	51.5	4.7
G13419	G08254//P07863/G09312	19	19.1	29.9	44.0	101.0	2.0	50.5	4.0
G13449	G08217//P08372/P08410	49	19.1	30.7	43.0	100.0	1.0	51.0	5.0
G13454	G08217//P08372/P08410	54	19.1	29.6	40.0	100.0	1.0	50.5	5.0
G13437	G09330//G09308/X09107	37	18.7	28.2	40.0	100.0	1.0	52.0	5.3
G13473	G09312/G05922	73	18.6	27.6	44.0	103.0	1.0	41.0	4.7
G13434	G09330//G09308/X09101	34	18.3	33.7	42.0	99.0	1.5	52.0	4.3
G13474	G09312/G05922	74	18.3	23.4	39.0	103.0	1.0	50.5	4.0
G13422	G08254//P07863/G09312	22	18.3	29.3	41.0	100.0	2.0	47.0	4.0
G13453	G08217//P08372/P08410	53	18.0	27.8	41.0	100.0	1.0	50.0	4.7
G13431	G09330//G09308/X09101	31	17.9	35.5	41.0	100.0	1.5	52.5	5.3
G13461	G09305/I09113	61	17.6	34.9	42.0	103.0	1.5	55.0	5.3
G13433	G09330//G09308/X09101	33	17.2	32.5	42.0	100.0	1.5	50.5	4.3
G13427	G08254//P07863/G09312	27	17.2	31.3	39.0	100.0	1.5	52.5	4.0
G13438	G09330//G09308/X09107	38	17.2	32.4	43.0	100.0	1.0	52.0	4.7
G13476	G09312/G05922	76	17.2	29.0	42.0	105.0	2.0	52.0	3.7
G13420	G08254//P07863/G09312	20	16.6	28.7	42.0	102.0	2.0	48.5	3.7
G13430	G09330//G09308/X09101	30	16.2	33.7	42.0	100.0	1.0	50.5	4.7
G13445	G08217//G08215/P07407	45	16.0	29.8	41.0	100.0	1.5	50.5	4.0
G13446	G08217//G08215/P07407	46	15.8	28.7	40.0	100.0	1.0	51.0	4.0
G13429	G09320//G09302/P07863	29	15.7	39.3	39.0	104.0	2.0	49.0	3.0
G13460	G09305/I09113	60	15.3	32.2	42.0	103.0	1.0	51.0	4.7
G13470	G05922/G09312	70	15.1	26.6	42.0	103.0	1.0	49.5	3.7
G13459	G09305/I09113	59	14.8	33.3	42.0	102.0	1.0	53.0	4.7
G13435	G09330//G09308/X09101	35	14.7	29.6	43.0	100.0	1.0	50.5	4.3
G13472	G05922/G09312	72	13.6	25.8	40.0	104.0	1.0	49.0	4.3
G13436	G09330//G09308/X09107	36	13.2	37.8	42.0	101.0	1.0	53.0	4.7
G05922	HIME TEBO*4/MATTERHORN, FUJI	82	13.1	27.3	41.0	105.0	1.5	45.0	3.3
MEAN (84)			20.3	31.4	41.5	101.0	1.5	51.7	4.6
LSD (.05)			2.5	1.6	1.2	1.0	0.5	6.8	0.8
CV (%)			8.9	3.7	1.7	0.6	20.6	7.9	12.6

EXPERIMENT 3109 PRELIMINARY RED AND PINK YIELD TRIAL								PLANTED: 6/7/13		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	
R13526	X10308/R08514	26	28.9	36.1	43.0	102.0	1.5	59.3	5.0	
I13401	SR 09303	42	28.7	26.0	44.0	102.0	2.0	57.3	4.3	
R13515	I07148//I08962/P07863	15	27.4	29.1	45.0	102.0	3.0	51.9	4.0	
R13511	I09138//S09603/R02082	11	26.4	31.7	42.0	100.0	2.0	54.2	4.0	
R13538	R98026/X10316	38	25.9	30.7	45.0	103.0	2.0	59.0	4.3	
R13537	R98026/X10316	37	25.3	31.2	46.0	103.0	2.0	59.1	4.7	
R13517	R98026/I10126	17	25.3	30.0	47.0	102.0	2.0	58.6	4.7	
R13507	I09134//R08504/R09508	7	25.3	34.5	45.0	103.0	1.5	59.4	4.3	
R13502	I09140//R09505/P07863	2	24.4	37.6	43.0	102.0	2.0	56.3	4.3	
R13518	R98026/I10126	18	24.3	33.0	43.0	104.0	2.0	56.3	4.3	
R13501	I09140//R09505/P07863	1	24.1	36.1	45.0	104.0	2.0	57.6	4.0	
R98026	R94037/R94161, MERLOT	41	24.0	33.8	44.0	104.0	2.0	57.0	4.0	
R13503	I09140//R09505/P07863	3	23.3	35.4	43.0	100.0	2.0	51.7	3.7	
R13514	I07148//I08962/P07863	14	23.2	29.3	46.0	103.0	2.0	53.1	4.3	
R13506	I09140//R09505/P07863	6	22.6	32.5	43.0	103.0	1.5	54.5	4.3	
R13535	R98026/X10316	35	22.1	32.5	46.0	104.0	3.0	54.1	4.0	
R13539	S00809/I09226	39	21.8	28.9	41.0	100.0	2.5	52.9	4.0	
R13536	R98026/X10316	36	21.0	29.4	45.0	102.0	1.5	59.2	4.3	
R13513	I09141//R02085/I09202	13	20.3	30.2	41.0	100.0	1.0	57.4	4.3	
R13510	I09136//R02085/I09202	10	20.0	22.9	44.0	102.0	2.0	57.0	5.0	
R13509	I09136//R02085/I09202	9	19.8	26.5	43.0	100.0	1.5	55.7	4.7	
R13521	I09207/R09501	21	19.1	32.7	43.0	105.0	2.0	55.9	4.3	
R13528	X10315/I08966	28	18.9	24.1	42.0	99.0	1.0	54.8	4.3	
R13530	X10316/I11209	30	18.7	26.6	40.0	100.0	2.0	50.6	3.7	
R13529	X10316/I11209	29	18.7	27.5	39.0	103.0	2.0	56.9	4.0	
R13519	I09207/R09501	19	18.4	33.9	43.0	104.0	2.0	57.2	4.0	
R13508	I09136//R02085/I09202	8	18.3	25.3	44.0	100.0	1.5	55.9	4.3	
R13531	X10316/R08541	31	17.8	31.8	42.0	102.0	1.0	57.8	4.7	
R13505	I09140//R09505/P07863	5	17.1	28.1	41.0	101.0	1.0	54.5	4.3	
R13520	I09207/R09501	20	16.9	35.6	43.0	106.0	1.5	58.4	4.3	
R13534	X10316/R08541	34	16.3	30.0	41.0	101.0	2.0	54.5	4.3	
R13504	I09140//R09505/P07863	4	15.8	38.0	42.0	103.0	2.0	56.0	4.0	
R13512	I09141//R02085/I09202	12	15.5	34.1	42.0	99.0	1.0	56.7	4.0	
R13527	X10315/I08966	27	15.5	25.3	40.0	99.0	1.0	50.3	4.0	
R13522	I10139/R98026	22	15.2	24.5	43.0	100.0	3.0	45.2	3.0	
R13523	I10139/R98026	23	15.2	25.2	42.0	101.0	3.0	45.4	3.7	
R13532	X10316/R08541	32	15.0	28.9	40.0	101.0	1.0	56.9	4.3	
R13533	X10316/R08541	33	14.9	32.0	42.0	102.0	1.5	53.3	4.0	
R13524	I10139/R98026	24	14.5	23.6	42.0	99.0	3.0	46.0	3.3	
R13525	I10139/R98026	25	14.4	24.9	42.0	100.0	3.0	45.9	3.0	
R13540	S00809/I09226	40	14.3	25.8	41.0	100.0	2.0	51.1	3.3	
R13516	I07148//S09603/R02082	16	13.0	25.2	43.0	102.0	2.0	50.7	4.0	
MEAN (42)			20.2	30.0	42.6	101.5	1.9	54.7	4.1	
LSD (.05)			2.2	0.9	2.0	1.7	0.2	3.2	0.6	
CV (%)			8.1	2.3	2.7	1.0	4.7	3.5	10.5	

EXPERIMENT 3110 PRELIMINARY RED YIELD TRIAL (1)

PLANTED: 6/7/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R13627	I11210/R98026	27	25.6	31.0	38.0	101.0	1.0	65.0	5.0
R13635	I11210/R98026	35	25.3	31.3	42.0	104.0	2.0	55.0	3.5
R13628	I11210/R98026	28	25.2	30.4	41.0	102.0	2.5	55.0	3.5
R13613	I11210/R98026	13	24.4	30.5	47.0	106.0	2.5	45.0	3.0
R98026	R94037/R94161, MERLOT	40	23.8	34.0	42.0	104.0	1.5	70.0	5.5
R13609	I11210/R98026	9	23.4	31.0	43.0	102.0	1.5	47.5	2.5
R13615	I11210/R98026	15	22.4	30.4	43.0	101.0	3.0	45.0	3.5
R13606	I11210/R98026	6	21.2	29.3	39.0	101.0	4.0	47.5	2.5
R13626	I11210/R98026	26	21.1	28.0	43.0	102.0	2.5	50.0	4.5
R13611	I11210/R98026	11	20.6	33.3	43.0	109.0	4.5	55.0	3.0
R13612	I11210/R98026	12	20.4	30.8	46.0	110.0	4.5	45.0	2.5
R13632	I11210/R98026	32	20.2	35.8	39.0	108.0	1.0	62.5	5.0
R13621	I11210/R98026	21	20.1	30.1	38.0	96.0	3.0	52.5	3.0
R13622	I11210/R98026	22	19.7	33.6	39.0	104.0	1.5	65.0	4.0
R13616	I11210/R98026	16	19.5	31.6	46.0	105.0	4.0	47.5	2.5
R13608	I11210/R98026	8	19.3	29.6	38.0	102.0	4.0	37.5	1.5
R13624	I11210/R98026	24	19.1	24.1	40.0	95.0	4.5	30.0	1.5
R13603	I11210/R98026	3	17.7	30.5	40.0	102.0	1.5	50.0	2.0
R13630	I11210/R98026	30	17.5	32.6	39.0	101.0	2.0	42.5	3.5
R13607	I11210/R98026	7	16.7	28.4	39.0	101.0	3.0	50.0	2.5
R13631	I11210/R98026	31	15.2	29.6	38.0	100.0	5.0	37.5	2.0
R13610	I11210/R98026	10	15.1	26.0	41.0	102.0	3.5	40.0	2.0
R13605	I11210/R98026	5	14.2	23.8	48.0	114.0	3.0	67.5	3.0
R13623	I11210/R98026	23	14.1	31.0	40.0	104.0	2.0	50.0	3.0
R13618	I11210/R98026	18	13.7	31.0	37.0	104.0	2.0	40.0	1.5
R13619	I11210/R98026	19	13.6	29.5	40.0	103.0	2.0	42.5	1.5
R13633	I11210/R98026	33	13.5	28.5	38.0	96.0	4.5	27.5	1.0
R13636	I11210/R98026	36	13.4	31.6	38.0	107.0	1.0	45.0	1.0
R13602	I11210/R98026	2	12.7	25.6	43.0	102.0	2.5	45.0	2.5
R13634	I11210/R98026	34	11.6	27.3	41.0	101.0	1.0	30.0	1.5
R13620	I11210/R98026	20	10.9	28.1	42.0	102.0	1.0	47.5	2.5
I11209	SER94 (CIAT)	38	10.8	24.1	38.0	102.0	2.0	37.5	1.0
R13604	I11210/R98026	4	10.5	27.9	38.0	104.0	1.0	32.5	1.0
I11207	SER48 (CIAT)	37	9.9	31.5	38.0	101.0	1.0	32.5	1.5
I11210	SER95 (CIAT)	39	9.4	25.6	39.0	102.0	2.5	37.5	1.5
R13601	I11210/R98026	1	9.2	27.5	43.0	102.0	3.0	40.0	1.0
R13625	I11210/R98026	25	8.2	28.5	38.0	102.0	1.0	37.5	1.0
R13614	I11210/R98026	14	8.1	20.8	43.0	103.0	1.5	45.0	1.5
R13617	I11210/R98026	17	8.0	25.6	38.0	95.0	1.0	30.0	1.0
R13629	I11210/R98026	29	7.4	37.3	37.0	100.0	1.0	30.0	1.0
MEAN (40)			16.3	29.4	40.4	102.4	2.4	45.3	2.4
LSD (.05)			2.5	1.6	1.2	5.0	0.7	8.6	1.3
CV (%)			11.3	4.0	1.7	2.9	16.2	11.2	32.3

EXPERIMENT 3111 PRELIMINARY RED YIELD TRIAL (2)

PLANTED: 6/7/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
R13717	R98026/I11207	17	26.4	28.5	42.0	100.0	4.5	45.0	2.0
R13762	R98026/I11207	62	23.1	26.5	42.0	100.0	4.5	55.0	2.5
R13752	R98026/I11207	52	22.8	31.5	44.0	101.0	1.5	65.0	4.5
R13741	R98026/I11207	41	22.5	31.2	43.0	102.0	4.5	50.0	3.0
R13712	R98026/I11207	12	22.3	31.0	41.0	102.0	2.5	60.0	4.5
R13764	R98026/I11207	64	22.3	26.7	44.0	101.0	3.0	47.5	3.0
R13728	R98026/I11207	28	22.2	33.2	41.0	101.0	2.5	55.0	4.0
R13771	R98026/I11207	71	21.8	32.2	38.0	103.0	2.0	57.5	4.0
R13769	R98026/I11207	69	21.7	35.1	39.0	100.0	1.5	55.0	3.0
R13763	R98026/I11207	63	20.9	32.2	46.0	100.0	4.5	50.0	2.0
R13757	R98026/I11207	57	20.7	28.9	45.0	100.0	3.5	37.5	1.5
R13765	R98026/I11207	65	20.7	32.7	42.0	100.0	3.0	50.5	3.0
R13713	R98026/I11207	13	20.5	27.5	39.0	100.0	1.0	60.0	4.5
R13704	R98026/I11207	4	20.5	33.4	44.0	100.0	3.0	55.0	3.0
R13773	R98026/I11207	73	20.2	32.8	43.0	102.0	1.5	65.0	5.5
R13761	R98026/I11207	61	20.2	31.2	40.0	101.0	3.0	55.0	2.0
R13718	R98026/I11207	18	20.1	30.9	45.0	101.0	2.0	65.0	4.5
R13723	R98026/I11207	23	19.6	27.8	41.0	101.0	3.0	55.0	2.0
R13724	R98026/I11207	24	19.3	32.1	41.0	99.0	2.0	50.0	3.0
R13748	R98026/I11207	48	19.2	30.4	45.0	101.0	2.0	65.0	5.5
R13742	R98026/I11207	42	19.2	31.5	44.0	99.0	1.0	55.5	5.0
R13710	R98026/I11207	10	18.9	30.7	46.0	100.0	2.5	55.0	4.0
R13729	R98026/I11207	29	18.9	29.8	46.0	98.0	5.0	40.0	1.0
R13736	R98026/I11207	36	18.7	29.8	42.0	101.0	1.0	62.5	4.5
R13733	R98026/I11207	33	18.5	31.0	38.0	100.0	3.0	55.0	3.5
R13737	R98026/I11207	37	18.3	31.4	38.0	100.0	3.0	40.0	1.5
R13767	R98026/I11207	67	17.8	31.7	41.0	96.0	3.0	50.0	2.0
R13732	R98026/I11207	32	17.6	32.6	39.0	100.0	2.0	60.0	4.0
R13735	R98026/I11207	35	17.6	30.4	38.0	102.0	3.5	50.0	4.0
R13746	R98026/I11207	46	17.5	27.6	43.0	100.0	3.5	45.0	2.5
R13775	R98026/I11207	75	17.5	28.2	39.0	100.0	2.5	45.0	2.5
R13731	R98026/I11207	31	17.4	32.9	38.0	103.0	3.0	55.0	1.0
R13770	R98026/I11207	70	17.4	32.4	42.0	102.0	1.5	60.0	4.5
R13715	R98026/I11207	15	17.2	34.8	43.0	101.0	3.5	50.0	2.5
R13745	R98026/I11207	45	17.2	28.3	43.0	105.0	3.5	50.0	2.0
R13744	R98026/I11207	44	17.0	32.8	37.0	100.0	2.5	60.0	1.5
R13743	R98026/I11207	43	17.0	29.3	37.0	100.0	1.5	50.0	3.0
R98026	R94037/R94161, MERLOT	80	17.0	33.4	42.0	102.0	2.0	55.0	4.5
R13734	R98026/I11207	34	16.8	32.2	40.0	150.0	3.0	55.0	2.5
R13754	R98026/I11207	54	16.6	25.5	44.0	100.0	1.0	55.0	2.0

EXPERIMENT 3111 PRELIMINARY RED YIELD TRIAL (2)

PLANTED: 6/7/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
R13721	R98026/I11207	21	16.2	30.3	38.0	101.0	2.0	50.0	2.5
R13707	R98026/I11207	7	16.0	31.1	41.0	100.0	1.0	55.0	4.0
R13719	R98026/I11207	19	16.0	29.0	39.0	100.0	2.0	42.5	2.0
R13760	R98026/I11207	60	16.0	30.1	41.0	100.0	1.0	55.0	4.0
R13711	R98026/I11207	11	15.8	30.5	41.0	100.0	2.5	55.0	2.5
R13709	R98026/I11207	9	15.7	33.7	37.0	101.0	1.0	50.0	3.0
R13725	R98026/I11207	25	15.5	28.0	39.0	98.0	1.0	55.0	4.0
R13776	R98026/I11207	76	15.5	30.7	42.0	101.0	3.5	55.0	2.5
R13739	R98026/I11207	39	15.2	35.9	41.0	101.0	1.5	60.0	3.0
R13716	R98026/I11207	16	14.8	31.2	38.0	102.0	2.5	50.0	2.0
R13766	R98026/I11207	66	14.5	30.9	41.0	100.0	4.5	42.5	1.5
R13740	R98026/I11207	40	14.0	29.3	38.0	95.0	1.5	45.0	4.0
R13749	R98026/I11207	49	14.0	31.2	38.0	95.0	1.5	40.0	1.0
R13755	R98026/I11207	55	14.0	30.5	38.0	100.0	3.5	45.0	1.5
R13702	R98026/I11207	2	13.8	34.2	37.0	101.0	1.0	50.0	2.5
R13774	R98026/I11207	74	13.7	30.0	37.0	98.0	1.0	40.0	1.0
R13758	R98026/I11207	58	13.4	32.6	40.0	105.0	3.5	60.0	1.5
R13759	R98026/I11207	59	13.2	27.3	45.0	101.0	4.5	47.5	2.0
R13722	R98026/I11207	22	13.1	35.6	38.0	96.0	1.5	55.0	2.0
R13714	R98026/I11207	14	12.9	35.9	38.0	95.0	1.0	45.0	1.5
R13738	R98026/I11207	38	12.7	29.8	40.0	107.0	1.5	45.0	2.0
R13750	R98026/I11207	50	12.7	27.0	42.0	100.0	2.0	47.5	2.5
R13703	R98026/I11207	3	12.5	32.9	38.0	98.0	1.5	40.0	1.5
R13726	R98026/I11207	26	12.4	27.7	41.0	100.0	2.0	40.0	2.0
R13730	R98026/I11207	30	12.4	36.6	37.0	98.0	1.0	37.5	1.0
R13768	R98026/I11207	68	12.3	27.0	43.0	95.0	4.5	45.0	1.0
R13708	R98026/I11207	8	12.2	28.4	37.0	95.0	1.0	45.0	2.5
R13727	R98026/I11207	27	12.2	32.1	38.0	100.0	1.0	47.5	1.5
R13747	R98026/I11207	47	11.6	26.6	43.0	100.0	4.5	45.0	2.0
R13706	R98026/I11207	6	11.3	28.0	42.0	103.0	2.5	42.5	1.5
I11207	SER48 (CIAT)	77	11.2	31.9	39.0	95.0	1.5	40.0	1.0
R13701	R98026/I11207	1	10.6	33.1	37.0	90.0	2.0	37.5	1.0
R13720	R98026/I11207	20	10.4	31.9	38.0	100.0	2.0	45.0	1.5
R13753	R98026/I11207	53	10.3	23.6	43.0	100.0	2.0	45.0	3.0
R13705	R98026/I11207	5	10.0	32.1	41.0	95.0	2.0	40.0	1.0
R13772	R98026/I11207	72	9.9	32.7	38.0	100.0	3.0	45.0	1.0
I11209	SER94 (CIAT)	78	9.6	23.6	43.0	95.0	2.0	40.0	1.0
I11210	SER95 (CIAT)	79	9.5	24.6	37.0	103.0	3.0	35.0	1.0
R13751	R98026/I11207	51	8.8	28.5	43.0	100.0	4.0	47.5	3.0
R13756	R98026/I11207	56	7.8	27.1	41.0	101.0	3.5	40.0	1.5
MEAN (80)			16.2	30.6	40.7	100.4	2.4	49.9	2.6
LSD (.05)			2.7	1.8	1.5	14.5	1.1	10.4	1.3
CV (%)			12.2	4.3	2.3	8.7	25.8	12.4	29.9

EXPERIMENT 3112 PRELIMINARY RED YIELD TRIAL (4)

PLANTED: 6/7/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R13804	R98026/I11209	4	25.3	33.1	42.0	100.0	4.5	55.0	2.5
R13829	R98026/I11209	29	24.6	25.8	41.0	100.0	4.5	45.0	1.5
R13821	R98026/I11209	21	24.3	34.0	46.0	107.0	2.5	60.0	5.0
R13806	R98026/I11209	6	23.0	28.0	48.0	110.0	3.5	50.0	1.5
R98026	R94037/R94161, MERLOT	53	22.4	34.0	42.0	103.0	3.0	50.0	4.0
R13834	R98026/I11209	34	21.6	25.8	47.0	105.0	3.5	42.5	1.0
R13810	R98026/I11209	10	21.2	30.1	38.0	100.0	3.0	42.5	1.5
R13845	R98026/I11209	45	20.7	25.0	45.0	100.0	3.0	55.0	3.5
R13831	R98026/I11209	31	20.7	27.0	41.0	105.0	3.0	45.0	2.5
R13803	R98026/I11209	3	20.6	25.7	43.0	100.0	2.5	55.0	3.5
R13026	Merlot SPS from ID	54	20.1	32.7	40.0	100.0	1.5	50.0	4.0
S12911	PK9-7/Rosetta	55	20.1	32.9	41.0	100.0	3.5	42.5	2.0
R13848	R98026/I11209	48	19.6	30.5	45.0	105.0	3.0	55.0	2.0
R13805	R98026/I11209	5	19.6	27.8	42.0	100.0	2.5	42.5	1.5
R13825	R98026/I11209	25	19.6	33.6	42.0	103.0	2.5	65.0	5.5
S08418	S02754/S04503, ROSETTA	56	19.2	31.7	42.0	100.0	1.5	55.0	3.5
R13822	R98026/I11209	22	18.6	30.1	46.0	95.0	1.0	40.0	2.0
R13826	R98026/I11209	26	18.4	29.8	38.0	100.0	2.5	37.5	1.0
R13823	R98026/I11209	23	17.8	28.2	38.0	100.0	2.0	50.0	2.5
R13816	R98026/I11209	16	17.5	28.1	48.0	105.0	2.0	45.0	1.0
R13818	R98026/I11209	18	17.5	28.7	44.0	108.0	4.0	50.0	2.5
R13801	R98026/I11209	1	17.1	27.4	48.0	105.0	3.0	55.0	3.0
R13828	R98026/I11209	28	16.8	30.2	47.0	100.0	4.0	45.0	2.0
R13820	R98026/I11209	20	16.6	29.1	38.0	100.0	2.5	50.0	2.5
R13807	R98026/I11209	7	16.6	34.2	43.0	100.0	3.0	50.0	2.5
R13808	R98026/I11209	8	16.5	32.7	37.0	110.0	3.5	55.0	2.0
R13809	R98026/I11209	9	16.4	31.5	45.0	100.0	4.0	45.0	2.5
R13837	R98026/I11209	37	16.1	24.4	39.0	100.0	3.0	40.0	1.5
R13841	R98026/I11209	41	15.8	27.9	39.0	100.0	2.0	42.5	1.0
R13844	R98026/I11209	44	15.8	25.7	39.0	100.0	1.5	47.5	1.5
R13811	R98026/I11209	11	15.7	29.7	39.0	100.0	2.5	45.0	1.0
R13813	R98026/I11209	13	15.6	28.0	47.0	103.0	2.5	43.0	1.0
R13840	R98026/I11209	40	15.4	26.5	38.0	100.0	2.5	47.5	1.0
R13815	R98026/I11209	15	15.0	24.7	42.0	100.0	3.0	42.5	1.5
R13842	R98026/I11209	42	14.9	30.1	47.0	110.0	3.5	42.5	1.0

EXPERIMENT 3112 PRELIMINARY RED YIELD TRIAL (4)

PLANTED: 6/7/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R13836	R98026/I11209	36	14.8	27.6	43.0	100.0	1.5	42.5	1.5
R13833	R98026/I11209	33	14.3	26.2	42.0	100.0	2.0	45.0	2.0
R13843	R98026/I11209	43	14.2	30.4	40.0	100.0	2.5	42.5	1.5
R13814	R98026/I11209	14	14.0	24.7	40.0	100.0	3.5	37.5	1.0
R13802	R98026/I11209	2	13.8	28.2	40.0	100.0	3.0	45.0	2.0
R13830	R98026/I11209	30	13.1	30.8	37.0	105.0	3.0	40.0	1.5
R13832	R98026/I11209	32	13.0	29.2	48.0	110.0	4.5	37.5	1.0
R13824	R98026/I11209	24	12.9	32.2	43.0	100.0	2.5	45.0	2.5
R13819	R98026/I11209	19	12.3	34.7	38.0	108.0	2.5	30.0	1.0
R13839	R98026/I11209	39	12.3	30.8	39.0	95.0	1.5	40.0	1.5
R13847	R98026/I11209	47	11.7	28.4	42.0	107.0	3.5	40.0	1.5
R13835	R98026/I11209	35	11.1	26.9	41.0	98.0	1.5	35.0	1.5
I11271	10IS-2423	12	11.0	21.1	45.0	100.0	2.0	42.5	1.0
R13846	R98026/I11209	46	10.8	22.9	42.0	100.0	2.0	42.5	2.0
R13838	R98026/I11209	38	9.8	23.7	39.0	103.0	2.0	40.0	1.0
I11210	SER95 (CIAT)	52	9.6	24.6	38.0	108.0	1.5	32.5	1.0
I11209	SER94 (CIAT)	51	9.4	23.5	38.0	100.0	3.0	30.0	1.0
I11207	SER48 (CIAT)	50	8.8	30.7	39.0	100.0	2.0	42.5	1.0
R13849	R98026/I11209	49	8.2	25.3	45.0	103.0	4.0	37.5	1.0
R13817	R98026/I11209	17	8.1	25.1	38.0	98.0	2.5	30.0	1.0
R13827	R98026/I11209	27	6.1	30.0	47.0	110.0	2.0	37.5	1.0
MEAN (56)			16.0	28.6	41.7	102.0	2.7	44.6	1.9
LSD (.05)			2.8	1.3	2.5	3.4	0.9	5.7	1.1
CV (%)			12.8	3.4	3.5	2.0	19.7	7.6	32.9

EXPERIMENT 3113 MRPN/CDBN YIELD TRIAL

PLANTED: 6/7/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
P07863	AN-37/P02630, ELDORADO	16	24.8	43.3	40.0	104.0	2.0	57.0	4.3
I13458	ISB 19	30	24.3	36.6	39.0	100.0	3.0	48.5	4.0
I13451	ND101331	11	24.3	35.6	45.0	101.0	1.9	56.5	4.0
I13435	PT12-37	49	24.1	36.8	43.0	100.0	1.8	53.0	4.7
I13424	SR12-2	37	24.0	34.6	42.0	100.0	2.8	53.0	4.0
I13430	GN10-7	44	24.0	45.8	38.0	104.0	2.1	52.6	4.0
I13434	PT12-3	48	23.6	34.1	39.0	98.0	2.8	50.5	3.0
I13452	ND101326	12	23.4	36.6	46.0	100.0	2.1	58.0	4.3
I12309	UCD-9634	34	22.9	31.4	39.0	101.0	2.5	53.0	4.0
S08418	S02754/S04503, ROSETTA	33	22.5	32.8	40.0	101.0	1.0	56.0	5.3
G08254	G04514/Matterhorn, POWDERHORN	17	22.4	33.4	39.0	100.0	1.0	55.0	4.7
I13448	CO 91003-7	7	22.1	36.5	45.0	100.0	2.5	54.0	4.3
I09204	PK9-1	42	22.0	35.3	38.0	97.0	2.5	50.9	3.7
I11274	GN9-4	35	21.9	37.1	42.0	102.0	2.0	54.9	5.0
I13426	SR12-5	39	21.7	38.3	42.0	103.0	2.0	55.0	4.0
I12306	ISB-18	29	21.6	35.4	40.0	102.0	2.0	56.5	4.0
I09112	NE1-08-16	23	21.3	36.0	39.0	101.0	1.6	54.5	4.0
P12603	P07406/P08401	18	21.3	35.3	44.0	100.0	1.0	57.0	5.3
I13457	PT11-9	28	21.2	37.1	40.0	100.0	2.1	56.6	5.0
G12502	P08410/G07302	20	21.2	33.5	40.0	100.0	1.5	55.0	4.7
I13460	ISB 21	32	21.2	35.8	40.0	100.0	3.1	52.5	3.7
I13428	PK10-19-2-B	41	21.1	33.9	39.0	99.0	2.0	55.0	4.0
I13425	SR12-3	38	20.6	29.3	43.0	99.0	1.6	57.0	4.3
I11244	CO 91216-15	6	20.0	36.9	41.0	101.0	2.0	52.5	4.0
I13433	PT11-61	47	19.9	32.1	41.0	100.0	2.0	52.5	4.0
I11257	PT9-6	27	19.8	39.4	42.0	98.0	2.5	51.0	4.0
I13427	PK10-3-6-B	40	19.6	29.2	43.0	97.0	3.0	49.0	3.7
I13423	SR10-2-4	36	19.1	36.9	40.0	100.0	1.3	54.0	4.7
I13432	PT10-30	46	19.1	39.0	39.0	96.0	3.0	46.0	3.3
I13455	NE1-10-20	22	19.1	38.1	40.0	102.0	2.0	54.5	4.3
G93414	MATTERHORN	2	19.1	33.8	40.0	99.0	2.1	51.0	4.0
P12610	P08362/P08401	19	19.0	32.8	40.0	100.0	1.0	55.5	6.0
G12508	P08410/G08275	21	18.7	29.0	44.0	100.0	1.1	54.5	5.3
I13447	CO 91137-3	5	18.4	38.2	39.0	101.0	1.5	53.6	4.0
I13453	ND09708	14	18.3	36.6	41.0	103.0	1.2	56.5	4.7

EXPERIMENT 3113 MRPN/CDBN YIELD TRIAL

PLANTED: 6/7/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
I13431	GN11-5	45	17.9	36.2	39.0	98.0	1.9	50.5	4.0
I13450	CO 91212-4	9	17.8	38.7	41.0	103.0	2.2	53.0	4.0
I98313	CO51715, MONTROSE	3	17.2	29.7	39.0	95.0	4.0	35.0	3.0
I84002	NW410//VICTOR/AURORA, OTHELLO	26	16.8	34.4	38.0	95.0	3.5	34.9	3.0
I09114	NE2-08-15	24	16.5	41.9	40.0	98.0	2.5	49.0	4.0
I12318	NDZ06219	10	16.5	38.0	43.0	100.0	0.8	55.5	5.0
I13459	ISB 20	31	16.4	38.2	38.0	97.0	3.0	48.0	3.0
I13454	ND09709	15	16.2	38.6	43.0	102.0	1.4	53.6	4.3
I13449	CO 91212-3	8	16.2	34.0	40.0	102.0	1.2	53.0	4.3
I99117	BUSTER	1	15.8	34.9	39.0	98.0	3.1	48.0	3.7
I12311	CO 90848-14	4	15.2	33.0	41.0	98.0	1.9	49.5	4.0
I11238	ND090713	13	14.0	36.7	41.0	103.0	2.0	51.5	4.0
I13456	NE2-11-2	25	13.9	35.8	39.0	102.0	2.5	52.0	4.0
I13429	GN10-1-7	43	13.0	38.2	38.0	98.0	2.1	50.0	4.0
MEAN (49)			19.8	35.8	40.4	100.0	2.1	52.4	4.2
LSD (.05)			2.5	2.1	1.8	2.3	0.6	2.5	0.3
CV (%)			9.4	4.4	2.6	1.4	16.3	2.8	6.0

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
B10244	B04644/ZORRO	18	24.4	19.4	44.0	100.0	1.5	50.0	5.5
B12720	B09175/Eclipse	11	22.6	21.1	43.0	97.0	1.0	48.5	5.0
B11371	B05055/B04587	4	21.7	17.3	44.0	99.0	1.0	49.5	5.0
B12724	B09184/B09135	17	21.5	17.9	44.0	99.0	1.0	47.0	4.0
B11617	I82054/B07554	16	21.3	18.8	42.0	97.0	1.0	48.0	4.5
B11302	N05311//B05055/B05053	2	20.4	18.8	44.0	98.0	1.0	48.0	4.5
B11582	I82054/B07554	8	20.1	18.0	45.0	98.0	1.0	49.0	4.0
N11257	N07009/MEDALIST	27	20.0	17.4	45.0	99.0	1.0	50.0	5.5
B11545	I82054/B07554	7	19.9	21.0	44.0	101.0	1.0	46.0	3.5
B12709	B07554//Jaguar/B07554	15	18.6	20.2	44.0	100.0	1.0	47.0	4.0
B04554	B00103*/X00822, ZORRO	14	18.3	19.5	44.0	99.0	1.0	47.5	4.5
N11228	N05311//N07009/N05324	24	18.3	15.4	44.0	98.0	1.0	48.5	5.5
N11283	MEDALIST/N08003	29	18.3	17.9	43.0	98.0	1.0	50.0	5.5
I11264	COOP 03019, MERLIN	20	18.2	18.9	44.0	100.0	1.0	50.5	5.5
N12453	N09065/N09050	35	17.9	18.6	43.0	99.0	1.0	48.0	5.5
I92002	C-20*3//GTS-0801/Seafarer, VISTA	22	17.7	18.1	44.0	103.0	1.5	49.5	4.0
N12466	N08010/N08007	31	17.7	15.3	44.0	98.0	1.0	50.5	5.0
N12442	N09060/N09175	34	17.6	22.2	46.0	101.0	1.0	48.0	4.5
B11363	B04644/B07554	3	17.4	18.1	44.0	99.0	1.0	47.5	4.5
I08958	Mayflower/Avanti, MEDALIST	19	17.3	18.7	44.0	101.0	1.0	50.0	5.5
N11277	N08010/N08007	28	17.0	16.4	45.0	98.0	1.0	49.0	4.5
B11588	I82054/B07554	9	16.9	20.4	44.0	102.0	1.0	47.5	4.0
I07116	T-39/Midnight, SHANIA	13	16.9	18.2	44.0	104.0	1.0	49.5	4.0
B09197	B05055/B04588	1	16.8	19.2	45.0	99.0	1.0	43.0	3.5
N11226	N05311*/B05044	32	16.2	17.3	45.0	100.0	1.0	48.5	4.0
B11594	I82054/B07554	10	16.0	21.9	44.0	97.0	2.0	47.5	3.0
N11256	N07009/MEDALIST	26	16.0	16.0	43.0	98.0	1.0	49.5	5.0
N11298	MEDALIST//B05054/B04588	33	15.6	17.6	43.0	100.0	1.0	47.0	4.5
B12721	B09175/Eclipse	12	15.4	19.8	44.0	98.0	1.0	46.5	4.5
N11230	N05311//BMD12/B04587	25	15.3	16.7	43.0	100.0	1.0	47.5	5.0
N09020	N05319/B04316	23	15.0	17.4	44.0	101.0	1.0	46.0	3.5
B11536	I82054/B07554	6	14.3	22.1	44.0	104.0	1.0	46.0	3.5
N11284	MEDALIST/N08003	36	14.1	16.9	44.0	99.0	1.0	49.0	5.5
N11296	MEDALIST//B05054/B04588	30	13.8	18.7	43.0	102.0	1.0	45.5	4.5
B11519	I82054/B07554	5	11.6	20.3	47.0	103.0	1.0	46.5	3.0
I07112	R99 NO NOD	21	10.8	17.5	43.0	104.0	2.0	48.5	3.0
MEAN (36)			17.5	18.6	43.8	99.5	1.1	48.1	4.5
LSD (.05)			3.1	0.9	1.1	1.8	0.3	2.2	0.1
CV (%)			15.2	4.0	1.5	1.1	15.5	2.7	0.7

EXPERIMENT 3216 STANDARD KIDNEY YIELD TRIAL

PLANTED: 6/19/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
K08961	K04604/USDK-CBB-15, SNOWDON	6	37.8	85.2	34.0	97.0	2.0	49.0	4.3
K11917	K04607/USWK-CBB-17	7	36.7	65.4	34.0	100.0	2.5	47.5	5.0
K11918	K04607/USWK-CBB-17	17	36.2	65.4	34.0	99.0	2.0	49.0	5.0
K11916	K04607/USWK-CBB-17	2	35.6	69.1	35.0	100.0	2.0	48.0	4.7
K12801	USWK-CBB-17//K08929/K08222	29	35.3	49.5	35.0	100.0	1.5	47.0	4.7
K11909	K06940/USWK-CBB-17	4	35.2	55.2	34.0	99.0	2.0	47.5	5.0
I90013	CELRK	19	35.1	79.5	34.0	98.0	2.0	48.5	4.3
K11944	K07926//C06819/X07804	21	34.5	76.9	36.0	97.0	2.5	47.0	4.7
K11914	K04604/USWK-CBB-17	1	34.0	76.1	34.0	100.0	2.0	46.5	4.0
I11201	Pink Panther//ZAA/Montcalm, CLOUSEAU	23	33.7	83.6	35.0	101.0	2.0	49.0	4.0
K11919	K04607/USWK-CBB-17	5	33.1	65.1	34.0	99.0	1.0	49.0	5.7
K12803	K07921//K08971/K08233	26	32.9	62.8	34.0	97.0	2.0	48.0	5.7
I10105	Montcalm/DRK15, MAJESTY	50	32.5	79.1	42.0	102.0	2.0	48.5	4.0
K12802	USWK-CBB-17//K08929/K08222	40	32.4	50.3	37.0	100.0	2.0	48.0	5.3
K11709	K06012//K06014/K07715	18	31.0	54.2	39.0	101.0	3.0	47.0	4.0
K11320	K08222/CORNELL603	3	30.8	49.7	37.0	100.0	2.0	47.5	4.7
K12811	K08901//K08929/K08222	34	30.1	64.5	34.0	99.0	1.5	48.0	5.7
K11915	K04604/USWK-CBB-17	16	30.0	70.5	35.0	101.0	2.0	48.0	3.7
K12810	K08901//K08929/K08222	27	29.5	66.1	36.0	100.0	2.0	48.5	4.7
K12225	K08222/CORNELL 603	36	29.4	49.3	36.0	97.0	2.0	46.5	5.0
K11710	K06012//K06014/K07715	11	27.9	54.5	37.0	100.0	2.0	47.5	4.0
K12203	K08233//K08220/K06012	28	27.7	48.4	42.0	103.0	3.0	46.5	3.3
I11234	Drake//ZAA/Montcalm, RED ROVER	55	27.6	64.0	39.0	101.0	2.5	46.5	3.7
K12601	Red Hawk//K08601/K08233	39	27.2	63.8	39.0	101.0	2.5	47.5	3.7
K90101	CHAR/2*MONT, RED HAWK	14	27.0	63.4	37.0	101.0	2.5	48.0	4.0
K11303	Red Hawk//K06003/CBB-15	24	26.2	60.0	40.0	102.0	2.0	47.0	3.7
K12219	K06001/Red Hawk	33	26.1	61.3	40.0	104.0	2.5	48.0	3.7
K11306	K06621/USDK-CBB-15	13	26.1	54.1	42.0	102.0	3.5	47.0	3.3
K94601	CN49242/3*MONT//REDKLOUD, CHINOOK2000	52	26.0	58.7	42.0	103.0	2.5	48.5	3.3
K11707	K06621/USDK-CBB-15	15	26.0	51.2	42.0	103.0	3.0	48.0	3.3
K12214	Red Hawk//K08220/K08233	44	25.6	64.6	39.0	101.0	2.5	47.5	3.7
K12201	K08222//K08220/K06012	31	25.4	61.1	39.0	103.0	2.5	46.5	3.0
K11714	K08601/K08233	10	25.3	59.9	43.0	105.0	3.0	48.5	3.0
K12209	K08233//K08222/K08601	41	24.9	54.6	41.0	101.0	2.5	47.0	3.7
K12217	Red Hawk/K08233	45	24.9	61.6	42.0	102.0	2.5	48.0	3.3

EXPERIMENT 3216 STANDARD KIDNEY YIELD TRIAL

PLANTED: 6/19/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
K12206	K08233//K08220/K08233	37	24.5	54.7	42.0	102.0	3.0	49.0	3.7
K08222	Red Hawk/USDK-CBB-15	8	24.0	62.2	42.0	105.0	3.0	46.5	3.0
K12205	K08233//K08220/K06012	35	23.9	63.1	37.0	102.0	2.5	47.0	3.3
K11713	K08601/K08233	12	23.3	55.1	46.0	104.0	3.5	49.0	3.3
K11939	K07929//K06014/K07715	9	23.3	77.2	34.0	103.0	2.5	47.0	3.3
K13301	ISLES/CELRK	47	23.2	75.9	35.0	102.0	2.5	47.5	3.7
K12207	K08233//K08220/K08974	42	23.1	63.5	36.0	104.0	3.5	45.5	3.0
K12807	K08233//K08220/K08974	38	23.1	63.5	35.0	104.0	3.0	47.0	3.3
K12602	K06619/K08222	32	23.0	52.2	45.0	104.0	4.0	44.5	3.0
K13302	ISLES/ISABELLA	48	22.9	55.6	36.0	98.0	2.0	46.0	4.0
K90902	BEA/50B1807//LASSEN, BELUGA	25	22.6	61.1	42.0	103.0	2.0	48.0	3.7
I13420	ND061210	53	22.4	51.2	46.0	103.0	2.5	47.5	3.7
I13422	ACUG 10-W1, YETI	56	20.9	66.4	43.0	103.0	2.5	49.0	3.7
K12805	K08222//K08222/K08974	30	20.7	62.4	41.0	103.0	3.0	46.5	3.7
K12204	K08233//K08220/K06012	46	19.7	63.2	40.0	104.0	3.0	46.5	3.0
K74002	MDRK/CN(3)-HBR(NEB#1), MONTCALM	20	18.9	63.1	38.0	105.0	3.0	48.0	3.0
I13421	ND061106	54	18.7	56.1	42.0	104.0	2.5	48.0	3.0
I02313	UC Canario 707	51	18.7	53.0	46.0	106.0	3.0	49.0	3.0
I11233	OAC 07-L1, OAC INFERNO	49	17.4	60.8	43.0	105.0	3.0	48.5	3.0
K11926	X06115/X06114	22	17.0	59.9	40.0	104.0	3.0	47.5	3.0
K12806	K08222//K08971/K08233	43	13.1	52.9	41.0	105.0	3.5	47.0	3.0
MEAN (56)			26.9	62.0	38.7	101.4	2.5	47.6	3.9
LSD (.05)			4.2	3.8	1.8	1.9	0.7	1.8	0.8
CV (%)			11.6	4.5	3.4	1.1	16.8	2.2	15.3

EXPERIMENT 3217 PRELIMINARY KIDNEY YIELD TRIAL

PLANTED: 6/19/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
K13902	K06939/WALLACE//K08938	6	34.0	69.1	37.0	98.0	1.0	48.8	6.0
K08961	K04604/USDK-CBB-15, SNOWDON	15	34.0	80.7	34.0	96.0	1.5	48.4	5.0
K13901	K06939/WALLACE//K08938	5	33.1	53.6	35.0	98.0	1.5	48.0	4.7
I11201	Pink Panther//ZAA/Montcalm, CLOUSEAU	16	31.7	80.8	35.0	101.0	2.0	49.2	4.0
K13906	K06939/WALLACE//K08938	10	30.9	48.8	36.0	96.0	1.5	48.3	4.7
K13909	K07921//K08971/K08233	13	30.3	64.6	36.0	95.0	1.1	46.6	5.0
K13903	K06939/WALLACE//K08938	7	29.9	52.9	35.0	97.0	1.4	47.3	4.3
K13905	K06939/WALLACE//K08938	9	29.8	47.9	36.0	99.0	2.0	49.0	5.0
K13907	K07921//K08971/K08233	11	29.5	63.2	35.0	95.0	1.5	47.3	5.0
K13904	K06939/WALLACE//K08938	8	28.9	49.3	34.0	96.0	1.9	47.1	4.7
K13602	CELRK/BADILLO	2	28.6	61.6	35.0	95.0	1.5	47.5	4.3
K13908	K07921//K08971/K08233	12	28.3	63.8	35.0	96.0	1.5	47.6	4.7
K13604	K08601*/K08233	4	22.0	67.9	41.0	103.0	3.0	48.7	3.7
K13601	CELRK/BADILLO	1	21.2	49.0	41.0	104.0	3.0	46.6	3.0
K13910	USWK-CBB-17//K06619/K08233	14	20.7	41.3	38.0	102.0	2.6	48.9	3.7
K13603	ISABELLA/K08228	3	20.1	47.1	41.0	103.0	2.0	51.5	3.0
MEAN (16)			28.3	58.9	36.5	98.1	1.8	48.2	4.4
LSD (.05)			2.8	3.9	1.7	2.3	0.9	1.9	0.7
CV (%)			7.0	4.7	3.4	1.4	28.4	2.2	10.7

EXPERIMENT 3218 STANDARD CRANBERRY YIELD TRIAL

PLANTED: 6/19/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
I92014	ETNA	18	30.9	74.0	36.0	96.0	2.0	48.0	4.8
C11269	C07401//CBB-20/C05653	17	28.2	62.2	35.0	97.0	2.5	46.5	4.8
C11266	C07401//CBB-20/C05653	4	28.1	57.4	35.0	98.0	3.0	48.0	4.5
C11305	C07413//CBB-20/C05617	12	27.6	61.0	34.0	96.0	1.5	50.0	5.3
C11373	C08706/C08712	20	27.2	69.0	36.0	97.0	2.0	49.5	5.0
C11320	C05617/CBB-20	2	27.1	56.3	36.0	95.0	2.0	46.5	4.8
C11258	C07401//CBB-20/C05617	5	26.6	60.0	36.0	96.0	2.0	48.0	5.0
C11314	CAPRI/CBB-20	8	26.6	59.2	36.0	98.0	2.0	48.0	5.3
C11263	C07401//CBB-20/C05617	16	26.1	61.7	36.0	95.0	2.0	46.0	4.3
C11212	C05617/C07411	15	25.6	66.5	37.0	98.0	2.5	48.5	3.8
C11259	C07401//CBB-20/C05617	6	25.5	58.1	35.0	96.0	2.5	48.0	5.3
C11260	C07401//CBB-20/C05617	1	25.3	60.1	35.0	95.0	2.5	44.0	4.0
C11223	CAPRI/X06150	19	24.8	65.6	35.0	98.0	2.0	48.5	5.5
C11317	CAPRI/CBB-20	13	24.4	55.8	36.0	100.0	2.5	46.0	3.8
C11247	BELLAGIO//X07801/C07403	22	24.4	53.2	37.0	95.0	2.5	48.5	3.5
C11261	C07401//CBB-20/C05617	9	24.2	60.3	35.0	96.0	2.0	45.0	4.3
C11206	C05631//C05603/CBB-20	23	23.7	58.4	38.0	98.0	2.5	48.0	4.0
C11273	C07403//CBB-20/C06812	3	23.5	54.0	37.0	100.0	3.0	47.0	4.0
C11274	C07403//CBB-20/C06812	11	22.8	63.3	36.0	100.0	3.0	47.5	4.0
C11388	C08712/C07403	10	22.6	57.4	37.0	100.0	3.0	47.0	3.8
C11219	BELLAGIO/X07801	21	22.5	54.1	37.0	96.0	2.0	50.5	4.8
C99833	CARDINAL/K94803, CAPRI	25	22.4	68.6	36.0	99.0	2.5	48.5	4.3
C11369	C99833/C08716	14	21.8	64.0	36.0	96.0	2.5	49.0	4.5
C11222	C05631/C07411	7	21.4	68.2	36.0	100.0	2.0	49.0	4.0
C11221	C06818/C07411	24	21.0	60.8	37.0	100.0	2.0	49.0	3.5
MEAN (25)			25.0	61.2	35.9	97.2	2.3	47.8	4.4
LSD (.05)			2.6	3.2	0.9	2.9	0.9	1.7	0.6
CV (%)			8.7	4.4	2.0	1.7	23.2	2.1	10.6

EXPERIMENT 3219 PRELIMINARY CRANBERRY YIELD TRIAL

PLANTED: 6/19/13

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
I92014	ETNA	19	32.2	72.8	36.0	96.0	2.0	47.3	4.7
C13412	I08969//CAPRI/CBB-20	12	28.8	42.8	36.0	98.0	2.0	49.3	4.7
C13413	C07411/C08712	13	28.7	63.8	36.0	95.0	2.0	47.5	4.3
C11266	C07401//CBB-20/C05653	20	26.9	56.5	35.0	96.0	2.0	48.0	5.7
C13411	CAPRI/I08969	11	24.6	57.9	36.0	95.0	2.0	46.1	4.7
C13417	C08712/X09111	17	22.8	65.5	36.0	98.0	2.5	48.0	4.3
C13416	C08712/X09111	16	22.1	63.8	36.0	97.0	2.0	44.1	3.7
C13406	C08714//C08717/CAPRI	6	21.9	64.2	36.0	99.0	2.0	48.3	4.3
C13410	CAPRI/I08969	10	21.6	56.9	36.0	95.0	2.0	47.0	4.7
C13403	BELLAGIO/I08969	3	21.4	59.3	37.0	98.0	2.0	47.9	4.3
C13414	C08714/BELLAGIO	14	20.4	63.2	37.0	100.0	2.5	48.4	4.0
C13404	BELLAGIO/I08969	4	20.4	59.3	37.0	97.0	1.0	49.5	5.7
C13401	BELLAGIO//C05617/CBB-20	1	20.2	53.3	37.0	98.0	2.0	48.8	3.3
C13402	BELLAGIO/I08969	2	20.2	61.1	36.0	96.0	2.0	49.2	5.0
C13418	C07411/C08708	18	19.9	64.4	37.0	96.0	2.0	49.1	4.3
C13405	C08714//C08712/C08717	5	18.4	57.6	37.0	98.0	2.5	45.6	3.3
C13415	C07411/X09102	15	18.4	61.7	36.0	96.0	3.0	46.6	4.0
C13407	C08714//C08717/C08716	7	13.7	53.1	37.0	95.0	2.5	45.1	3.3
C13409	C08714//C08717/C08716	9	13.3	53.5	37.0	98.0	2.0	47.3	4.0
C13408	C08714//C08717/C08716	8	12.4	50.2	36.0	97.0	2.0	48.3	3.7
MEAN (20)			21.4	59.0	36.3	96.7	2.1	47.6	4.3
LSD (.05)			3.9	3.9	1.2	1.4	0.6	2.7	0.7
CV (%)			13.3	4.8	2.4	0.8	15.0	3.1	10.9

EXPERIMENT 3220 PRELIMINARY MAYACOBIA YIELD TRIAL**PLANTED: 6/19/13**

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO
			/ACRE	WT. (g)	FLOWER
K08961	K04604/USDK-CBB-15, SNOWDON	16	33.4	76.6	33.0
Y11405	FR-07-AZP-14-06	3	23.4	52.5	39.0
K90101	CHAR/2*MONT, RED HAWK	1	23.1	57.7	40.0
MEAN (3)			26.6	62.3	37.3

EXPERIMENT 3221 PRELIMINARY FABADA YIELD TRIAL**PLANTED: 6/19/13**

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE
K11802	K07926//C06819/X07804	1	19.1	88.4	36.0	97.0	2.3	48.7	4.3
K12824	K07926//K07303/I07136	3	19.0	84.7	35.0	99.0	2.3	47.0	3.7
K11925	K99974/XANA	2	18.5	105.3	35.0	99.0	2.0	47.0	3.7
MEAN (3)			18.9	92.8	35.0	98.7	2.2	47.6	3.9
LSD (.05)			3.9	7.0	2.7	1.0	0.6	1.5	0.6
CV (%)			11.8	3.9	4.4	0.6	15.0	1.9	8.6

EXPERIMENT 3222 NATIONAL WHITE MOLD YIELD TRIAL

PLANTED: 6/19/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.	WM	WM
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE	(1-9)	%
S08418	S02754/S04503, ROSETTA	54	38.9	33.0	41.0	98.0	1.1	54.1	6.0	2.0	22.2
P07863	AN-37/P02630, ELDORADO	51	36.3	41.8	42.0	103.0	2.0	49.3	5.0	3.7	40.7
R12859	R08512/SR9-5	48	34.3	31.9	41.0	98.0	1.0	50.0	6.0	2.7	29.6
R12832	SR9-5/Merlot	47	34.2	32.2	40.0	98.0	1.5	50.8	3.7	2.7	29.6
B12724	B09184/B09135	20	32.7	19.6	42.0	98.0	1.1	51.1	4.7	5.0	55.6
B12720	B09175/Eclipse	19	31.6	23.1	42.0	99.0	1.0	53.0	4.7	4.3	48.1
N11258	N07009/MEDALIST	14	31.5	18.2	42.0	102.0	1.3	52.9	5.3	2.0	22.2
B11363	B04644/B07554	15	31.4	21.5	42.0	100.0	1.4	52.5	5.0	2.7	29.6
K11916	K04607/USWK-CBB-17	61	31.2	63.4	35.0	98.0	0.9	46.9	5.7	2.3	25.9
B12715	Zorro/N09056	37	30.7	18.8	42.0	99.0	1.1	48.1	4.0	4.7	51.9
B04554	B00103*/X00822, ZORRO	52	30.5	20.8	42.0	100.0	1.5	51.4	5.0	4.0	44.4
N11298	MEDALIST//B05054/B04588	13	30.4	20.0	42.0	102.0	1.4	53.7	4.7	2.0	22.2
I11264	COOP 03019, MERLIN	50	30.1	18.9	42.0	104.0	1.1	50.8	4.0	2.3	25.9
B12723	B09184/B09135	42	30.0	19.8	41.0	99.0	0.9	49.1	5.0	3.3	37.0
S12911	PK9-7/Rosetta	49	29.9	33.8	42.0	99.0	2.1	51.6	3.3	5.7	63.0
B11343	B07554//ZORRO/B05044	16	29.8	19.5	42.0	99.0	1.5	49.6	4.7	4.3	48.1
B12716	B09128/Eclipse	40	29.8	18.8	42.0	99.0	1.6	50.2	4.7	3.3	37.0
I08933	37-2, USPT-WM-12	12	29.7	35.0	40.0	97.0	2.5	48.1	4.3	4.0	44.4
G08254	G04514/Matterhorn, POWDERHOR	55	29.4	36.5	38.0	97.0	1.6	50.9	5.3	4.0	44.4
B12721	B09175/Eclipse	32	29.3	22.5	41.0	97.0	0.9	50.9	5.0	4.7	51.9
K11914	K04604/USWK-CBB-17	60	29.2	66.3	35.0	100.0	2.5	47.3	4.0	3.7	40.7
N12461	Eclipse/N09056	27	28.4	17.2	41.0	99.0	1.4	48.3	4.7	4.3	48.1
N12442	N09060/N09175	17	28.1	23.3	44.0	103.0	1.6	53.1	4.7	3.0	33.3
B10244	B04644/ZORRO	7	27.6	20.4	41.0	99.0	1.1	52.7	5.3	3.3	37.0
B12710	B07554//Jaguar/B07554	35	27.5	22.1	42.0	100.0	1.0	51.3	4.7	3.3	37.0
K08961	K04604/USDK-CBB-15, SNOWDON	59	27.0	72.6	35.0	96.0	1.5	47.8	6.0	1.7	18.5
I07116	T-39/Midnight, SHANIA	53	26.9	20.7	45.0	105.0	2.1	54.9	4.0	5.7	63.0
N12456	B09174/N09056	30	26.6	17.8	40.0	100.0	1.8	52.6	5.0	4.7	51.9
B12729	B09201/B09135	43	26.6	17.7	41.0	100.0	0.9	50.8	5.0	2.3	25.9
N12453	N09065/N09050	22	26.5	20.1	40.0	98.0	2.0	50.9	5.0	5.7	63.0
B12708	B07554//X08106/X08102	36	26.3	18.7	41.0	100.0	1.1	51.0	5.0	2.3	25.9
N12441	N09060/N09175	24	26.1	21.2	41.0	100.0	0.9	49.9	5.3	3.0	33.3
N12458	B09174/N09056	28	26.1	17.9	41.0	98.0	1.3	50.1	4.7	4.3	48.1
B12728	B09193/B09184	39	25.3	19.6	41.0	99.0	1.0	46.5	5.0	2.7	29.6
P12610	P08362/P08401	46	25.2	32.3	40.0	97.0	1.1	50.9	5.0	5.7	63.0
N11228	N05311//N07009/N05324	26	25.1	17.4	42.0	103.0	1.6	51.2	4.7	3.7	40.7
I13445	039-A-5	11	25.0	34.8	41.0	101.0	2.0	48.5	4.3	4.7	51.9
C11266	C07401//CBB-20/C05653	57	24.8	57.5	35.0	96.0	1.9	45.1	4.3	6.7	74.1
I13444	031-A-11	10	24.6	34.3	39.0	100.0	3.1	46.2	3.7	5.3	59.3
N11283	MEDALIST/N08003	8	23.6	17.5	41.0	101.0	1.4	52.6	5.0	4.0	44.4

EXPERIMENT 3222 NATIONAL WHITE MOLD YIELD TRIAL

PLANTED: 6/19/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.	WM	WM
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE	(1-9)	%
I81010	JAPON3/MAGDALENE, BUNSI	2	23.2	19.6	40.0	102.0	2.9	42.8	3.7	6.7	74.1
I13443	040-B-2	9	22.9	35.2	41.0	104.0	2.6	51.7	4.0	4.3	48.1
N12447	B09174/N09056	23	22.1	18.9	42.0	98.0	1.9	49.3	4.0	6.3	70.4
N12446	B07554//X08106/X08102	31	22.1	17.3	40.0	99.0	1.1	49.1	5.7	3.0	33.3
N12467	N08010/N08007	29	21.8	17.1	43.0	100.0	1.2	54.5	4.7	4.7	51.9
N12466	N08010/N08007	25	21.6	17.5	43.0	102.0	1.5	53.3	4.3	4.3	48.1
I12319	VRW 32	5	21.5	24.0	44.0	103.0	1.7	48.1	3.0	2.3	25.9
B12713	B07554//Jaguar/B07554	38	21.5	20.4	42.0	99.0	0.9	49.6	4.0	5.3	59.3
N12468	N08010//B04349/B05044	21	21.3	16.6	42.0	98.0	1.1	53.5	4.7	5.0	55.6
C11260	C07401//CBB-20/C05617	56	21.2	61.8	35.0	97.0	3.1	45.4	4.7	5.3	59.3
B12709	B07554//Jaguar/B07554	18	21.0	21.1	41.0	100.0	1.0	49.5	4.7	3.7	40.7
B12711	B07554//Jaguar/B07554	44	20.9	20.4	41.0	100.0	1.4	49.6	4.3	5.0	55.6
K11306	K06621/USDK-CBB-15	62	20.1	49.1	44.0	103.0	3.1	48.5	4.0	6.3	70.4
B12707	B07554//X08106/X08102	33	18.9	18.5	44.0	100.0	1.1	47.0	4.3	2.7	29.6
B12736	Eclipse/N09056	41	18.5	18.7	42.0	96.0	2.0	52.8	4.7	6.7	74.1
P12603	P07406/P08401	45	18.4	34.1	40.0	98.0	1.5	49.6	5.0	5.0	55.6
B12712	B07554//Jaguar/B07554	34	18.3	20.3	42.0	102.0	0.9	51.1	4.0	4.3	48.1
I89011	BERYL	3	17.7	31.1	39.0	97.0	4.5	29.5	1.0	9.0	100.0
C11273	C07403//CBB-20/C06812	58	17.5	49.5	37.0	99.0	2.0	45.9	4.0	5.0	55.6
K11714	K08601/K08233	64	17.0	57.2	45.0	106.0	2.6	50.2	3.7	5.7	63.0
K12225	K08222/CORNELL 603	63	14.8	47.5	37.0	98.0	2.1	46.2	4.7	2.3	25.9
I96417	G122	1	12.5	39.3	45.0	106.0	3.1	49.3	3.0	5.3	59.3
I06217	A195	4	9.2	65.0	50.0	111.0	1.9	49.4	2.0	3.7	40.7
I13442	ASR 1001	6	6.6	13.5	38.0	96.0	1.4	40.6	1.0	5.0	55.6
MEAN (64)			25.1	28.9	40.9	99.9	1.6	49.6	4.4	4.2	46.3
LSD (.05)			4.6	1.8	1.6	2.4	0.7	3.6	0.5	1.5	16.1
CV (%)			13.6	4.6	2.9	1.4	26.9	4.3	8.9	25.6	25.6

EXPERIMENT 3223 IRRIGATED DROUGHT YIELD TRIAL

PLANTED: 6/18/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.	WM	WM	BIOMASS	HARVEST
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE	(1-9)	(%)	(KG)	INDEX(%)
BC091	P07863, ELDORADO	3	38.4	38.9	42.0	103.0	3.0	50.0	2.5	5.7	63.0	5.9	31.5
BC089	Santa Fe	26	37.7	41.5	40.0	93.0	3.5	40.0	4.0	5.3	59.3	5.1	35.8
BC204	NE2-09-3	59	36.4	38.6	41.0	96.0	3.0	40.0	2.5	5.0	55.6	4.6	34.3
BC099	S08418, ROSETTA	54	35.8	34.8	42.0	96.0	1.0	55.0	5.0	3.3	37.0	5.7	30.5
BC080	Matterhorn	23	34.6	35.5	41.0	96.0	2.5	50.0	4.5	6.7	74.1	5.0	31.7
BC386	Buster	95	34.4	36.6	40.0	93.0	5.5	35.0	1.5	6.7	74.1	5.1	33.8
BC120	La Paz	34	34.3	31.5	42.0	98.0	2.0	50.5	5.0	6.0	66.7	5.8	27.2
BC216	I9365-31	61	32.4	24.8	44.0	105.0	4.0	40.0	2.0	3.3	37.0	6.2	26.4
BC053	F04-2801-4-1-2	15	32.0	23.1	42.0	96.0	3.5	47.5	4.0	4.0	44.4	5.4	31.2
BC387	Medicine Hat	96	31.7	41.9	40.0	93.0	2.5	50.0	4.5	6.3	70.4	5.0	27.7
BC329	CDC Crocus	91	31.5	41.8	37.0	90.0	7.0	27.5	1.0	7.3	81.5	4.9	30.1
BC302	ND-307	88	31.2	38.5	42.0	94.0	3.5	45.0	2.5	6.3	70.4	5.4	25.9
BC300	Lariat	86	31.1	39.8	41.0	98.0	4.0	50.0	2.0	6.0	66.7	6.9	22.6
BC357	Gemini	92	31.0	35.6	38.0	90.0	5.5	32.5	2.0	8.0	88.9	4.6	32.3
BC297	GN9-1	83	30.9	33.3	41.0	93.0	4.5	32.5	3.0	6.7	74.1	4.9	26.3
BC160	UI-537	44	29.6	36.8	40.0	93.0	7.0	27.5	1.0	8.0	88.9	4.4	31.5
BC037	IBC 301-204	11	29.0	24.5	40.0	90.0	4.5	30.0	1.5	6.3	70.4	4.3	29.3
BC085	Jaguar	24	29.0	21.0	42.0	96.0	2.5	60.0	5.0	5.7	63.0	5.2	26.6
BC093	Merlot	28	28.7	36.4	43.0	98.0	3.0	60.0	4.0	4.3	48.1	6.2	23.4
BC142	ROG 312	42	28.2	35.2	40.0	93.0	7.0	32.5	1.0	7.3	81.5	4.5	29.4
BC124	Shania	35	28.2	21.8	46.0	108.0	3.0	65.0	2.5	5.3	59.3	7.4	17.0
BC104	115M (Black Rhino)	30	28.0	22.5	44.0	100.0	3.0	40.0	1.5	3.7	40.7	7.3	21.4
BC161	Common Pinto	45	27.6	34.2	42.0	90.0	7.0	27.5	1.0	9.0	100.0	4.6	26.4
BC041	Aifi Wuriti	13	27.3	24.5	42.0	103.0	3.5	55.0	2.5	5.0	55.6	6.0	22.0
BC033	PR 0443-151	10	27.2	19.1	44.0	103.0	5.5	47.5	1.5	6.0	66.7	4.9	25.4
BC070	Sierra	20	27.2	31.7	44.0	101.0	6.5	35.0	1.0	5.3	59.3	6.8	17.8
BC375	Yolano	94	27.0	32.4	41.0	90.0	5.0	35.0	1.0	7.7	85.2	4.9	26.2
BC026	DOR 364	8	27.0	24.4	43.0	98.0	3.5	47.5	3.5	6.3	70.4	5.9	22.5
BC079	Kodiak	22	26.4	39.5	40.0	93.0	6.5	32.5	1.0	7.3	81.5	5.3	23.4
BC088	Zorro	25	26.0	20.7	42.0	99.0	1.0	60.0	5.5	5.3	59.3	5.6	20.9
BC239	USPT-CBB-5	69	26.0	36.7	41.0	90.0	6.0	30.0	1.0	6.7	74.1	4.7	26.6
BC131	Pink Floyd	37	25.9	36.6	41.0	90.0	7.0	30.0	1.0	7.0	77.8	4.0	29.8
BC133	Medalist	38	25.9	19.5	43.0	100.0	2.5	60.0	5.5	4.0	44.4	4.5	19.4
BC024	Croissant	7	25.9	36.6	43.0	96.0	3.0	47.5	4.0	6.0	66.7	4.3	29.1
BC301	Stampede	87	25.8	35.7	41.0	94.0	1.0	60.0	5.0	6.3	70.4	4.5	24.7

EXPERIMENT 3223 IRRIGATED DROUGHT YIELD TRIAL

PLANTED: 6/18/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.	WM	WM	BIOMASS	HARVEST
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE	(1-9)	(%)	(KG)	INDEX(%)
BC110	Topaz	32	25.7	36.5	39.0	90.0	6.5	32.5	1.0	6.3	70.4	5.0	26.5
BC007	BelNeb-RR-1	1	25.6	34.9	40.0	90.0	7.0	25.0	1.0	8.7	96.3	4.0	26.6
BC094	Sedona	29	24.8	37.6	45.0	96.0	3.0	50.5	4.0	5.0	55.6	5.9	20.4
BC236	USPT-CBB-1	68	24.8	35.8	42.0	90.0	3.0	45.0	2.5	6.0	66.7	5.6	20.7
BC296	GN9-4	82	24.5	35.3	41.0	98.0	2.0	50.0	4.5	5.0	55.6	5.0	23.8
BC066	C-20	18	24.4	20.4	44.0	115.0	4.0	50.0	2.0	5.3	59.3	7.2	16.2
BC062	Domino	17	24.4	20.6	44.0	108.0	4.0	50.0	1.5	4.0	44.4	6.4	18.3
BC290	BAT 477	80	24.2	25.3	42.0	95.0	7.0	27.5	1.0	4.7	51.9	6.1	18.9
BC048	F07-449-9-3	14	24.2	29.0	45.0	105.0	3.5	47.5	2.0	4.7	51.9	6.0	21.6
BC028	PR 0340-3-3-1	79	24.1	26.5	41.0	96.0	2.0	55.0	4.0	5.3	59.3	5.9	20.7
BC192	Weihing	55	24.0	38.7	41.0	96.0	4.0	45.0	2.5	6.0	66.7	5.0	22.7
BC234	PT7-2	67	24.0	37.2	42.0	93.0	2.5	55.0	3.5	6.7	74.1	5.2	23.0
BC232	NW-590	66	24.0	32.6	45.0	95.0	7.0	22.5	1.0	7.3	81.5	5.1	22.7
BC075	Raven	21	23.9	20.0	43.0	98.0	1.5	55.0	5.5	5.0	55.6	5.1	22.4
BC068	Mayflower	19	22.9	21.4	43.0	98.0	1.0	65.0	5.5	4.0	44.4	6.3	17.7
BC243	USRM-20	71	22.9	42.4	42.0	93.0	5.0	40.0	1.5	4.7	51.9	4.4	25.3
BC109	Poncho	31	22.6	36.7	42.0	90.0	7.0	27.5	1.0	8.7	96.3	4.7	22.7
BC111	Buckskin	33	22.5	37.3	39.0	90.0	7.0	22.5	1.0	7.0	77.8	4.4	26.9
BC174	US-1140	50	22.1	33.1	41.0	90.0	7.0	25.0	1.0	8.7	96.3	5.0	20.0
BC286	A285	78	22.1	22.2	43.0	103.0	4.0	45.0	2.0	5.0	55.6	5.5	19.2
BC298	PT9-17	84	22.1	38.7	41.0	93.0	7.0	32.5	1.0	7.0	77.8	4.8	20.6
BC145	Midnight	43	21.8	20.9	43.0	95.0	1.5	52.5	4.0	4.0	44.4	5.7	19.6
BC164	Kimberly	47	21.7	34.3	41.0	90.0	7.0	30.0	1.0	7.7	85.2	5.0	22.2
I11207	SER48 (CIAT)	48	21.7	34.9	40.0	93.0	5.0	37.5	3.0	4.3	48.1	4.7	21.5
BC134	Navigator	39	21.3	19.0	43.0	98.0	2.0	60.0	5.5	5.3	59.3	5.7	14.7
BC231	Othello	65	21.2	39.0	38.0	90.0	7.0	30.0	1.0	7.3	81.5	4.7	22.8
BC307	Eclipse	90	21.2	20.7	43.0	96.0	4.0	47.5	4.0	7.0	77.8	5.2	20.8
BC306	Avalanche	89	21.1	21.8	43.0	96.0	4.0	55.0	4.5	5.3	59.3	5.5	19.8
BC178	UI-114	52	21.1	34.0	43.0	90.0	7.0	30.0	1.0	8.7	96.3	4.4	21.0
I08959	SER16 (CIAT)	6	20.8	26.8	39.0	93.0	6.5	27.5	1.0	6.7	74.1	4.1	22.9
BC291	SEA 10	81	20.8	34.6	41.0	90.0	7.0	32.5	1.0	6.7	74.1	4.3	25.2
BC196	Chase	58	20.7	32.5	43.0	90.0	7.0	20.0	1.0	8.7	96.3	3.8	23.7
BC038	CENTA Pupil	12	20.4	23.6	42.0	96.0	2.5	47.5	4.0	6.0	66.7	4.9	19.7
BC162	Common Red Mexican	46	20.1	31.7	42.0	95.0	6.0	32.5	1.0	8.0	88.9	4.9	17.0
BC092	T-39	27	20.1	21.5	43.0	93.0	4.5	45.0	2.0	6.0	66.7	5.6	16.5

EXPERIMENT 3223 IRRIGATED DROUGHT YIELD TRIAL

PLANTED: 6/18/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.	WM	WM	BIOMASS	HARVEST
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE	(1-9)	(%)	(KG)	INDEX(%)
BC022	Shiny Crow	5	19.9	23.0	42.0	103.0	6.5	32.5	1.0	5.7	63.0	4.9	19.9
BC299	Maverick	85	19.7	35.8	40.0	90.0	6.5	30.0	1.0	7.7	85.2	5.2	19.1
BC228	Nodak	64	19.7	35.1	41.0	90.0	7.0	25.0	1.0	8.3	92.6	5.2	18.9
BC194	Coyne	56	19.6	35.8	41.0	96.0	4.5	40.0	3.0	7.3	81.5	4.5	19.8
BC267	Victor	73	19.4	36.9	43.0	103.0	7.0	27.5	1.0	8.0	88.9	5.4	14.3
BC279	Roza	75	19.2	32.7	47.0	103.0	7.0	27.5	1.0	8.0	88.9	4.9	16.6
BC016	Bill Z	2	18.8	36.8	41.0	90.0	7.0	25.0	1.0	7.3	81.5	4.7	19.1
BC176	UI-59	51	17.9	33.9	40.0	90.0	7.0	20.0	1.0	8.3	92.6	4.1	20.5
BC138	Marquis	41	17.7	34.3	42.0	90.0	6.5	27.5	1.0	7.7	85.2	5.2	15.5
BC179	UI-425	53	17.7	36.0	41.0	93.0	7.0	22.5	1.0	8.3	92.6	5.9	14.4
BC358	Orion	93	17.3	33.8	41.0	93.0	5.9	40.0	1.5	7.0	77.8	5.3	16.4
BC020	Montrose	4	16.5	33.8	42.0	90.0	7.0	15.0	1.0	8.7	96.3	3.4	24.6
BC031	Verano	9	16.3	23.4	44.0	105.0	4.5	40.0	2.0	4.3	48.1	5.6	18.9
BC127	Schooner	36	15.4	19.4	40.0	101.0	6.5	30.0	1.5	5.0	55.6	6.1	13.3
BC137	Beryl R	40	15.0	30.9	38.0	90.0	6.5	32.5	1.0	5.7	63.0	4.3	17.9
BC170	UI-239	49	14.7	33.3	40.0	90.0	7.0	25.0	1.0	7.7	85.2	4.9	16.1
BC278	Viva	74	14.2	28.6	46.0	103.0	7.0	32.5	1.0	8.7	96.3	6.4	10.2
BC280	Harold	76	13.5	33.1	47.0	110.0	7.0	32.5	1.0	9.0	100.0	5.6	11.0
BC222	Quincy	62	13.4	39.0	41.0	90.0	7.0	30.0	1.0	8.0	88.9	4.4	15.4
BC281	Gloria	77	12.8	31.3	42.0	90.0	7.0	27.5	1.0	9.0	100.0	4.4	14.9
BC215	A-55	60	12.2	26.3	43.0	113.0	1.0	72.5	4.0	2.3	25.9	4.0	24.5
BC195	ABCP-8	57	12.0	29.8	45.0	93.0	7.0	20.0	1.0	9.0	100.0	4.2	12.6
BC272	Indeterminate Jamaica Red	72	11.5	42.1	45.0	90.0	4.0	35.0	2.0	5.7	63.0	3.6	13.1
BC242	NW-63	70	11.0	33.0	43.0	90.0	7.0	25.0	1.0	7.0	77.8	5.0	12.4
BC056	Seafarer	16	10.7	20.4	42.0	96.0	4.0	45.0	4.0	6.3	70.4	5.4	5.2
BC224	TARS-VCI-4B	63	4.7	21.9	50.0	108.0	7.0	30.0	1.0	8.0	88.9	6.7	5.6
MEAN (96)			23.4	31.3	42.0	95.6	4.9	39.1	2.3	6.4	71.1	5.2	21.8
LSD (.05)			5.5	2.6	1.8	3.1	1.2	8.5	1.1	1.3	14.9	1.2	5.5
CV (%)			17.5	6.2	3.2	1.9	14.9	13.1	30.5	15.5	15.5	17.1	18.7

EXPERIMENT 3224 NON-IRRIGATED DROUGHT YIELD TRIAL

PLANTED: 6/18/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.	BIOMASS	HARVEST
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE	(KG)	INDEX(%)
BC094	Sedona	29	36.2	37.5	43.0	100.0	1.0	62.5	6.0	5.0	37.7
BC279	Roza	75	35.6	35.4	46.0	120.0	7.0	32.5	1.0	8.3	15.1
BC093	Merlot	28	35.5	35.6	41.0	103.0	1.0	52.5	4.5	5.7	26.7
BC298	PT9-17	84	35.0	44.1	39.0	105.0	3.5	47.5	2.5	6.3	28.3
BC070	Sierra	20	34.5	38.9	43.0	105.0	3.5	50.0	2.5	6.3	26.3
BC024	Croissant	7	33.9	38.2	42.0	98.0	2.5	50.0	4.5	4.8	34.7
BC109	Poncho	31	33.8	41.7	38.0	103.0	6.0	32.5	1.5	3.8	35.7
BC016	Bill Z	2	33.2	38.3	40.0	105.0	7.0	27.5	1.0	5.1	29.4
BC297	GN9-1	83	33.0	36.8	40.0	105.0	4.0	35.0	2.0	5.2	29.7
BC357	Gemini	92	32.7	33.3	37.0	103.0	6.0	27.5	1.0	4.2	38.6
BC026	DOR 364	8	32.5	23.2	44.0	110.0	2.0	47.5	3.0	5.3	32.8
BC300	Lariat	86	32.4	40.3	39.0	98.0	2.0	45.0	3.5	6.0	30.0
BC232	NW-590	66	32.3	34.9	40.0	110.0	6.0	30.0	1.0	5.5	22.0
BC142	ROG 312	42	32.3	33.2	37.0	103.0	7.0	25.0	1.0	4.0	36.0
BC162	Common Red Mexican	46	32.0	35.6	40.0	115.0	7.0	30.0	1.0	6.6	23.0
BC170	UI-239	49	31.3	34.1	39.0	115.0	7.0	27.5	1.0	5.2	27.6
BC091	P07863, ELDORADO	3	31.2	39.5	41.0	110.0	1.5	52.5	2.5	6.1	22.3
BC231	Othello	65	31.0	37.3	37.0	108.0	4.0	37.5	1.5	4.2	34.6
BC242	NW-63	70	30.8	34.2	41.0	120.0	6.5	32.5	1.0	7.0	22.9
BC120	La Paz	34	30.7	41.6	41.0	108.0	1.0	60.0	4.5	5.9	28.2
BC066	C-20	18	30.6	22.1	44.0	113.0	1.5	50.0	4.0	6.8	23.2
BC286	A285	78	30.1	23.3	44.0	95.0	2.5	42.5	3.5	3.8	41.1
BC195	ABCP-8	57	30.0	30.7	46.0	105.0	5.0	32.5	1.0	4.5	27.8
BC278	Viva	74	30.0	28.4	43.0	115.0	7.0	22.5	1.0	6.9	21.9
BC133	Medalist	38	29.7	22.4	42.0	120.0	1.0	47.5	2.5	4.6	30.1
BC088	Zorro	25	29.7	22.6	41.0	105.0	1.0	50.0	3.5	4.5	30.7
BC243	USRM-20	71	29.4	49.8	39.0	95.0	5.0	35.0	2.5	4.2	31.3
BC007	BelNeb-RR-1	1	29.0	33.3	38.0	98.0	7.0	22.5	1.0	3.0	41.6
BC236	USPT-CBB-1	68	29.0	36.4	43.0	108.0	2.0	40.0	3.0	5.7	21.8
BC138	Marquis	41	28.7	33.3	38.0	110.0	5.0	32.5	1.0	5.0	29.3
BC137	Beryl R	40	28.6	27.3	37.0	100.0	7.0	30.0	2.0	3.6	35.5
BC375	Yolano	94	28.5	30.5	37.0	113.0	2.5	37.5	1.0	4.0	31.7
BC164	Kimberly	47	28.5	37.8	41.0	100.0	4.5	32.5	1.0	4.7	29.0
BC161	Common Pinto	45	28.4	33.7	39.0	105.0	7.0	25.0	1.0	4.9	26.7
BC228	Nodak	64	28.4	33.0	38.0	100.0	7.0	22.5	1.0	4.0	39.3

EXPERIMENT 3224 NON-IRRIGATED DROUGHT YIELD TRIAL

PLANTED: 6/18/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.	BIOMASS	HARVEST
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE	(KG)	INDEX(%)
BC234	PT7-2	67	28.3	40.9	40.0	110.0	1.0	52.5	3.0	5.0	23.7
BC272	Indeterminate Jamaica Red	72	28.3	44.9	43.0	115.0	4.0	42.5	2.5	4.4	30.5
BC299	Maverick	85	28.1	38.0	38.0	100.0	4.0	35.0	3.0	3.9	31.2
I08959	SER16 (CIAT)	6	28.1	25.8	38.0	100.0	3.0	40.0	3.5	3.1	45.1
BC280	Harold	76	28.0	32.1	44.0	118.0	7.0	35.0	1.0	6.6	17.0
BC160	UI-537	44	28.0	34.3	37.0	103.0	6.0	25.0	1.0	3.9	37.0
BC038	CENTA Pupil	12	27.9	21.9	43.0	105.0	1.0	47.5	3.5	5.1	31.1
BC037	IBC 301-204	11	27.6	25.4	40.0	93.0	1.0	32.5	4.0	3.4	37.1
BC281	Gloria	77	27.6	34.0	44.0	120.0	7.0	32.5	1.0	6.0	17.9
BC048	F07-449-9-3	14	27.4	29.3	43.0	103.0	1.0	37.5	3.5	4.2	29.1
BC099	S08418, ROSETTA	54	27.3	36.0	41.0	98.0	1.0	45.0	4.5	3.9	37.7
BC267	Victor	73	27.3	32.1	43.0	118.0	7.0	22.5	1.0	7.1	15.5
BC216	I9365-31	61	27.2	24.7	45.0	110.0	4.0	35.0	1.5	5.1	25.8
BC131	Pink Floyd	37	27.2	32.3	39.0	110.0	5.5	25.0	1.0	3.5	36.2
BC104	115M (Black Rhino)	30	27.1	22.0	43.0	113.0	2.0	35.0	1.0	5.1	25.0
BC239	USPT-CBB-5	69	27.1	35.2	37.0	105.0	5.0	30.0	1.0	3.2	34.0
BC062	Domino	17	27.1	19.6	45.0	100.0	1.0	50.0	4.5	4.7	30.0
BC386	Buster	95	27.1	39.0	38.0	100.0	3.5	35.0	2.0	3.1	40.6
BC068	Mayflower	19	26.7	20.9	41.0	110.0	1.0	55.0	4.0	6.1	24.6
BC194	Coyne	56	26.6	39.2	39.0	105.0	3.0	45.0	3.0	4.8	27.3
BC053	F04-2801-4-1-2	15	26.5	22.6	41.0	95.0	1.0	35.0	3.0	3.5	33.5
BC174	US-1140	50	26.5	27.2	37.0	105.0	7.0	25.0	1.0	3.6	36.6
BC079	Kodiak	22	26.3	43.2	40.0	105.0	4.0	35.0	3.0	3.8	38.0
BC301	Stampede	87	26.3	39.1	39.0	103.0	1.0	35.0	4.0	4.8	27.2
BC196	Chase	58	26.1	35.9	42.0	100.0	7.0	27.5	1.0	3.4	39.4
BC179	UI-425	53	26.1	37.6	39.0	113.0	7.0	25.0	1.0	6.2	20.6
BC028	PR 0340-3-3-1	79	25.8	24.7	44.0	113.0	1.0	35.0	1.5	4.5	24.3
BC387	Medicine Hat	96	25.7	39.2	37.0	98.0	1.0	40.0	2.5	3.5	34.6
BC302	ND-307	88	25.4	42.2	40.0	103.0	1.5	47.5	4.5	3.9	38.0
BC124	Shania	35	25.1	20.9	46.0	105.0	1.0	45.0	3.5	4.8	25.6
BC020	Montrose	4	24.8	32.1	41.0	90.0	1.0	14.1	1.0	2.9	40.7
BC041	Aifi Wuriti	13	24.7	24.4	42.0	105.0	1.5	50.0	3.0	5.5	21.5
BC085	Jaguar	24	24.6	26.8	44.0	105.0	1.0	35.0	2.0	3.5	33.3
BC291	SEA 10	81	24.5	33.9	39.0	100.0	6.0	30.0	1.5	3.7	30.4
BC134	Navigator	39	24.4	19.8	40.0	100.0	1.0	45.0	4.5	4.4	27.6

EXPERIMENT 3224 NON-IRRIGATED DROUGHT YIELD TRIAL

PLANTED: 6/18/13

NAME	PEDIGREE	ENTRY	YIELD CWT	100 SEED	DAYS TO	DAYS TO	LODGING	HEIGHT	DES.	BIOMASS	HARVEST
			/ACRE	WT. (g)	FLOWER	MATURITY	(1-5)	(cm)	SCORE	(KG)	INDEX(%)
BC329	CDC Crocus	91	24.2	38.5	35.0	98.0	7.0	22.5	1.0	2.5	48.7
BC080	Matterhorn	23	24.2	36.3	38.0	115.0	1.0	47.5	1.0	4.7	21.1
BC056	Seafarer	16	24.1	26.6	42.0	115.0	3.0	37.5	2.5	4.6	28.1
BC022	Shiny Crow	5	23.8	24.2	40.0	100.0	4.0	30.0	1.0	3.8	30.2
BC033	PR 0443-151	10	23.7	20.6	46.0	108.0	1.0	32.5	1.5	3.9	26.4
BC358	Orion	93	23.7	36.8	40.0	108.0	1.0	50.0	1.5	6.7	16.3
BC222	Quincy	62	23.2	33.8	39.0	110.0	7.0	27.5	1.0	5.0	24.3
BC092	T-39	27	23.1	20.5	42.0	95.0	1.5	37.5	3.5	3.7	29.1
BC176	UI-59	51	23.0	32.0	39.0	103.0	7.0	27.5	1.0	3.7	32.0
BC307	Eclipse	90	22.8	21.3	42.0	100.0	1.0	35.0	3.5	3.1	41.0
BC145	Midnight	43	22.0	22.5	44.0	115.0	1.0	44.1	1.0	6.3	25.0
BC192	Weihing	55	21.9	41.8	40.0	110.0	1.5	45.0	2.0	3.9	23.9
BC089	Santa Fe	26	21.8	43.3	40.0	105.0	2.0	37.5	2.5	4.7	22.7
I11207	SER48 (CIAT)	48	21.8	30.0	40.0	110.0	2.5	37.5	2.5	3.4	33.5
BC290	BAT 477	80	21.7	23.6	42.0	105.0	5.0	32.5	2.0	4.4	23.5
BC075	Raven	21	21.7	21.1	43.0	103.0	1.0	37.5	2.5	4.2	22.5
BC178	UI-114	52	21.3	32.7	40.0	113.0	7.0	30.0	1.0	4.3	31.1
BC110	Topaz	32	21.1	33.4	37.0	98.0	5.5	40.0	2.0	2.7	42.0
BC111	Buckskin	33	21.0	37.3	36.0	110.0	7.0	27.5	1.0	4.5	26.3
BC204	NE2-09-3	59	21.0	41.9	39.0	103.0	2.5	40.0	2.5	4.1	25.3
BC127	Schooner	36	20.4	19.8	40.0	110.0	4.5	37.5	1.5	4.8	19.9
BC306	Avalanche	89	19.3	23.3	43.0	100.0	1.0	37.5	3.5	3.6	24.4
BC215	A-55	60	18.7	25.2	47.0	115.0	1.0	54.1	2.0	6.8	16.2
BC031	Verano	9	18.1	21.9	43.0	108.0	1.0	35.0	2.0	3.6	20.1
BC224	TARS-VCI-4B	63	18.1	24.8	48.0	120.0	7.0	37.5	1.0	8.6	12.1
BC296	GN9-4	82	17.6	36.9	39.0	113.0	1.5	50.0	2.5	6.6	12.5
MEAN (96)			27.0	31.9	40.8	106.0	3.6	37.3	2.2	4.7	29.0
LSD (.05)			6.1	3.6	1.7	6.1	0.8	10.6	1.5	1.3	8.1
CV (%)			16.8	8.2	3.1	3.5	13.4	17.1	41.4	19.6	20.7

EXPERIMENT 3425 BNF YIELD TRIAL

PLANTED: 6/4/13

NAME	PEDIGREE	ENTRY	YIELD CWT 100 SEED		DAYS TO FLOWER	DAYS TO MATURITY	LODGING HEIGHT (1-5)	HEIGHT (cm)	DES. SCORE	BIOMASS (KG)	HARVEST INDEX(%)	STAND (PLANTS/M)	SPAD
			/ACRE	WT. (g)									
B11524	I82054/B07554	23	39.4	25.3	45.0	103.0	3.5	40.0	3.5	7.0	28.4	10.3	42.8
B11521	I82054/B07554	20	38.2	24.4	47.0	97.0	3.5	40.0	5.0	6.3	25.0	9.0	48.7
B11567	I82054/B07554	65	37.2	27.5	46.0	92.0	3.0	35.0	4.5	4.3	39.9	10.8	43.6
B11551	I82054/B07554	49	36.3	33.3	45.0	94.0	3.0	35.0	4.5	6.0	31.2	12.0	45.7
B11508	I82054/B07554	7	36.0	31.6	44.0	97.0	3.5	40.0	3.5	6.4	26.4	13.0	49.3
B11624	I82054/B07554	120	35.9	27.7	47.0	99.0	3.0	40.0	4.0	5.0	42.1	11.8	40.8
B11552	I82054/B07554	50	35.3	26.2	44.0	94.0	3.0	40.0	5.0	5.5	28.9	12.3	46.8
B11536	I82054/B07554	35	35.2	27.5	42.0	93.0	3.0	50.0	4.5	4.6	38.7	8.5	49.6
B11573	I82054/B07554	71	34.7	26.5	42.0	98.0	3.0	35.0	3.5	5.4	28.5	11.8	43.0
B11623	I82054/B07554	119	34.7	24.3	47.0	95.0	3.0	40.0	4.0	6.1	24.7	8.3	44.9
B11519	I82054/B07554	18	34.3	25.9	45.0	93.0	2.0	40.0	5.0	5.6	33.7	9.5	47.0
B11555	I82054/B07554	53	34.1	30.4	43.0	98.0	2.0	55.0	4.0	5.6	28.5	12.3	47.7
B11562	I82054/B07554	60	34.1	25.6	45.0	98.0	3.5	35.0	3.5	6.1	24.6	11.8	50.0
B11569	I82054/B07554	67	34.0	26.7	42.0	97.0	3.0	35.0	3.5	5.4	27.2	11.3	43.7
B11580	I82054/B07554	78	33.9	27.0	47.0	98.0	3.5	30.0	4.0	6.0	27.1	11.8	50.6
B11553	I82054/B07554	51	33.7	28.4	45.0	97.0	3.5	45.0	4.5	6.3	24.0	11.5	47.0
B11537	I82054/B07554	36	33.3	31.0	45.0	99.0	3.5	40.0	3.0	6.5	27.4	9.5	41.1
B11581	I82054/B07554	79	33.3	26.5	46.0	99.0	3.5	30.0	3.5	4.7	29.8	11.3	45.5
B11548	I82054/B07554	46	33.3	26.6	45.0	95.0	2.5	40.0	4.5	5.5	30.6	9.5	45.0
B11515	I82054/B07554	14	33.2	27.2	42.0	94.0	3.5	30.0	3.5	4.0	36.9	13.0	49.3
B11602	I82054/B07554	99	33.2	31.5	44.0	97.0	3.0	45.0	4.5	4.3	40.7	12.3	46.9
B11605	I82054/B07554	102	33.2	24.1	47.0	97.0	3.0	45.0	4.0	6.4	21.1	10.8	45.8
B11572	I82054/B07554	70	32.9	26.5	48.0	95.0	3.5	25.0	3.5	6.3	24.5	10.8	47.5
B11547	I82054/B07554	45	32.6	29.7	42.0	92.0	3.5	30.0	4.0	4.2	36.0	11.8	48.2
B11593	I82054/B07554	91	32.5	26.8	44.0	95.0	2.0	50.0	4.5	4.7	31.6	8.8	44.9
B11541	I82054/B07554	39	32.5	29.6	45.0	101.0	3.5	50.0	3.0	7.5	21.0	8.3	44.7
B11530	I82054/B07554	29	32.4	27.6	43.0	97.0	3.0	40.0	3.0	5.0	31.5	10.5	43.0
B11586	I82054/B07554	84	32.3	27.6	45.0	93.0	2.0	50.0	5.5	5.1	35.2	10.3	49.1
B11571	I82054/B07554	69	32.1	26.2	46.0	95.0	1.0	60.0	6.0	4.9	31.0	13.0	45.4
B11542	I82054/B07554	40	31.8	30.4	44.0	96.0	3.0	40.0	3.5	5.8	29.6	11.0	41.5
I09129	PR0443-151	126	31.8	26.6	44.0	93.0	2.5	35.0	4.5	5.1	30.8	11.5	44.7
B11611	I82054/B07554	108	30.9	29.3	45.0	96.0	2.5	50.0	4.5	4.9	34.3	11.8	43.4
B11582	I82054/B07554	80	30.9	23.3	42.0	95.0	1.5	45.0	5.5	4.1	35.5	13.5	38.7
B11512	I82054/B07554	11	30.8	28.1	43.0	96.0	2.5	40.0	4.5	5.4	30.5	11.8	40.3
B11526	I82054/B07554	25	30.7	27.9	43.0	94.0	2.5	45.0	4.0	4.8	30.2	13.5	48.7

EXPERIMENT 3425 BNF YIELD TRIAL

PLANTED: 6/4/13

NAME	PEDIGREE	ENTRY	YIELD CWT 100 SEED		DAYS TO FLOWER	DAYS TO MATURITY	LODGING HEIGHT (1-5)	HEIGHT (cm)	DES. SCORE	BIOMASS (KG)	HARVEST INDEX(%)	STAND (PLANTS/M)	SPAD
			/ACRE	WT. (g)									
B11532	I82054/B07554	31	30.6	28.4	42.0	97.0	3.0	40.0	4.0	6.3	22.6	10.5	43.7
B11503	I82054/B07554	3	30.6	25.3	44.0	96.0	2.5	50.0	4.5	6.3	24.2	9.0	44.0
B11617	I82054/B07554	114	30.5	25.5	43.0	90.0	1.0	40.0	6.0	3.9	44.0	12.0	44.1
B11596	I82054/B07554	94	30.3	25.6	44.0	96.0	1.0	50.0	5.0	5.4	28.6	7.8	43.6
B11516	I82054/B07554	15	30.1	28.6	43.0	93.0	3.0	40.0	4.5	5.0	26.9	12.0	39.5
B11588	I82054/B07554	86	30.1	30.7	43.0	97.0	2.0	50.0	4.5	5.5	29.2	10.0	50.6
B11575	I82054/B07554	73	30.1	28.3	45.0	97.0	2.5	50.0	4.0	5.2	30.9	10.3	44.9
B11612	I82054/B07554	109	30.0	28.3	46.0	98.0	1.5	55.0	5.0	5.9	28.7	11.0	47.8
B11620	I82054/B07554	116	29.9	25.2	43.0	91.0	3.0	30.0	4.5	4.2	43.0	10.5	46.9
B11511	I82054/B07554	10	29.9	27.3	44.0	94.0	2.5	45.0	4.0	5.2	29.1	11.3	46.1
B11533	I82054/B07554	32	29.9	26.9	44.0	93.0	2.5	35.0	4.5	4.2	31.4	10.5	44.2
B11594	I82054/B07554	92	29.8	27.6	43.0	93.0	3.0	40.0	3.5	4.7	27.8	9.5	44.4
B11527	I82054/B07554	26	29.6	30.1	44.0	96.0	3.0	40.0	3.0	5.3	30.6	9.0	44.8
B11590	I82054/B07554	88	29.5	24.0	44.0	96.0	1.0	55.0	5.0	4.2	38.1	12.0	42.2
B11559	I82054/B07554	57	29.5	28.4	46.0	96.0	1.5	50.0	4.5	6.3	25.0	9.5	49.8
B11570	I82054/B07554	68	29.4	28.2	45.0	97.0	1.0	50.0	3.5	5.0	29.3	11.8	42.4
B11603	I82054/B07554	100	29.4	28.3	44.0	98.0	3.0	40.0	4.0	5.4	27.4	10.3	47.3
B11619	I82054/B07554	115	29.3	27.0	43.0	97.0	3.0	45.0	4.0	4.7	31.7	8.5	46.6
B11544	I82054/B07554	42	29.3	29.0	42.0	96.0	2.0	40.0	4.0	4.7	33.0	9.8	43.3
B04554	B00103*X00822, ZORRC	124	29.2	27.3	42.0	94.0	1.5	40.0	4.5	4.0	32.5	13.3	43.5
B11510	I82054/B07554	9	29.1	29.1	44.0	96.0	3.0	40.0	4.0	6.0	25.4	8.3	45.4
B11574	I82054/B07554	72	29.1	27.8	44.0	97.0	3.5	35.0	2.5	7.1	22.6	9.5	46.3
B11549	I82054/B07554	47	29.1	28.6	43.0	97.0	1.0	50.0	2.0	6.2	22.5	11.3	47.9
B11616	I82054/B07554	113	29.1	26.8	45.0	97.0	1.0	50.0	6.0	4.7	34.3	14.3	43.4
B11615	I82054/B07554	112	29.0	26.5	43.0	94.0	3.0	45.0	3.5	5.1	34.2	11.5	49.0
B11566	I82054/B07554	64	29.0	24.4	45.0	95.0	3.0	50.0	4.0	4.7	27.1	10.5	44.5
I82054	PUEBLA 152 MX	123	29.0	33.1	45.0	101.0	4.0	35.0	3.0	6.4	24.3	9.3	48.9
B11564	I82054/B07554	62	28.8	29.3	44.0	98.0	2.5	55.0	3.5	5.6	30.2	10.3	45.3
B11608	I82054/B07554	105	28.8	29.2	43.0	98.0	3.5	40.0	3.0	5.9	24.1	13.0	43.9
B11609	I82054/B07554	106	28.7	26.9	45.0	96.0	2.5	50.0	4.5	6.8	21.1	5.8	42.2
B11622	I82054/B07554	118	28.6	28.2	44.0	92.0	2.0	50.0	5.0	5.3	28.4	9.8	47.0
B11531	I82054/B07554	30	28.5	28.2	43.0	97.0	3.0	50.0	4.0	5.8	29.6	9.3	45.6
B11539	I82054/B07554	37	28.5	26.8	42.0	94.0	1.5	45.0	4.5	3.6	39.8	9.3	49.6
B11529	I82054/B07554	28	28.4	29.6	45.0	95.0	2.5	32.5	3.5	4.6	29.5	8.3	45.7
B11507	I82054/B07554	6	28.2	31.5	44.0	98.0	3.0	35.0	3.0	5.7	27.1	11.8	45.4

EXPERIMENT 3425 BNF YIELD TRIAL

PLANTED: 6/4/13

NAME	PEDIGREE	ENTRY	YIELD CWT 100 SEED		DAYS TO FLOWER	DAYS TO MATURITY	LODGING HEIGHT (1-5)	HEIGHT (cm)	DES. SCORE	BIOMASS (KG)	HARVEST INDEX(%)	STAND (PLANTS/M)	SPAD
			/ACRE	WT. (g)									
B11568	I82054/B07554	66	28.2	27.5	44.0	98.0	3.0	45.0	3.5	5.9	22.8	8.8	39.5
B11558	I82054/B07554	56	28.1	30.1	43.0	96.0	3.0	40.0	3.0	6.1	20.7	10.5	43.6
B11599	I82054/B07554	96	28.0	27.1	44.0	95.0	3.0	50.0	4.5	4.7	30.9	7.0	42.4
B11576	I82054/B07554	74	27.9	29.7	44.0	95.0	3.0	40.0	4.0	4.6	31.3	10.8	49.5
B11584	I82054/B07554	82	27.6	23.8	43.0	95.0	1.5	45.0	4.5	5.3	25.2	12.0	45.9
B11561	I82054/B07554	59	27.6	25.3	44.0	98.0	2.0	40.0	4.0	6.5	26.3	9.3	44.9
B11585	I82054/B07554	83	27.4	23.2	45.0	96.0	2.0	45.0	4.0	3.6	37.6	11.8	43.7
I11271	10IS-2423	129	27.3	30.5	42.0	91.0	2.5	40.0	3.5	4.1	37.1	11.0	41.8
B11610	I82054/B07554	107	27.2	32.7	43.0	99.0	2.5	50.0	4.0	6.1	24.5	10.8	43.5
B11505	I82054/B07554	5	27.2	26.8	44.0	95.0	2.0	40.0	4.5	4.0	35.2	10.8	49.2
B11563	I82054/B07554	61	27.2	28.0	45.0	99.0	2.0	50.0	3.5	5.0	23.3	8.5	46.5
B11606	I82054/B07554	103	27.2	29.3	42.0	96.0	2.5	45.0	4.5	5.0	29.6	12.3	49.6
B11546	I82054/B07554	44	27.1	24.6	45.0	98.0	2.5	50.0	3.5	7.1	17.2	8.3	42.5
B11589	I82054/B07554	87	27.1	28.2	43.0	97.0	1.0	50.0	3.5	5.4	25.0	11.8	47.7
B11621	I82054/B07554	117	27.1	26.7	43.0	98.0	2.5	45.0	3.5	5.0	25.7	13.3	38.8
B11520	I82054/B07554	19	27.1	26.2	42.0	92.0	3.5	35.0	3.0	5.7	26.1	11.0	39.2
B11556	I82054/B07554	54	27.0	26.9	42.0	98.0	1.5	50.0	4.0	5.5	24.9	12.0	45.4
B11514	I82054/B07554	13	27.0	25.8	43.0	96.0	3.0	40.0	3.5	5.0	24.0	8.8	42.6
B11587	I82054/B07554	85	27.0	29.7	42.0	97.0	1.0	45.0	4.0	4.8	30.7	13.8	49.8
B11504	I82054/B07554	4	27.0	26.2	43.0	99.0	3.0	40.0	3.0	6.6	21.0	10.3	39.7
B11565	I82054/B07554	63	26.9	29.4	42.0	92.0	2.5	55.0	5.0	5.2	27.7	10.8	44.4
B11502	I82054/B07554	2	26.8	30.9	43.0	97.0	3.0	45.0	3.5	5.2	25.5	10.5	37.7
B11579	I82054/B07554	77	26.7	31.2	42.0	95.0	2.5	40.0	3.0	3.6	40.2	11.3	38.5
B11577	I82054/B07554	75	26.4	29.9	43.0	99.0	3.0	45.0	3.0	5.9	20.1	10.8	47.6
B11595	I82054/B07554	93	26.3	29.8	43.0	98.0	2.0	52.5	4.0	6.0	25.6	6.5	40.2
B11509	I82054/B07554	8	26.3	27.3	42.0	96.0	1.0	60.0	6.0	5.9	22.5	13.5	45.7
B11604	I82054/B07554	101	26.1	29.6	43.0	98.0	3.0	50.0	4.0	7.6	20.6	9.5	45.6
B11583	I82054/B07554	81	26.1	29.8	43.0	100.0	2.0	45.0	3.5	6.8	20.2	10.3	43.9
B11626	I82054/B07554	122	26.0	27.7	45.0	96.0	3.0	35.0	2.5	5.6	18.4	11.5	46.1
B11534	I82054/B07554	33	25.7	33.0	44.0	100.0	4.0	30.0	2.5	4.6	30.8	12.3	48.5
B11560	I82054/B07554	58	25.6	33.0	44.0	98.0	4.0	35.0	2.5	5.0	22.6	9.3	46.9
B11625	I82054/B07554	121	25.4	24.7	44.0	95.0	3.0	35.0	3.5	5.2	25.8	9.3	42.9
B11614	I82054/B07554	111	25.3	27.1	42.0	94.0	2.0	40.0	5.0	4.5	30.8	9.8	47.0
B11613	I82054/B07554	110	25.3	25.4	42.0	96.0	1.0	50.0	5.0	4.5	32.8	13.8	43.6
B11592	I82054/B07554	90	25.2	27.7	44.0	96.0	1.0	40.0	4.5	4.7	28.5	12.5	42.0

EXPERIMENT 3425 BNF YIELD TRIAL

PLANTED: 6/4/13

NAME	PEDIGREE	ENTRY	YIELD CWT 100 SEED		DAYS TO FLOWER	DAYS TO MATURITY	LODGING HEIGHT (1-5)	HEIGHT (cm)	DES. SCORE	BIOMASS (KG)	HARVEST INDEX(%)	STAND (PLANTS/M)	SPAD
			/ACRE	WT. (g)									
B11522	I82054/B07554	21	25.1	28.1	44.0	97.0	2.0	50.0	3.5	5.3	25.6	11.8	48.2
B11557	I82054/B07554	55	24.9	27.1	43.0	97.0	3.0	40.0	3.5	6.8	18.4	11.8	42.1
B11607	I82054/B07554	104	24.9	26.8	43.0	99.0	1.0	50.0	4.5	4.6	28.3	9.8	42.3
B11523	I82054/B07554	22	24.6	31.2	44.0	96.0	3.0	35.0	3.5	4.7	31.1	10.3	48.5
I08958	Mayflower/Avanti, MEDALIST	130	24.4	23.5	44.0	94.0	2.0	50.0	5.5	5.8	19.7	7.8	48.6
I11272	PR1147-6	128	24.3	29.0	43.0	95.0	1.0	45.0	5.0	4.6	23.2	11.3	46.1
B11554	I82054/B07554	52	24.2	28.3	46.0	96.0	3.5	35.0	3.0	4.5	31.8	8.5	39.4
B11591	I82054/B07554	89	24.1	28.7	44.0	96.0	2.0	55.0	4.5	5.4	22.9	9.8	46.2
B11517	I82054/B07554	16	24.1	33.1	46.0	102.0	3.5	45.0	2.5	5.7	22.1	10.5	45.3
B11578	I82054/B07554	76	23.8	30.1	43.0	101.0	4.0	40.0	2.5	7.1	16.0	9.8	45.7
I10149	VERANO	127	23.8	28.4	43.0	95.0	1.5	45.0	4.5	4.5	26.9	8.0	51.8
B11513	I82054/B07554	12	23.4	31.8	43.0	96.0	3.5	30.0	2.5	5.7	19.0	9.3	38.9
B11501	I82054/B07554	1	23.3	32.0	42.0	98.0	3.0	45.0	3.0	5.5	22.7	12.3	40.6
B11598	I82054/B07554	95	23.2	31.8	41.0	94.0	2.0	42.5	3.5	4.9	27.3	10.5	43.9
B11535	I82054/B07554	34	23.2	30.1	42.0	96.0	2.5	35.0	3.0	5.6	19.8	8.5	43.8
B11525	I82054/B07554	24	23.0	31.5	43.0	96.0	2.0	40.0	2.5	4.6	23.9	10.3	48.2
B11545	I82054/B07554	43	22.9	28.0	43.0	95.0	1.0	50.0	5.5	5.0	26.5	11.5	46.3
B11543	I82054/B07554	41	22.3	26.8	43.0	97.0	2.0	55.0	4.5	5.2	29.2	10.8	44.4
B11550	I82054/B07554	48	22.2	31.3	44.0	99.0	3.0	40.0	3.5	6.0	15.9	11.5	47.3
I07112	R99 NO NOD	125	22.1	22.9	43.0	94.0	2.5	45.0	4.5	5.0	22.8	7.0	39.3
B11600	I82054/B07554	97	20.8	30.2	43.0	97.0	3.0	55.0	3.5	5.0	18.7	7.8	48.8
B11518	I82054/B07554	17	20.8	33.7	43.0	94.0	2.5	30.0	2.0	6.3	18.1	8.5	43.5
B11540	I82054/B07554	38	18.9	31.8	42.0	97.0	3.0	40.0	4.0	5.4	18.4	10.8	46.5
B11528	I82054/B07554	27	16.5	27.5	42.0	94.0	3.0	35.0	3.0	5.4	19.1	11.8	38.8
B11601	I82054/B07554	98	14.7	28.7	43.0	98.0	3.0	40.0	3.0	7.0	14.9	12.8	46.4
MEAN (130)			28.6	28.1	43.5	95.9	2.5	43.0	3.9	5.4	27.6	10.6	45.0
LSD (.05)			4.1	0.9	2.0	3.2	0.2	9.9	0.6	1.3	7.6	2.9	4.8
CV (%)			10.6	2.5	2.8	2.0	5.3	13.9	9.7	17.3	20.4	16.5	6.4

Evaluation of Kidney Bean Yield and Nitrogen Fixation under Low Soil Nitrogen

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U.S. Kidney bean cultivars as a group have limited genetic diversity. They also require more intensive crop management than most other bean market classes. The objective of this study was to evaluate biological nitrogen fixation and seed yield in a diverse group of kidney lines. A 250 line Andean bean trial was planted on June 6, 2013 at the Montcalm Research Farm with two replications per entry in a sandy soil low in total N (0.09%). The lines in the trial included numerous large seed types, including kidney, cranberry, yellow, and red mottled types. The data presented here is only for the 100 entries which were light red, dark red and white kidney seed types. The lines come mostly from the US and Canada, Puerto Rico, Africa, and to a lesser extent Central America, South America, and Europe. At flowering, shoot biomass was sampled for nitrogen concentration and the ratio of $^{15}\text{N}/^{14}\text{N}$ at the UC Davis Stable Isotope Facility. The amount of nitrogen in a sample that derived from N fixation was calculated. Two non nodulating bean lines, G51493nn and G51496nn were included as checks. The top yielding line of the study was US-WK-CBB-15. While most of the top yielding lines were from the US or Canada, the 5th highest yielding line was from Tanzania (Table 1). On average, cultivars from North America derived less of their total plant nitrogen from fixation as compared to cultivars from Africa, Central and South America, and Europe (Figure 1). Seed yield was not correlated with nitrogen fixation capacity. This trial provides useful data to aid in selection of parental lines for kidney bean breeding.

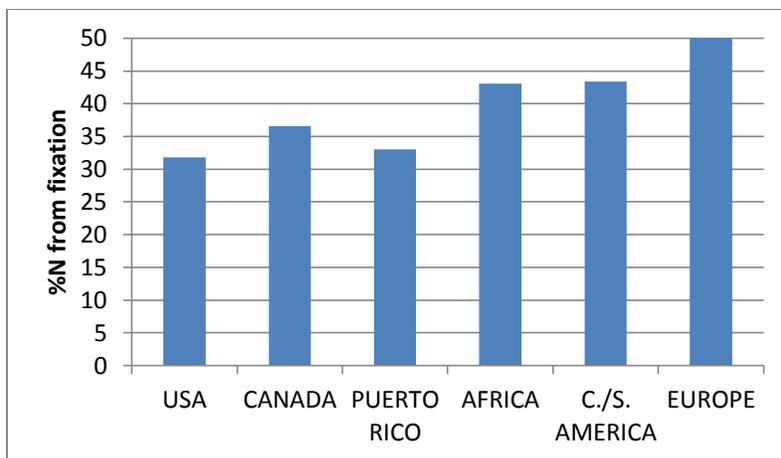


Figure 1: Average %N derived by biological nitrogen fixation by country of origin.

Table 1: Agronomic data for Kidney Bean Lines grown at the Montcalm Research Farm in 2013.

ADP ID	Sub ID	Country of Origin	Seed Type	Days to Flower	Days to Maturity	Yield cwt/acre	100 seed wt (g)	%N ¹	%N from Fixation ²
ADP0665	USWK-CBB-17	USA	WK	38	82	28.4	53.7	3.2	47.0
ADP0616	OAC Lyrick	Canada	LRK	35	75.5	26.7	71.7	3.3	22.8
ADP0602	Sacramento	USA	LRK	35	79.5	26.7	69.7	2.6	29.2
ADP0639	Chinook2000	USA	LRK	42.5	91.5	26.2	51.2	2.9	23.4
ADP0099	Bwanashamba	Tanzania	DRK	51.5	93	25.4	48.0	2.7	55.5
ADP0680	Clouseau	USA	LRK	37	82	25.2	75.8	3.0	n/a
ADP0427	Badillo	Puerto Rico	LRK	51	88	24.9	47.9	2.7	36.7
ADP0618	AC Elk	Canada	LRK	35.5	81	24.9	66.5	2.8	38.9
ADP0673	UC Nichols	USA	LRK	42	88.5	23.6	44.5	2.9	16.6
ADP0644	FoxFire	USA	LRK	36	77	22.9	60.7	3.3	27.6
ADP0628	H9659-27-7	USA	LRK	47	84.5	22.7	49.0	3.0	54.8
ADP0614	ND061106	USA	LRK	40	86	22.1	59.1	2.7	12.5
ADP0633	TARS-HT2	Puerto Rico	LRK	43	94	21.6	46.3	3.1	33.3
ADP0670	AC Calmont	Canada	DRK	42	87	21.5	59.2	3.3	36.5
ADP0653	USDK-CBB-15	USA	LRK	39.5	86.5	21.5	50.1	3.3	31.0
ADP0627	H9659-21-1	USA	LRK	49	84.5	21.4	53.4	2.6	65.6
ADP0632	TARSHT1	Puerto Rico	DRK	36.5	81	20.5	57.5	3.0	17.1
ADP0631	OAC Inferno	Canada	LRK	44.5	95	20.1	53.9	3.4	69.3
ADP0112	Uyole96	Tanzania	DRK	42	95	20.0	45.6	2.8	36.7
ADP0635	OAC Redstar	Canada	DRK	41.5	85.5	19.9	52.5	3.1	32.8
ADP0687	Pink Panther	USA	LRK	36.5	81.5	19.6	48.1	3.2	52.0

ADP ID	Sub ID	Country of Origin	Seed Type	Days to Flower	Days to Maturity	Yield cwt/acre	100 seed wt (g)	%N¹	%N from Fixation²
ADP0629	H9659-27-10	USA	LRK	44	83.5	19.6	47.9	2.7	43.7
ADP0623	Drake	USA	DRK	40	77	19.5	56.3	3.0	36.0
ADP0638	Red Hawk	USA	LRK	41	83	19.5	51.8	2.7	33.0
ADP0011	KIBOROLONI	Tanzania	DRK	35	79	19.4	50.6	3.0	26.4
ADP0615	Litekid	Canada	LRK	43.5	95	19.3	54.6	3.0	4.3
ADP0605	1132-V96	USA	LRK	41	87.5	18.7	60.6	3.5	30.2
ADP0648	RedKloud	USA	LRK	36.5	79	18.5	59.7	3.5	2.4
ADP0607	NY105	USA	LRK	36.5	77.5	18.4	65.9	2.9	39.3
ADP0637	Isabella	USA	LRK	36.5	84	18.0	52.2	3.0	13.1
ADP0640	Beluga	USA	WK	41.5	87	18.0	51.8	2.8	10.2
ADP0655	Fiero	USA	DRK	39.5	87.5	17.9	56.6	3.1	21.3
ADP0606	NY104	USA	LRK	36	76.5	17.7	65.4	3.3	52.2
ADP0645	Lassen	USA	WK	35	78	17.3	62.5	3.1	12.8
ADP0280	G14440	Spain	DRK	51	95	17.0	58.9	2.8	49.3
ADP0657	Kardinal	USA	LRK	53.5	91	16.9	52.6	2.8	49.1
ADP0630	H9659-23-1	USA	LRK	46.5	82.5	16.9	43.5	2.7	49.4
ADP0042	MKOKOLA	Tanzania	DRK	52	97	16.9	37.5	3.9	81.6
ADP0650	K-42	USA	LRK	50.5	88.5	16.6	55.6	3.2	70.1
ADP0599	Isles	USA	LRK	42	84.5	16.6	62.6	3.1	51.1
ADP0391	PI308894	Costa Rica	LRK	49	91	16.5	45.9	3.1	38.9
ADP0684	Majesty	Canada	LRK	42	85.5	16.2	67.0	3.2	51.1

ADP ID	Sub ID	Country of Origin	Seed Type	Days to Flower	Days to Maturity	Yield cwt/acre	100 seed wt (g)	%N¹	%N from Fixation²
ADP0613	02-385-14	USA	DRK	39	85	16.1	52.8	2.3	0
ADP0269	Horoz Fasulyesi	Turkey	WK	47.5		16.1	51.6	2.9	55.8
ADP0015	W616495	Tanzania	DRK	48.5	93	16.0	43.2	3.3	60.4
ADP0603	Wallace773	USA	LRK	37	77.5	15.8	46.9	3.1	47.6
ADP0658	Blush	USA	LRK	42.5	91	15.7	53.8	3.2	35.7
ADP0664	Silver Cloud	USA	WK	41	88	15.7	62.0	3.2	37.1
ADP0010	CANADA	Tanzania	DRK	42.5	96	15.7	49.4	2.8	33.2
ADP0654	USDK-4	USA	DRK	43	88.5	15.7	54.4	2.8	31.5
ADP0220	G5625	Mexico	DRK	41.5		15.6	47.2	3.2	43.6
ADP0647	RedKanner	USA	LRK	41.5	92.5	15.5	47.0	3.3	10.9
ADP0018	SODAN	Tanzania	DRK	45.5	90.5	15.4	47.0	2.8	38.0
ADP0667	VA-19	USA	DRK	47	92.5	15.2	54.5	2.6	32.3
ADP0601	Camelot	USA	DRK	39	86	15.0	47.7	2.8	27.8
ADP0679	Red Rover	USA	DRK	39.5	81	14.9	59.3	3.1	28.2
ADP0636	Montcalm	USA	DRK	41.5	93	14.7	55.8	3.4	26.1
ADP0672	CDRK	USA	DRK	46.5	88	14.3	51.7	3.0	59.0
ADP0604	1062-V98	USA	LRK	37.5	77	14.2	52.2	3.5	17.3
ADP0098	Selian97	Tanzania	DRK	51.5	106	13.9	42.9	2.9	58.7
ADP0609	K-407	USA	DRK	44	86	13.6	41.6	2.9	37.4
ADP0390	PI307808	El Salvador	DRK	53.5	97	13.4	36.6	2.8	50.5
ADP0649	Kamiakin	USA	LRK	49.5	89	13.4	51.8	2.7	35.8

ADP ID	Sub ID	Country of Origin	Seed Type	Days to Flower	Days to Maturity	Yield cwt/acre	100 seed wt (g)	%N¹	%N from Fixation²
ADP0012	W616489	Tanzania	DRK	48	91.5	13.4	46.4	2.5	27.1
ADP0112	Uyole96	Tanzania	DRK	43	93.5	13.4	43.5	3.3	49.8
ADP0038	Moono	Tanzania	DRK	45.5	97	13.2	53.3	2.6	39.2
ADP0186	Kisola	Kenya	DRK	53.5	92	13.0	38.7	3.8	59.7
ADP0676	CELRK	USA	LRK	35	82.5	12.6	68.6	2.7	16.4
ADP0598	Charlevoix	USA	DRK	43	84	12.4	55.4	3.2	10.1
ADP0017	W616529	Tanzania	DRK	46	89	12.2	43.4	3.5	21.0
ADP0651	K-59	USA	LRK	42	88	12.0	55.0	2.9	21.8
ADP0031	RHNo.11	Tanzania	DRK	51	92	11.9	50.0	3.2	51.6
ADP0656	Royal Red	USA	DRK	42.5	88	11.8	53.6	2.8	41.0
ADP0105	Sewani97	Tanzania	DRK	56.5	105	11.6	40.7	3.0	35.1
ADP0634	UC RedKidney	USA	LRK	44.5	91	11.6	47.9	2.8	37.9
ADP0376	PI189408	Guatemala	DRK	40	91	11.4	48.0	3.2	18.0
ADP0057	KIJIVU	Tanzania	DRK	52.5	96	11.3	39.5	2.9	22.0
ADP0463	PI353534-A	India	DRK	40	86	11.2	39.9	3.2	7.5
ADP0368	Line 258	Malawi	WK	57.5	103	11.1	47.9	2.6	33.8
ADP0013	KIBUMBULA	Tanzania	DRK	34.5	83	10.7	49.5	3.0	37.3
ADP0666	USWK-6	USA	WK	37	85	10.7	52.5	3.0	40.4
ADP0674	UCD0704	USA	WK	47.5	96	10.7	47.1	2.9	22.1
ADP0450	INIAP422	Ecuador	WK	53	108	10.7	54.5	3.1	53.2
ADP0005	KABUKU	Tanzania	DRK	35	80.5	10.5	51.5	3.1	5.6

ADP ID	Sub ID	Country of Origin	Seed Type	Days to Flower	Days to Maturity	Yield cwt/acre	100 seed wt (g)	%N ¹	%N from Fixation ²
ADP0659	USLK-1	USA	LRK	36.5	81	9.9	59.7	3.2	46.2
ADP0029	RHNo.2	Tanzania	DRK	52	93	9.8	45.5	3.1	61.1
ADP0612	ICA Quimbaya	Colombia	LRK	42.5	97	9.8	41.0	3.1	47.0
ADP0206	Perry Marrow	USA	WK	40	83.5	9.6	54.2	2.9	19.7
ADP0006	W616465	Tanzania	DRK	48.5	95	9.1	45.5	3.1	36.6
ADP0366	CC-54	Malawi	DRK	57	105	9.1	55.6	3.0	31.0
ADP0417	PI451906	Guatemala	DRK	40	90	9.1	47.7	3.3	31.6
ADP0452	INIAP425	Ecuador	WK	48.5	103	8.3	50.4	3.6	64.3
ADP0428	Colorado Pais	Puerto Rico	LRK	51.5	86.5	8.2	34.7	3.1	54.2
ADP0041	MRONDO	Tanzania	DRK	51.5	96	8.0	30.3	3.1	68.8
ADP0225	Mecosta 003	USA	LRK	41.5	92	6.9	56.5	3.1	11.3
ADP0089	KABLANKETI	Tanzania	DRK	55.5	84	6.7	36.2	3.5	48.8
ADP0101	Witrood	Europe	WK	43.5	87.5	5.0	35.4	3.2	45.7
ADP0469	PI527521	Burundi	WK	52.5	97.5	4.1	38.2	2.8	58.3
	G51493Ann	CIAT	n/a	57	103	4.0	32.1	2.1	0.0
	G51496Ann	CIAT	n/a	56.5	107	3.8	51.3	1.7	0.0
Mean				43.9	88.7	15.4	51.0	3.0	35.6

1 %N was determined in the aboveground plant biomass at flowering

2 % N derived from fixation is out of 100%

2013 White Mold Fungicide Trial

Montcalm Research Farm, Entrican, Michigan

Treatment	Application	Rate	% Incidence	% severity	Yield lbs/AC
UTC	H2O		65	49	2537
Propulse	AB	8 oz	39	28	2909
Propulse	AB	10.3 oz	34	23	2910
Pulpulse	A	10.3 oz	54	40	2576
Propulse+Serenade Optimum	A+B	10.3 oz+16 oz	57	43	2536
Serenade Optimum	AB	16 oz	48	34	2671
Endura	AB	8 oz	28	19	2803
Omega	AB	8 oz	29	19	2892
Aproach	AB	12 oz	46	35	2915
Aproach	A	12 oz	53	39	2537
Cruzin+BF2+Bionic	AB	8 oz + 2 oz	63	47	2627
Cruzin+Bionic	AB	10 oz	62	46	2608
Endura+Omega	A	8 oz + 8 oz	36	23	3140
Endura+Propulse	A	8 oz + 8 oz	28	18	2854
LSD .05 =			15	12	306
C. V. =			22%	24%	7.8%

Application Code:A=100% or first bloom, B=10 days after 100% bloom

Rating Date: % infection "rating" on September 23, % Incidence, %severity

Merlot Small Red Beans planted in 20" rows. Population of 115,680. Irrigation of two .5 inch per week.

Planted:June 18 Harvested: October 2 First Spray: July 30 Second Spray: August 9

Sprayed with 4 row bicycle-wheel CO2 sprayer using 30 gpa at 65 psi.

Twin-Jet nozzle placed directly over the row. Plot size sprayed was 4 rows by 30 feet.

Harvest area was middle 2 rows by 15 feet.

2013 Eastern Huron County White Mold Fungicide Trial

Doug Bismack Farm-Cooperative Elevator Co.

Treatment	Appl.	Rate	% Incidence	% severity	Yield lbs/AC
UTC	H2O		36	25	1722
Propulse	AB	8 oz	22	16	2017
Propulse	AB	10.3 oz	29	20	1888
Pulpulse	A	10.3 oz	20	13	2089
Propulse+Serenade Optimum	A+B	10.3 oz+16 oz	25	16	1916
Serenade Optimum	AB	16 oz	24	14	1988
Endura	AB	8 oz	21	12	2008
Omega	AB	8 oz	26	17	1921
LSD .05 =			4	4	251
C. V. =			12%	16%	8.8%

Melot small reds planted in 22 inch rows.

Planted: June 18, First Spray: August 5, Second Spray: August 14, Harvested: September 28

2013 Land Roller Trial

MSU SAGINAW VALLEY RESEARCH AND EXTENSION CENTER

Treatment	Date	Yield lbs/Ac
Pre-Plant	June 7	2269
0 Day	June 7	2291
1 Day	June 8	2471
2 Days	June 9	2585
4 Days	June 11	2765
Emerged	June 15	2461
UTC		2285

LSD .05 = 308
C.V. = 8.5%

Zorro Black Beans, Planted: June 7, Harvested: September 18

Emerged beans rolled 8 days after planting. Harvest Area: 2 rows X 15 feet

2013 Syngenta Foliar Insecticide Trial

Treatment	Rate	Yield lbs/Ac
UTC		2393
A12871WARRIOR	1.92 oz	2523
ENDIGO	4.5 oz	2470
ACTARA	5.5 oz	2351
BESEIGE	10 oz	2391
BRIDGADE	5.13 oz	2487

LSD .05 = 456
C.V. = 12.4%

Zorro Black Beans Planted: June 25, Harvested: October 3, Sprayed: July 12

Spray Area: 5 Rows X 40 feet on 20 inch rows. Harvest Area: 2 rows X 15 feet.