2014 RESEARCH REPORT

SAGINAW VALLEY

RESEARCH & EXTENSION CENTER

MICHIGAN STATE UNIVERSITY

AgBioRESEARCH

TABLE OF CONTENTS

SAGINAW VALLEY RESEARCH AND EXTENSION CENTER REPORT

James D. Kelly, Coordinator
Paul E. Horny, Farm Manager
Dennis Fleischmann, Technician

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 Michigan State University Office of Land Management then 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, irrigation and municipal water were established and in 2014 fiber optic internet connection with wireless connection throughout the office and connectivity to the research plots within one mile of the building were established. A direct video link to MSU campus was also established at this time. Also a central RTK radio tower was installed with a three mile radius to provide a signal for three of the tractors and a combine that were equipped with Autosteer technology. Wheat early generation variety trials were new to the farm also. Future infrastructure plans include 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 2014 season was the sixth season of research at the site. This research report is primarily a compilation of research conducted at the site in 2014. Most of the work represents one year's results, and even though multi-season results are included, **this work should be considered as 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 2014 collected with the automated rain gauge is given in Table 1. The monthly totals are given at the bottom of the table. Rainfall was average to above average through the growing season. Planting in the spring was delayed due to a late, cold wet spring. The rainfall total of 28.49 was average. Maximum and minimum daily temperatures along with growing degree days (base 50) are given in Table 2. The 2014 season was below average with 0 days above 90 degrees and 9 days above 85 degrees. The growing degree days for 2014 was 2225 which was below the 5 year average. Despite the cool wet summer corn yielded 200 bushels/acre, soybeans 60 bushels per acre, dry beans at 30 cwt/acre with a plot yield at 50 cwt/acre, and sugarbeets yielded at 30 tons/acre with a plot yield at 45 tons/acre.

GROWING DEGREE DAYS - SAGINAW VALLEY RESEARCH FARM

Base 50 (max + min / 2 - 50)

	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
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
2014	45.50	271.50	536.00	488.00	525.00	285.00	74.00	2225.00
AVERAGE	63.50	246.62	488.84	623.46	555.47	326.46	94.65	2399.00

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

MAXIMUM-MINIMUM AIR TEMPERATURES (F)
SAGINAW VALLEY RESEARCH & EXTENSION CENTER - 2014

	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	13	2	24	15	21	9	57	32	54	40	86	56
2	12	0	21	-6	13	-7	48	27	53	41	85	67
3	13	-8	18	-14	13	-18	36	29	57	44	74	61
4	30	12	23	0	17	3	44	32	54	38	72	53
5	27	15	21	0	16	-2	45	28	56	33	76	48
6	15	-11	27	0	28	-7	57	28	61	33	80	47
7	3	-16	13	2	41	1	53	29	57	37	83	52
8	14	-4	16	-3	37	14	60	32	82	47	76	59
9	20	-13	26	3	33	6	55	28	75	60	77	53
10	37	19	19	-2	44	32	68	41	70	49	78	55
11	39	31	12	-9	44	33	65	31	79	42	74	58
12	37	31	22	-11	33	9	64	33	68	58	76	62
13	40	29	33	7	24	2	68	47	80	59	67	47
14	36	23	26	14	47	22	64	27	59	46	70	43
15	28	15	21	-3	37	17	31	22	48	38	81	51
16	26	17	18	-8	17	8	44	22	51	35	86	65
17	28	18	18	-14	28	7	64	30	55	35	87	65
18	21	14	40	11	43	21	57	34	67	40	77	63
19	27	10	40	20	42	31	55	26	71	44	75	54
20	27	5	38	25	35	29	73	33	74	51	70	51
21	6	-5	42	27	40	24	80	51	81	55	79	59
22	10	-7	29	21	36	20	57	36	71	51	81	61
23	9	-4	24	14	22	11	53	33	69	45	76	61
24	17	-4	20	6	27	13	56	30	77	47	76	68
25	23	0	21	5	29	15	49	39	81	51	68	58
26	21	-1	13	-2	29	9	46	38	84	56	77	53
27	15	-5	10	-6	39	27	54	30	79	65	83	55
28	7	-7	16	-	45	31	55	38	72	50	87	61
29	17	-1			36	28	68	44	76	43	85	69
30	28	10			43	25	66	52	84	48	86	69
31	30	17			59	30			82	54		

MAXIMUM-MINIMUM AIR TEMPERATURES (F)
SAGINAW VALLEY RESEARCH & EXTENSION CENTER - 2014 cont.

	JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	82	66	81	58	81	62	65	52	38	24	31	13
2	72	63	81	54	77	60	68	51	46	20	33	12
3	67	50	82	54	80	54	68	50	56	39	36	23
4	76	49	81	60	81	60	50	39	56	40	31	16
5	79	51	77	59	87	65	52	41	52	39	36	25
6	81	57	78	57	72	53	63	44	48	35	39	20
7	81	65	79	53	74	47	64	42	41	29	35	15
8	74	62	76	51	76	49	57	36	43	34	40	28
9	71	53	79	50	79	55	58	34	42	31	36	29
10	73	53	83	53	73	59	54	32	54	36	29	18
11	78	51	79	60	66	48	57	29	53	35	38	15
12	81	60	75	58	56	47	60	29	35	28	31	23
13	79	65	74	53	57	43	66	50	34	22	39	30
14	79	59	69	47	61	39	69	57	33	22	46	38
15	67	55	74	42	60	43	65	53	31	22	50	41
16	67	51	76	51	64	40	61	51	31	20	44	36
17	75	47	75	54	67	39	1	45	29	14	36	26
18	77	51	78	55	59	39	46	38	24	13	29	24
19	79	55	77	62	67	33	51	29	25	12	32	19
20	81	54	78	63	78	51	56	45	24	10	31	15
21	83	59	77	57	64	46	48	39	25	5	33	20
22	86	61	78	62	62	45	49	32	46	21	39	25
23	77	60	77	57	74	43	53	27	49	40	46	33
24	73	49	75	58	73	44	61	32	54	32	42	31
25	75	51	85	60	76	44	66	42	33	29	37	32
26	80	59	83	65	77	44	59	34	31	28	45	31
27	80	60	74	57	77	45	69	30	29	20	48	35
28	65	51	72	47	77	49	-	-	26	15	36	27
29	71	47	75	53	77	48	48	36	48	25	27	17
30	74	50	81	63	54	48	48	32	54	31	22	12
31	77	52	82	66			43	31			19	12

MONTHLY PRECIPITATION, SAGINAW VALLEY RESEARCH FARM

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
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
2014	0.47	0.55	0.92	3.99	3.06	2.74	4.17	3.90	3.03	2.10	2.07	1.49	28.49
AVG.	1.29	1.13	1.57	2.91	3.03	2.83	2.49	3.18	3.16	2.58	2.50	1.43	28.09

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

PRECIPITATION - SAGINAW VALLEY RESEARCH & EXTENSION CENTER- 2014

Day:	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1					0.02		0.03	0.14	0.74	0.01	0.13	
2			0.05		0.01	0.25						
3					0.06		0.26			0.39		
4				0.22				0.58		0.06		
5								0.55	0.03			
6							0.10			0.05	0.15	
7					0.20		1.80			0.13		
8				0.01	0.05	0.13	0.49				0.17	0.07
9		0.07			0.13							0.03
10	0.29	0.01							0.37		0.01	
11	0.17					1.05		1.3	0.05		0.08	
12				0.92	0.51	0.01	0.08	0.02	0.04			
13				1.31	0.87		0.57		0.50	0.06		
14		0.01		0.14	0.07		0.02			0.51		
15				0.01	0.97		0.12		0.18	0.16		0.01
16							0.03		0.01	0.03		0.2
17	0.01									0.05		0.04
18		0.12				0.52				0.07		
19			0.17					0.25				
20		0.34			0.13	0.05		0.10	0.11	0.03		
21			0.02	0.29	0.01				0.59	0.01		
22			0.20	0.05							0.03	
23						0.1					0.59	0.13
24						0.5					0.89	0.96
25				0.12		0.13						0.05
26												
27			0.20		0.03		0.29					
28			0.28				0.27					
29				0.69			0.10	0.01	0.36		0.01	
30				0.23			0.01	0.95	0.05		0.01	
31										0.54		
TOTAL	0.47	0.55	0.92	3.99	3.06	2.74	4.17	3.90	3.03	2.10	2.07	1.49

Rainfall is measured in inches

2014 YEAR END TOTAL: 28.49 INCHES

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.

Cercospora Leafspot Nursery:

This nursery was planted at four locations and two 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 3.5 and the most susceptible variety had a rating of 6.6 on a scale of 0-9.

Michigan Sugar Company

Official Variety Trial

Average of 6 Locations - 2014

Variety	$/A	RWSA	RWST	T/A	% Sugar	% CJP
B-149N	$1,929	9984	259.3	38.2	17.3	95.8
B-12RR2N	$1,905	9850	263.1	37.1	17.6	95.6
B-1448	$1,904	9844	255.1	38.3	17.1	95.4
C-G333NT	$1,895	9797	255.8	37.9	17.1	95.6
SX-1228RR	$1,884	9724	258.1	37.4	17.2	95.8
B-18RR4N	$1,876	9740	261.5	36.8	17.5	95.7
B-19RR1N	$1,858	9628	253.9	37.5	17.0	95.6
C-RR059	$1,848	9532	264.8	35.8	17.7	95.6
SX-1212RR	$1,848	9541	259.0	36.5	17.3	95.8
B-147N	$1,834	9474	254.8	36.9	17.2	95.4
C-RR074NT	$1,834	9479	257.8	36.5	17.4	95.3
SX-RR1235	$1,832	9480	263.8	35.5	17.6	95.8
SX-RR1245N	$1,831	9458	265.4	35.3	17.7	95.7
C-G427NT	$1,826	9449	252.3	37.1	16.9	95.5
C-RR202	$1,820	9381	264.4	35.3	17.6	95.8
B-1399	$1,803	9328	256.7	36.0	17.1	95.7
SX-RR1243	$1,802	9294	256.2	36.0	17.1	95.7
SX-1211N RR	$1,797	9297	245.3	37.6	16.5	95.5
C-RR288	$1,796	9262	258.6	35.5	17.3	95.7
B-133N	$1,791	9256	248.8	37.0	16.8	95.1
B-1397	$1,789	9231	257.1	35.7	17.2	95.7
C-G351NT	$1,785	9208	273.3	33.4	18.2	95.8
SX-RR1242	$1,768	9125	250.0	36.3	16.7	95.7
M-301	$1,761	9057	255.6	35.3	17.4	94.8
C-G454	$1,752	9056	258.7	34.8	17.3	95.7
HM-9617RR	$1,750	9030	251.5	35.7	16.9	95.4
HM-173RR	$1,747	8995	252.2	35.5	17.0	95.2
SX-RR1244	$1,745	9034	254.0	35.0	17.0	95.6
HM-28RR	$1,737	8969	248.4	35.9	16.7	95.4
HM-9616RR	$1,733	8936	273.2	32.5	18.2	95.7
M-410	$1,732	8934	246.9	36.0	16.7	95.1
HM-131RR	$1,718	8854	263.1	33.4	17.6	95.4
HM-9443RR	$1,714	8856	256.2	34.3	17.3	95.1
SX-RR1241N	$1,711	8836	251.4	34.9	16.9	95.4
HM-9607RR	$1,687	8692	270.3	32.0	18.0	95.7
M-404	$1,680	8693	237.7	36.3	16.4	94.4
M-406	$1,653	8535	247.4	34.3	16.9	94.5
SX-1291RR	$1,643	8470	253.6	33.3	17.1	95.3
HM-425RR	$1,639	8465	252.3	33.4	17.2	94.8
M-405	$1,622	8370	242.5	34.4	16.6	94.6
Average	$1,782	9204	256.3	35.7	17.2	95.4
LSD 5%	94.0	509.7	5.7	1.7	0.3	0.3
CV %	4.6	4.9	2.0	4.1	1.6	0.3

Michigan Sugar Company
Cercospora Leafspot Nursery
Blumfield and SVREC - 2014

Variety	Average of 2	Blumfield	SVREC
	0-9	0-9	0-9
B-1399	3.45	3.81	3.10
C-RR288	3.45	3.67	3.24
C-G454	3.66	3.94	3.38
C-RR202	3.78	3.93	3.63
HM-425RR	3.92	3.84	4.00
M-406	3.97	3.90	4.04
Resistant Check	4.08	4.26	3.90
HM-28RR	4.20	4.33	4.07
M-405	4.21	4.40	4.02
SX-1291RR	4.23	4.10	4.35
B-1397	4.28	4.56	4.00
HM-131RR	4.33	4.54	4.12
SX-RR1244	4.34	4.29	4.39
C-RR059	4.36	4.53	4.20
HM-173RR	4.36	4.53	4.20
B-147N	4.39	4.46	4.33
SX-RR1243	4.55	4.39	4.70
C-G351NT	4.55	4.66	4.44
HM-9616	4.66	4.49	4.84
SX-RR1241N	4.79	4.86	4.72
B-1448	4.80	4.99	4.61
C-G427NT	4.86	5.18	4.54
B-12RR2N	4.87	4.93	4.81
B-18RR4N	4.89	5.08	4.70
SX-1212RR	4.92	5.01	4.83
B-133N	4.97	5.35	4.58
SX-RR1235	5.02	5.13	4.92
SX-RR1242	5.04	4.48	5.60
M-404	5.05	5.19	4.91
HM-9443RR	5.06	4.97	5.15
HM-9607RR	5.09	4.68	5.50
B-19RR1N	5.12	4.96	5.28
SX-RR1245N	5.14	5.19	5.10
SX-1228RR	5.15	5.02	5.28
M-301	5.21	5.16	5.26
C-G333NT	5.28	5.71	4.85
HM-9617RR	5.41	5.32	5.50
SX-1211NRR	5.44	5.30	5.58
B-149N	5.49	5.79	5.18
M-410	5.57	5.59	5.54
C-RR074NT	5.71	6.25	5.17
Susceptible Check	6.55	6.34	6.76
Average	4.72	4.79	4.65
LSD 5%	0.33	0.51	0.34
CV %	5.64	8.53	5.79

0-9 Scale - Cercospora rating a lower number is better.

Sugar beet activities of the USDA-ARS East Lansing conducted in cooperation with Saginaw Research & Extension Center during 2014

Mitch McGrath, Linda Hanson, Paul Galewski, and Tom Goodwill
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 2014 that focused on Cercospora leaf spot (CLS) and Rhizoctonia crown and root rot (CRR) disease performance of a wide range of *Beta vulgaris* materials. CLS and CRR trials were conducted in conjunction with the Beet Sugar Development Foundation (BSDF) and CLS trials 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 CRR nursery was planted on May 6, 2014, the BSDF CLS evaluation nursery was planted on May 5, 2014, and the other evaluation and breeding nurseries on May 8. A randomized complete-block design with one to five replications was used, depending on the specific test. All plots were 15 ft long, with 30 in between rows with the exception of the BSDF CLS nursery, planted on 20 in rows. Most entries were commercial or near-commercial varieties, and weeds were controlled with glyphosate at the recommended rates. For non-commercial entries, weeds were controlled with three applications of mixtures of phenmedipham, desmedipham, triflusulfuron methyl, and clopyralid and one application of S-metolachlor. Hand weeding was done as needed to control larger weeds. The BSDF trails were thinned by hand with the generous help of Michigan Sugar Cooperative. Bolting beets were removed throughout the season. In the CLS nursery, flutolanil was applied in a band in furrow at planting to control Rhizoctonia damping-off and azoxystrobin was applied at the 2-4 leaf stage to control CRR

The BSDF cooperative CRR eastern evaluation nursery, a new addition to the SVREC, had entries from three companies, with a total of 236 entries plus three control varieties evaluated. This nursery was 1-row with 5 replications conducted in a double-blind fashion. In addition, three rows of known susceptible or moderately resistant varieties were planted to collect sacrificial samples through the season and assess root rot development. The nursery was inoculated on July 11 with a dry ground barley inoculum of *Rhizoctonia solani*, anastomosis group 2-2 (highly virulent isolate) at 0.96 g per foot of row using a Gandy applicator to apply inoculum directly to the rows. The nursery was sprayed with water following inoculum application to ensure sufficient moisture for infection. Roots were dug September 4, 5, and 8 with a modified single row harvester. Each root was rated for disease severity using a 0-7 scale where 0=no visible lesions and 7=root completely rotted. A weighted disease index was calculated for each replicate. Variety disease index means for the entire nursery ranged from 2.6 to 6.6, with the percent of roots classified as “harvestable” (less than 25% of the root rotted) ranging from 3% to 83% for the different varieties.

The official BSDF cooperative CLS evaluation nursery had entries from three companies (one more than 2013), with a total of 212 entries evaluated. This nursery was 2-row, 4 replications conducted in a double-blind fashion. The nursery was inoculated on 10 July with a liquid spore suspension (approximately 1×10^3 spores/ml) of *Cercospora beticola*. Inoculum was produced from a mixture of leaves collected from the 2013 inoculated leaf spot nursery at SVREC and naturally infected beets grown on the Michigan State University campus farms in East Lansing, MI. Visual evaluations of the plot were conducted with a disease index (DI) on a scale from 0-10 where 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 are 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. Variety means for the entire nursery were 2.4 (range = 1 to 5), 4.0 (range = 2 to 6), 5.0 (range 2 to 7), and 5.6 (range = 3 to 8) on Aug 14, Aug 21, Aug 28, and Sept 3, respectively.

Also in cooperation with the BSDF, 30 Plant Introductions were screened for CLS reaction (Table 1). Internal controls included a susceptible check, 12N0050 (kindly provided by L. Campbell), and a resistant check, EL50/2 (PI 664912). One accession, PI 604522, was not significantly different from the resistant control at any of the rating dates. Five additional accessions (PI504242, PI518298, PI540610, PI590767, and PI 599351) were not significantly different from the resistant control at three of the four rating dates but had higher ratings at the peak of the epidemic. Only five accessions (NSL141985, PI590616, PI590767, PI614828, and PI604521) did NOT require removal of seed stalks from at least one replicate during the season.

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

	Identification			Average Disease Index[z]			
Entry	Donor's ID	subsp.	Origin	14 Aug	21 Aug	28 Aug	3 Sep
Ames 4265	IDBBNR 5652	*maritima*	Turkey	2.0	2.7	3.7	4.3
NSL 141985	JANASZ	*vulgaris*	United States	2.7	4.0	4.7	5.0
PI 504242	Wild beet	*maritima*	Italy	1.7	2.7	3.0	3.7
PI 504274	Wild beet	*maritima*	France	2.3	3.3	4.0	4.3
PI 518298	IDBBNR 5792	*maritima*	United Kingdom	2.0	3.0	3.0	4.0
PI 590614	DESPREZ Z	*vulgaris*	France, Nord	3.0	4.0	4.0	4.3
PI 590616	ELITE DESPREZ TYPE R	*vulgaris*	France, Nord	3.0	3.7	4.3	5.0
PI 540610	WB 864	*maritima*	France	1.7	2.7	3.0	3.7
PI 540684	WB 938	*maritima*	Denmark	2.3	3.3	3.7	4.3
PI 590767	FC606(4X)	*vulgaris*	United States	1.0	2.3	3.3	4.0
PI 546381	IDBBNR 5659	*maritima*	Spain	2.3	3.0	3.7	4.3
PI 614828	AT3994-4	*vulgaris*	United States	3.0[w]	4.5	5.0	6.0
PI 562590	IDBBNR 9741	*maritima*	Egypt, Matruh	2.7	4.0	nd	nd
PI 562603	IDBBNR 9752	*maritima*	Egypt, Matruh	3.0[w]	3.5	4.5	4.5
PI 599351	R423B	*maritima*	United States	1.3	2.3	3.0	3.7
PI 604510	IBBNR 2218	*maritima*	Italy, Sicily	2.7	3.7	4.0	4.0
PI 604511	IDBBNR 2649	*maritima*	France, Nord	2.0	3.0	3.7	4.0
PI 604512	IDBBNR 2670	*maritima*	Greece, Peloponnese	2.7	3.7	4.0	4.7
PI 604513	IDBBNR 3054	*maritima*	Greece	2.0	3.0	4.0	4.0
PI 604514	IDBBNR 3092	*maritima*	Greece, Peloponnese	2.3	3.3	4.3	4.3
PI 604515	IDBBNR 3294	*maritima*	Greece, Peloponnese	2.7	3.7	4.0	4.0
PI 604516	Seskla	*maritima*	Greece	1.0	2.5	3.5	4.0
PI 604517	IDBBNR 3350	*maritima*	Greece	2.7	4.0	5.0	5.0
PI 604518	IDBBNR 3356	*maritima*	Greece	2.0	3.0	3.7	4.3
PI 604519	IDBBNR 3390	*maritima*	Italy, Sicily	2.3	3.3	4.0	4.3
PI 604520	IDBBNR 3628	*maritima*	Spain, Alicante	2.7	3.5	4.5	5.0
PI 604521	IDBBNR 3705	*maritima*	Germany	2.3	3.7	4.3	5.0
PI 604522	IDBBNR 3739	*maritima*	Greece	1.3	2.3	3.0	3.3
PI 604523	IDBBNR 3742	*maritima*	Greece	2.0	3.7	4.3	4.7
PI 604524	IDBBNR 3851	*maritima*	Portugal, Lisboa	2.0	3.3	3.7	4.0
Leaf Spot Susceptible Check[y] (12N0050)			USA	3.5	4.5	5.0	6.0
Leaf Spot Resistant Check[x] (EL50/2)			USA	1.3	1.8	2.3	2.5
			$LSD_{0.05}$	1.24	1.06	1.01	0.98
Trial Mean				2.2	3.2	3.8	4.3

nd – ratings were not made because of insufficient leaf tissue

[z]Disease Index is based on a scale where 0=healthy to 10=all leaves dead. Each number is an average of three plots except as noted below.
[y]The Leafspot Susceptible Check, , is kindly provided by Larry Campbell.
[z]The Leafspot Resistant Check is EL50/2 (PI 664912).
[w]Numbers based on average from two plots as insufficient leaf tissue remained of one of the replicates after seed stalks were removed to rate.

USDA-ARS cooperator germplasm evaluations included 21 USDA-ARS germplasm entries from Fargo, ND and 218 entries from Ft. Collins, CO (replicated, randomized), along with 402 self-pollinated entries (non-replicated, non-randomized) of an F2-derived F6 recombinant inbred population (designated CRB) from a cross between C869 (susceptible) and EL50 (resistant) sugar beets, and four open pollinated (OP) breeding lines being advanced to combine various traits, including good post-harvest storability, Rhizoctonia seedling and CRR resistance, sugarbeet cyst nematode resistance, and CLS resistance (Table 2). Only two ratings were done for these materials, on Aug 21 and Sept 3, when disease progression was more advanced. Significant differences were observed in all cases.

Table 2: Cercospora leaf spot reaction for East Lansing breeding and genetic materials entered into the 2013 SVREC leaf spot nursery.

Entry #	Name	Type	# Plots	Mean Aug 23	Mean Sept 3
985	EL50/2	resistant check	16	2.0	2.4
995	2012 storage mix OP		3	2.7	3.3
994	2012 broad mix OP		3	3.7	3.7
997	2012 Rhizoc Nema OP		30	3.4	3.7
993	SR98 x Cerc		4	3.3	3.8
988	Red marker 2		11	3.5	3.9
996	SR100		3	4.0	4.0
987	Red marker 1		18	3.9	4.2
986	C869 O-type		11	3.5	4.2
CRB6	RIL population mean	(ranges from 3 to 6)	402	3.3	4.6
989	12N0050	susceptible check	2	5.0	6.0

In addition to the CRB6 population, whose roots were harvested for a further round of inbreeding, a second Recombinant Inbred population was grown without disease pressure to evaluate performance and advance the material another generation. This population of 360 F2-derived F4 materials from a cross between C869 (moderate sugar) and L19/2 (high sugar) did not emerge well, with 17 exceptions that did provide a good stand. Surviving roots were harvested and will be self-pollinated in the 2015 East Lansing greenhouse.

Four other germplasm lines were tested under non-disease conditions. These lines represent two standards (C869 and SP7322) and two storage rot resistant breeding lines that looked promising in preliminary tests. These four will be retested during the spring of 2015 with the common storage rot pathogens that were isolated from rotten beets in Michigan storage piles in recent years. Both breeding lines were quite vigorous with full stands throughout the 2014 field season, and their seed is also being increased in the 2015 greenhouse in preparation for germplasm release.

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 undergrad Nick Boerman for his help throughout the field season.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Management of glyphosate (Group 9)-resistant horseweed in sugarbeet

Christy Sprague, Amanda Goffnett and Gary Powell, Michigan State University

Locations: Gratiot Co.; SVREC (Richville)	**Application timings**: 2- & 6-leaf beets
Planting Dates: May 23 (GR); May 6 (SVREC)	**Herbicides:** see treatments
Soil Type: Loamy sand (GR); Clay loam (SVREC)	**O.M.:** 2.9% (GR); 2.9 (SVREC)
Replicated: 4 times	**Variety:** HM-173 RR (SVREC)

Table 1. Sugarbeet injury and glyphosate-resistant horseweed control (Gratiot co.) and sugarbeet injury, yield and recoverable white sugar per acre (RWSA) (SVREC) for various herbicide programs for potential horseweed control.

		Gratiot Co.		SVREC (Richville)		
Herbicide treatments[a]	Timing	Sugarbeet injury[b]	Horseweed control[b]	Sugarbeet injury[b]	Yield	RWSA
		— % —	— % —	— % —	– ton/A –	— lb/A —
Roundup - applied 2X		0	30	0	31.8	7780
Stinger (2 oz)	2-lf	0	64	0	35.9	8885
Stinger (3 oz)	2-lf	2	81	0	30.5	7692
Stinger (4 oz)	2-lf	5	71	0	31.7	8024
Stinger (6 oz)	2-lf	6	74	0	32.6	7933
Stinger (2 oz) fb. (2 oz)	2-lf fb. 6-lf	11	80	0	32.9	8259
Stinger (3 oz) fb. (3 oz)	2-lf fb. 6-lf	13	93	0	31.9	8095
Stinger (2 oz) fb. (4 oz)	2-lf fb. 6-lf	13	92	0	32.4	7852
Stinger (4 oz)	6-lf	3	91	0	31.7	7837
Stinger (6 oz)	6-lf	11	88	1	33.8	8514
Stinger (8 oz)	6-lf	14	82	0	33.5	8350
Stinger (2 oz) fb. (4 oz) fb. (4 oz)	2-lf fb. 6-lf fb. canopy	11	99	0	33.6	7982
Stinger (2 oz) + UpBeet[c] (0.5 oz) fb. Stinger (4 oz) + UpBeet (0.5 oz)	2-lf fb. 6-lf	16	90	4	32.4	8086
UpBeet (1 oz) fb. UpBeet (1 oz)	2-lf fb. 6-lf	0	38	5	33.8	8666
Untreated		0	0	0	23.5	5843
$LSD_{0.05}$[d]		5	15	2	4.4	1242

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

[b] Sugarbeet injury was evaluated ~10 d after the 6-leaf application timing; horseweed control was at harvest (Oct. 2).

[c] All treatments with UpBeet included 1 pt/A of Destiny HC.

[d] Means within a column greater than least significant difference (LSD) value are different from each other.

Summary: Two field trials were conducted to evaluate possible herbicide treatments to control glyphosate-resistant horseweed (marestail) in sugarbeet. The first trial was conducted on a grower's field in Gratiot Co. where glyphosate-resistant horseweed was present. The second study was conducted at the Saginaw Valley Research and Extension Center to evaluate the impacts of these treatments on sugarbeet injury and yield. All treatments contained Roundup PowerMax at 22 fl oz/A at each application timing. Overall, sugarbeet injury was less than 15% with all treatments, 10 d after the 6-leaf sugarbeet application. At least two-applications of Stinger at a minimum rate of 3 oz/A were needed for season-long control of glyphosate-resistant horseweed. The treatment that provided the best control of glyphosate resistant horseweed was three applications of Stinger at 2 oz, fb. 4 oz fb. 4 oz/A at the 2-, 6-leaf sugarbeet stages and at canopy closure. None of the treatments reduced yield compared with the Roundup only treatments. This is one year's results and these treatments need to be evaluated further.

Management of glyphosate (Group 9)-resistant Palmer amaranth in sugarbeet

Christy Sprague and Gary Powell, Michigan State University

Locations: Gratiot Co.; SVREC (Richville)	**Application timings**: 2-, 6-leaf beets & @ canopy
Planting Dates: May 29 (GR); May 6 (SVREC)	**Herbicides:** see treatments
Soil Type: Sandy loam (GR); Clay loam (SVREC)	**O.M.:** 3.1% (GR); 2.9 (SVREC)
Replicated: 4 times	**Variety:** HM-173 RR (SVREC)

Table 1. Palmer amaranth control (Gratiot co.) and sugarbeet injury, yield and recoverable white sugar per acre (RWSA) (SVREC) of selected herbicide programs examined for glyphosate-resistant Palmer amaranth control.

		Gratiot Co.	SVREC (Richville)		
Herbicide treatments[a]	Timing	Palmer amaranth[b]	Sugarbeet injury[b]	Yield	RWSA
		— % —	— % —	- ton/A -	— lb/A —
Roundup - applied 3X	2-lf fb. 6-lf fb. canopy	8	0	31.8	7879
Betamix (2 pt) + Warrant (3 pt)	2-lf fb. 6-lf	86	13	33.1	8392
Betamix (2 pt) fb. Betamix (3 pt) + Warrant (3 pt)	2-lf fb. 6-lf	85	16	31.4	8507
Warrant (3 pt) fb. Warrant (3 pt)	2-lf fb. 6-lf	75	5	32.6	7837
Betamix (2 pt) + Warrant (3 pt) fb. Warrant (3 pt)	2-lf fb. 6-lf	89	9	30.6	7886
Betamix (2 pt) fb. Betamix (3 pt)	2-lf fb. 6-lf	51	0	33.0	8355
Betamix (2 pt) + Stinger (2 oz) fb. Betamix (3 pt) + Stinger (4 oz)	2-lf fb. 6-lf	49	3	31.8	8470
Betamix (2 pt) + Stinger (2 oz) fb. Betamix (3 pt) + Stinger (4 oz) + Warrant (3 pt)	2-lf fb. 6-lf	96	6	33.3	8456
Betamix (2 pt) fb. Betamix (3 pt) fb. Betamix (3 pt)	2-lf fb. 6-lf fb. canopy	86	3	31.1	8111
Betamix (2 pt) + Stinger (2 oz) fb. Betamix (3 pt) + Stinger (4 oz) fb. Betamix (3 pt) + Stinger (4 oz)	2-lf fb. 6-lf fb. canopy	59	4	30.6	7827
Betamix (2 pt) fb. Betamix (4 pt) fb. Betamix (6 pt)	2-lf fb. 6-lf fb. canopy	92	2	35.6	9386
Betamix (2 pt) fb. Betamix (4 pt) + Warrant (3 pt) fb. Betamix (6 pt)	2-lf fb. 6-lf fb. canopy	99	15	29.8	7673
$LSD_{0.05}$[c]		15	12	3.5	878

[a] Roundup PowerMax at 32 fl oz/A fb. 22 fl oz/A and 22 fl oz/A was applied in each of the treatments. All POST treatments included ammonium sulfate at 17 lb/100 gal. See recommendations in the MSU Weed Control Guide for Field Crops.

[b] Palmer amaranth control was evaluated in mid-August and sugarbeet injury was evaluated ~10 d after the 6-leaf application.

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

Summary: Two field trials were conducted to evaluate possible herbicide treatments to control glyphosate-resistant Palmer amaranth in sugarbeet. The first trial was conducted to evaluate Palmer amaranth control and the second trial was conducted to examine the effects of these treatments on sugarbeet injury and yield. Not all treatments are presented. Results indicate that there are some treatments that show some promise for glyphosate-resistant Palmer amaranth control (Table 1), without reducing yield compared with three applications of glyphosate alone. This is only one year's results and these treatments need to be evaluated further.

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 5, 2014	**Variety:**	see summary
Replicated:	4 times	**Population:**	106,000 seeds/A
Soil Type:	Clay loam, 3% OM, pH 7.6 (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	79 A[c]	98 A	97 A	99 A	20.4 B	25.5 A
Sharpen (2 fl oz/A) + MSO + AMS	77 A	98 A	98 A	99 A	9.5 C	21.9 B
Roundup (22 fl oz/A) + AMS	68 B	95 B	88 B	99 A	21.2 B	22.1 B
Untreated	60 C	94 C	75 C	97 B	25.8 A	26.9 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', 'Zenith', and 'Eclipse' at an early application timing (50% of pods were yellow), and a standard application timing (80% of pods were yellow). 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. Growers should not make preharvest applications at this earlier timing. Data were averaged over all varieties. Differences in black bean desiccation between the application timings was greatest 3 DAT, with Gramoxone and Sharpen demonstrating the quickest desiccation at the early timing. By 7 DAT, desiccation for preharvest treatments were at acceptable levels, except for Roundup, which took up to 14 DAT for maximum desiccation. Lower yields were observed with all preharvest herbicides at the early application timing and with Sharpen and Roundup at the standard timing. The lowest yield was observed with early applications of Sharpen, which may be due the quicker speed of activity halting dry bean development, again preharvest treatments should never be made this early. Overall, the speed of desiccation and yield were influenced by application timing and desiccation treatment. Beans from this trial will be canned and evaluated for color retention. This research was supported by MSU Project GREEEN, 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 27, 2014	**Variety:**	see summary
Replicated:	4 times	**Population:**	106,000 seeds/A
Soil Type:	Clay loam, 3% OM, pH 7.6 (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	88 B[c]	96 A	99 A	99 A	18.0 AB	19.6 A
Sharpen (2 fl oz/A) + MSO + AMS	91 A	95 A	99 A	99 A	15.1 C	17.0 B
Roundup (22 fl oz/A) + AMS	76 C	96 A	98 B	99 A	17.2 B	17.9 B
Untreated	68 D	92 B	97 C	98 B	19.0 A	20.0 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 a later planting date. Desiccation treatments of Gramaxone, Sharpen, and Roundup were applied to three varieties: 'Zorro', 'Zenith', and 'Eclipse' at an early application timing (50% of pods were yellow), and a standard application timing (80% of pods were yellow). 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. Growers should not make preharvest herbicide applications to dry beans when less than 80% of the pods are yellow. Data were averaged over all varieties. Similar to the earlier planting date, the greatest difference in black bean desiccation between application timings were observed at 3 DAT, with Sharpen demonstrating rapid desiccation at the early application timing. By 7 DAT, desiccation for all preharvest treatments was above 95%. Lower yields were observed with Sharpen and Roundup, with early applications of Sharpen having the greatest impact. This may be due to the quick activity of Sharpen halting the continued development of the dry bean. Again preharvest treatments should never be made this early. Overall, the speed of desiccation and yield for the later planted dry beans were influenced by application timing and desiccation treatment. Beans from this trial will be canned and evaluated for color retention. This research was supported by MSU Project GREEEN, The Michigan Dry Bean Commission, and the Michigan Department of Agriculture Specialty Crops grant.

2014 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 sixth season at the 320 acre Saginaw Valley Research & Extension Center (SVREC) research farm near Frankenmuth in 2014. A total of 2,742 yield trial plots (20 tests) were harvested in 2014 and ~3000 single plant selections were made in the early generation nurseries. Yield trials at SVREC included 36-entry standard navy test; 30-entry standard black test; 48-entry prelim navy tests; 36-entry and 72-entry prelim black tests; 36-entry standard GN; 30-entry standard pinto test; 36-entry standard red/pink test; 32-entry prelim GN test; 40-entry, 80-entry, and 56-entry prelim red tests; 24-entry drought trial and 48-entry Co-op and regional test that includes pinto, GN, red and pinks. At the Montcalm Research Farm near Entrican yield trials included 30-entry bush cranberry test; 36-entry kidney test; 30-entry preliminary kidney test; and 64-entry white mold test. Two 36-entry certified organic trials were conducted in Tuscola and Sanilac counties. All trials were direct harvested except for kidney and cranberry beans at Montcalm.

Bean yields at SVREC were exceptional in 2014 averaging 35 cwt/acre with top yields exceeding 50 cwt in some trials. Temperatures were moderate not exceeding 90F and rainfall for 4-summer months was 2.2 inches above the 30-year average. The extra rainfall was well distributed with most falling in July so there was no stress to the crop due to limited moisture or high temperatures at the critical flowering period. White mold was a serious problem in the commercial crop and on adjacent farms but not in research plots where the extra tile drainage allowed for more rapid drying of the soil surface following rain. The trials at SVREC received no post herbicide treatment or any insecticide or fungicide treatments in 2014. The highest yield potential was in the preliminary black and small red trials and the navy beans underperformed in 2014. Overall the top yielding navy lines were generally later, and did not exhibit the best dry down at maturity. The new black bean variety Zenith was the top yielding cultivar in all trials. There was a fairly severe outbreak of common bacterial blight and the greatest damage occurred in the medium seeded great northern and pinto trials. Good levels of resistance were observed in the pink bean trials and in some of the new black bean lines.

Plots at Montcalm had similar rainfall pattern as SVREC but the supplemental irrigation did contribute to the development of white mold. Incidence in the National Sclerotinia Initiative nursery was very high in the susceptible checks and proved to be an excellent screening nursery. The major problem at Montcalm was the presence of severe root rots mainly Fusarium that was accentuated by the wet and cooler soil conditions early in the season. In disease samples sent for lab analysis, *Pythium* species were detected in addition to *Rhizoctonia solani* and various *Fusarium* species including *F. oxysporum* or wilt and *F. solani* complex. Despite the severe disease pressures, yields in kidney beans approached 40 cwt/acre and many lines with tolerance to root rot and with resistance to common bacterial blight were identified in kidney bean nurseries. The wet conditions caused a delay in applying post herbicide treatments and additional nitrogen was applied as a side dress to help overcome early problems with root diseases. Deer feeding was a major problem in the trials and will need to be addressed in future years. The white mold trial was direct harvested while the standard kidney and cranberry trials were pulled and windrowed.

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. 4101: Standard Navy Bean Yield Trial

This 36-entry trial included standard commercial navy bean varieties, and advanced lines from the MSU breeding program, which carry the N-prefix. Yields ranged from 26.2 to 40.8 cwt/acre with a mean of 34.9 cwt/acre. The trial was fairly uniform and variability was well controlled (CV=9.9%) and the LSD needed for significance was 4.1 cwt/acre. Only four entries significantly out-yielded the test mean and included two top yielding lines from 2013 navy trials. The newly released variety Alpena performed well, slightly out yielding Merlin and Medalist by ~2 cwt/acre and significantly out yielded Vista and Indi. The line continues to dry down well in contrast to other current varieties that retain green stem at harvest. The new OAC variety Fathom was comparable to Hyland T9905, but with lower agronomic desirability rating due to lodging problems. Canning tests will be conducted on all new MSU breeding lines before being considered for release.

Expt. 4102: Standard Black Bean Yield Trial

This 30-entry trial included the standard commercial black bean varieties and advanced breeding lines. Yields ranged from 28.2 to 46.1 cwt/acre with a test mean of 37.3 cwt/acre. Variability was low in this test, (CV=7.6%) and the LSD was 3.3 cwt/acre. Eight entries significantly outyielded the test mean and these included a new line ND071206 from NDSU. These lines had a mixed range of backgrounds with parents from CIAT, Puerto Rico and NDSU and some lines had seed sizes outside the normal range for black beans. Zorro fell outside this group and below GTS-1103, Shania, and Eclipse in performance. The new release Zenith, which was the top yielding entry in 2011-13 ranked below Zorro this season due to higher pressure from common bacterial blight in this trial. Zenith exhibits an excellent combination of high yield potential, erectness, dry down and superior canning quality. Canning tests will be conducted on breeding lines to ensure only those with canning quality similar to Zenith are advanced.

Expt. 4103: Preliminary Navy Bean Yield Trial

This 48-entry trial included new navy bean lines and check varieties. Yields ranged from 31.8 to 45.1 cwt/acre with a mean of 39.3 cwt/acre. Variability was low in this 3-rep test (CV=7.1%) and the LSD was 3.8 cwt/acre and overall yields were better than advanced navy trial 4101. Three lines significantly outyielded the test mean. Merlin was the highest yielding variety ahead of Alpena and Medalist in the trial. This trial exceeded the yield of the standard navy trial by 5 cwt and suggested the high yield potential of these new lines. Future advances of many of the new breeding lines will largely depend on disease reactions and canning quality of the entries.

Expt. 4104: Preliminary Black Bean Yield Trial

This 36-entry trial included new black bean lines and check varieties. Yields ranged from 8.8 to 51.3 cwt/acre with a mean of 34.3 cwt/acre. Test 4104 was the top yielding test in 2014. Variability was high in this 3-rep test (CV=14.0%) and the LSD was large at 6.5 cwt/acre. Seventeen lines significantly outyielded the test mean and the top yielding entry produced an all-time high yield for the SVREC farm. Zenith was the top yielding variety followed by Zorro, Shania, and Jaguar. This trial also included a series of non-nodulating black breeding lines derived from crossing Zorro with non-nodulating navy bean R99. These lines were developed with the intent they might provide

a useful black bean check for future biological nitrogen fixation studies, but proved to be poorly suited to field conditions and will be discarded. Their poor performance contributed to the higher variability present in this trial. Many of the lines in this trial 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. 4106: Standard Great Northern Bean Yield Trial

This 36-entry trial included MSU great northern breeding lines (G-prefix) and standard commercial check varieties and otebo bean lines. The test ranged in yield from 17.4 to 34.8 cwt/acre with a mean yield of 28.1 cwt/acre. Variability was moderate (CV= 11.0%) resulting in a LSD value of 3.6 cwt/acre needed for significance. Five breeding lines significantly outperformed the test mean and included the otebo breeding line G12901 and four GN lines, two of which were derived from crosses with Eldorado pinto. Matterhorn yielded just above the test mean, and 3 cwt/acre above Powderhorn. Fuji otebo was the lowest yielding entry, underscoring the need for new upright varieties in the otebo class such as G12901 that produced nearly double the yield in this trial. 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' confectionary paste prior to any decision on release.

Expt. 4107: Standard Pinto Bean Yield Trial

This 30-entry trial included standard commercial pinto bean varieties Eldorado and La Paz, and advanced breeding lines from the MSU breeding program with the P-prefix. The trial ranged in yield from 29.0 to 39.5 cwt/acre with a mean of 34.7 cwt/acre. Variability was moderate (CV=10.8%) in this trial and the LSD needed for significance was 4.4 cwt/acre. The top yielding variety Eldorado was the only entry that significantly out-yielded the test mean at 39.5 cwt/acre. La Paz ranked 10th in the trial yielding 36.0 cwt/acre. The remainder of the top 10 highest yielding entries were new P14 lines. This group included two groups of sibling families, one derived from crossing with CSU variety Long's Peak and the other with leafhopper tolerant breeding lines. Eldorado continues to show its yield potential: was 2nd in 2010 and 2013 and 1st in 2011, 2012, and 2014. Only those high-yielding entries with more upright architecture and canning quality equivalent to Othello will be advanced in 2015.

Expt. 4108: 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 27.5 to 44.5 cwt/acre with a mean yield of 35.0 cwt/acre. Variability was low (CV=7.7%) resulting in a LSD value of 3.2 cwt/acre for significance. Nine breeding lines including private small red line SR09303 and MSU pink variety Rosetta significantly outperformed the test mean. Sibling family R12843-45 were among three of the top six yielding lines; two of the siblings were also the top yielding MSU small red lines in the 2013 trial. Three new S14 lines were also among the group that significantly exceeded the test mean. Small red variety Merlot yielded equivalent to the test mean, while pink variety Sedona yielded below test mean and significantly lower than new pink variety Rosetta. Many of the pink lines showed high levels of resistance to common blight. Merlot

had an overall poor performance year combined with delayed maturity in many locations similar to 2011-2013. Progress in small red breeding program has been limited by a lack of useful variability and inability to combine performance with upright architecture, disease resistance and suitable canning quality in new lines. All lines will be evaluated for canning quality and BCMV reaction prior to advancing to 2015 trials.

Expt. 4109: Preliminary Great Northern Bean Yield Trial

This 32-entry trial included new great northern bean lines and otebo lines along with check varieties. Yields ranged from 25.8 to 46.8 cwt/acre with a mean of 38.8 cwt/acre. Variability was well controlled in this 3-rep test (CV=4.6%) and the LSD was 2.4 cwt/acre. Eight lines significantly out-yielded the test mean, with top yielding entry derived from a cross with Eldorado pinto demonstrating its potential as a parent to enhance yield in the GN class, similar to results observed in 2013. Matterhorn and Powderhorn checks yielded below the test mean and Matterhorn out preformed Powderhorn in 2014. Otebo beans G12901 and Fuji were also included in this test, and G12901 yielded 37.3 cwt/acre, equivalent to Powderhorn GN, whereas Fuji was the lowest yielding entry at 25.8 cwt/acre. Future advances of many of the new breeding lines will largely depend on disease reactions and canning quality of the entries.

Expts. 4110, 4111, 4112: Small Red Bean Genetic Yield Trials

The three genetic studies were conducted as yield trials to evaluate three recombinant inbred line (RIL) populations consisting of 40 (4110); 80 (4111) and 56 (4112) individuals. The populations were derived from crosses between Merlot and SER95 (4110); SER48 (4111); and SER94 (4112). The SER lines were developed at CIAT Colombia as sources of drought tolerance in the small red seed type. Yields ranged from 14.6 to 41.6 cwt/acre with a mean of 28.5 cwt/acre in test 4110. Variability was moderate in this 3-rep test (CV=10.2%) and the LSD was 4.0 cwt/acre. Eleven lines significantly out-yielded the test mean including the Merlot variety. The SER lines yielded below the test mean. Yields ranged from 18.8 to 42.7 cwt/acre with a mean of 30.8 cwt/acre in test 4111. Variability was moderate in this 3-rep test (CV=8.9%) and the LSD was 3.7 cwt/acre. Fifteen lines significantly out-yielded the test mean but did not include the Merlot variety. The SER lines yielded below the test mean. Top yielding entry R13752 was the third highest yielding line from this test in 2013. Yields ranged from 22.3 to 50.5 cwt/acre with a mean of 35.6 cwt/acre in test 4112. Variability was moderate in this 3-rep test (CV=8.8%) and the LSD was 4.2 cwt/acre. Fourteen lines significantly out-yielded the test mean. R12844 was top yielding entry at 50.5 cwt/acre, significantly out performing commercial check Merlot by 13.7 cwt/acre. The SER lines 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 in all three populations. Some lines with acceptable seed quality will be entered in the standard small red yield trials in 2015.

Expt. 4113: 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 48-entry trial ranged in yield from 19.3 to 47.8 cwt/acre with a mean of 35.4 cwt/acre. Variability was low (CV=7.0%) resulting in a LSD value (3.4 cwt/acre) for significance. As a result thirteen lines were significantly higher in yield than the test mean including the MSU varieties Eldorado and Powderhorn, the new Flor de Mayo variety Gypsy Rose and the private variety La Paz. In the top group were pinto, great northern, small red from MSU, USDA-WA, Colorado, and Idaho. Several new slow darkening pintos SF103-8, 23ST-27 from NDSU, and L11PS-series from Gentec were included in this trial. The NDSU lines exhibited upright habit better suited to MI conditions with average yield potential. The Gentec lines closely resembled the variety Othello. The new tebo line G12901 significantly outyielded current variety Fuji in this trial by a margin of 10 cwt/acre. 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. Canning quality will also be evaluated for all entries in this trial.

Expts. 4914 & 4915: Organic Dry Bean Yield Trials

Two 36-entry yield trials were conducted on certified organic grower farms in Tuscola and Sanilac counties following standard organic agronomic practices. Entries in these trials consisted of a diverse mix of bean breeding lines and commercial varieties across 12 seed types. Previous organic trials have consisted of only navy and black beans, but additional seed types were added this year to evaluate if they were suited to organic production systems and could offer viable alternatives to organic growers. Both trials were planted mid-June and enjoyed plentiful soil moisture and moderate temperatures.

Test 4914 suffered from excessive rainfall in July that damaged parts of the trial, leading to higher variability (CV=18.2%) and LSD (4.7cwt/acre). White mold was also a contributing factor, with moderate disease severity. Grasses were the predominant weed control challenge. Yields ranged from 14.7-31.5cwt/A with a mean of 21.9cwt/acre. Eldorado pinto produced the highest yield, while a range of black, pinto, and small red breeding lines also yielded > 25cwt/acre. The pink bean Rosetta was the second highest yielding commercial variety at 25.6 cwt/acre. The three kidney bean varieties were among the lowest performers, suggesting they may be more challenging to produce in this region under organic conditions.

Test 4915 was less variable (CV=11.2%) resulting in a lower LSD (1.8cwt/acre), although yields were generally lower with a trial mean of 13.7cwt/acre. Severe white mold infection greatly reduced yields, despite the more vigorous plant growth compared to the Caro plot. Broadleaves (lambsquarter, pigweed, nightshade) were the predominant weeds present. Harvest conditions were challenging, and further decreased measured yield. Eldorado pinto was also the highest yielding variety at this location, but a range of commercial varieties performed well including Rosetta pink, Zenith black, Merlot small red, Powderhorn great northern, and Merlin navy with yields in the 17.5-22 cwt/acre range. Kidney beans were also lower yielding in this trial, although the new white kidney Snowdon significantly outyielded the other two kidney bean varieties. Overall these trials suggest that there are current commercial varieties in a range of seed classes that are suited to organic production conditions and could be grown in addition to the current focus on organic black beans.

Expt. 4216: Standard Kidney Bean Yield Trial

This 36-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 (4x total 2.70”). A group of yellow bean breeding lines from both MSU and OSU were also tested. Yields ranged from 14.1 to 39.6 cwt/acre with a mean of 32.4 cwt/acre. Variability was moderate (CV=8.5%) resulting in a LSD value of 3.7 cwt/acre needed for significance. Eight breeding lines significantly out-yielded the test mean, including DRK, LRK, WK, and yellow lines. The top yielding entry K11306 appears to have resistance to root rot and is under consideration for advancement. The program is becoming interested in yellow beans and Y11405 was among the top yielders. Four yellow beans from OSU (DBY-code) were evaluated in 2014 and despite showing poor adaptation, floppy growth habit and pale yellow seed color, two lines yielded with Clouseau and Snowdon, while the other two fell at the bottom of the trial. The DBY-lines carry resistance to BCMV whereas Y11405 is susceptible. Clouseau, Snowdon, CELRK, and new NDSU DRK variety Talon yielded above the test mean, whereas Yeti, Red Hawk, GTS-104, Redcoat, Beluga, Majesty, Montcalm and Inferno were below the mean. Majesty produced a seed size of 84 g compared to 67g for Montcalm. The most severe disease pressure in the trial was severe root rot (Fusarium) brought on by cool wet conditions following planting. Prevalence of root rot severely reduced stands and overall early season vigor in many plots, but lines with tolerance to the disease were identified. New LRK variety Rosie from NDSU was the lowest yielding variety in the trial, suggesting it may not be well adapted to MI. 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 2015.

Expt. 4217: Preliminary Kidney Bean Yield Trial

This 30-entry trial was conducted on the MRF to compare new and standard kidney bean varieties under supplemental irrigation (4x total 2.70”). Yields ranged from 23.4 to 42.3 cwt/acre with a mean of 34.9 cwt/acre. Variability was moderate (CV=8.5%) in this 3-rep test and the LSD needed for significance was 4.1 cwt/acre. Seven lines significantly out-yielded the test mean and included Snowdon and Clouseau. Several progeny of Snowdon were among the top yielding lines, with both WK and LRK seed types. New DRK lines were generally lower yielding, and the variety Red Hawk also yielded below the test mean. The low yielding entry K11925 was the largest seeded fabada line (102g) illustrating the difficulty of combining yield with large seed size. Only those entries with acceptable seed size and canning quality will be advanced in 2015.

Expt. 4218: Standard Bush Cranberry Bean Yield Trial

This 30-entry trial was conducted on the MRF to compare new and standard bush cranberry bean varieties under supplemental irrigation (4x total 2.70"). Yields ranged from 22.5 to 43.4 cwt/acre with a mean of 33.9 cwt/acre. Variability was low (CV=7.1%) and the LSD needed for significance was 3.3 cwt/acre. Six lines significantly out-yielded the test mean, including three new breeding lines and the Etna check. These include a family of lines with superior agronomics but lack the large seed size (57g) needed in the cranberry market class. Etna had the largest seed size at 75 g/100 seed. Overall the cranberry beans on the farm were the most damaged by root diseases in 2014 and the class lacks genetic potential due to its very narrow genetic base. Only those entries equivalent to Etna in seed size with improved yield, earlier maturity and canning quality will be advanced in 2015.

Expt. 4219: 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, NDSU, USDA-WA and Europe. 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 6 times for a total of 4.00" 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 11.1 to 100% and pressure was high with a mean value of 48.6% in 2014. The test ranged in yield from 2.2 to 33.8 cwt/acre with a mean yield of 20.6 cwt/acre. Variability was high (CV=16.5%), thus a high LSD value (4.6 cwt/acre) was needed for significance. As a result 15 lines significantly out-yielded the test mean and included the Eldorado, Powderhorn, Rosetta, Zenith, and Zorro varieties. Among those lines exceeding the test mean were the new slow darkening pinto SF103-8 (Santa Fe ancestry) from NDSU, pinto line USPT-WM-12 from USDA-WA for the fifth year, great northern 031-A-11 from USDA-WA and otebo G12901and R12844 top yielding small red from MSU. Kidney and cranberry entries, including resistant check G122, yielded poorly in this trial, largely due to stand problems associated with root rot and limitations with direct harvest. ASR1002 rice bean from Europe was the lowest yielding entry, largely due to tiny seed size and general lack of adaptation. As in past years pintos, great northerns 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. The biggest surprise was the low yield of Merlin and Alpena navy bean varieties yielding less than Beryl with significantly less white mold infection. The root rot diseases may have damaged the small white seeded beans more than other classes as the top yielding navy only yielded 24cwt/acre. 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 across all market classes.

4120: National Dry Bean Drought Nursery

This 24-entry trial was conducted at the SVREC to evaluate a series of breeding lines identified as possessing improved levels of drought stress through shuttle breeding efforts between University of Nebraska and Tropical Agriculture Research Station (TARS) in Puerto Rico. The trial was replicated by colleagues at four locations across the U.S and P.R. The seed types ranged from small blacks and reds to great northern types. Yields ranged from 19.8 to 43.2 cwt/acre with a mean of 33.5 cwt/acre. Variability was moderate (CV=11.4%) and the LSD needed for significance was 5.3 cwt/acre. Seven lines significantly out-yielded the test mean, including varieties Zenith, Stampede, Powderhorn, and Zorro. Matterhorn also yielded above the mean, while Merlot ranked below the mean and equivalent to GN variety Marquis. Although conditions were ideal this season and plots suffered no heat or drought stress, the highest yielding breeding line was SB-DT1, identified previously as possessing drought tolerance. TARS-MST1, also known to tolerate multiple abiotic stresses, ranked just below Zorro. These results are encouraging as they suggest these lines developed specifically to tolerate stress also have similar yield potential as the local checks when grown under ideal conditions. The group at MSU will continue to do more in depth physiological studies on the ten top entries.

Early Generation Breeding Material grown in Michigan in 2014

F3 through F5 lines

Navy and Black - 363 lines
Pinto - 72 lines
GN - 245 lines
Pinks and Reds - 32 lines
Kidneys (DR, LR, White) - 51 lines

F2 populations

Navy and Black -164 populations
Pinto - 68 populations
GN - 100 populations
Pinks and Reds - 104 populations
Kidneys (DR, LR, White) – 337 populations
Yellow – 18 populations

F1 populations: 839 different crosses among ten contrasting seed types.

2014 DRY BEAN YIELD TRIALS

EXPERIMENT	TITLE	PLANTING DATE	LOCATION	ENTRIES	DESIGN	REPS	HARVEST METHOD
4101	STANDARD NAVY BEAN YIELD TRIAL	06/04/14	SVR&EC FRANKENMUTH	36	SQ. LATTICE	4	DIRECT HARVESTED
4102	STANDARD BLACK BEAN YIELD TRIAL	06/04/14	SVR&EC FRANKENMUTH	30	REC. LATTICE	4	DIRECT HARVESTED
4103	PRELIMINARY NAVY BEAN YIELD TRIAL	06/04/14	SVR&EC FRANKENMUTH	48	ALPHA LATTICE	3	DIRECT HARVESTED
4104	PRELIMINARY BLACK BEAN YIELD TRIAL-1	06/04/14	SVR&EC FRANKENMUTH	36	SQ. LATTICE	3	DIRECT HARVESTED
4105	PRELIMINARY BLACK BEAN YIELD TRIAL-2	06/04/14	SVR&EC FRANKENMUTH	72	REC. LATTICE	3	NOT HARVESTED
4106	STANDARD GREAT NORTHERN YIELD TRIAL	06/04/14	SVR&EC FRANKENMUTH	36	SQ. LATTICE	4	DIRECT HARVESTED
4107	STANDARD PINTO BEAN YIELD TRIAL	06/04/14	SVR&EC FRANKENMUTH	30	REC. LATTICE	4	DIRECT HARVESTED
4108	STANDARD PINK & SMALL RED YLD TRIAL	06/05/14	SVR&EC FRANKENMUTH	36	SQ. LATTICE	4	DIRECT HARVESTED
4109	PRELIMINARY GREAT NORTHERN YLD TRIAL	06/05/14	SVR&EC FRANKENMUTH	32	ALPHA LATTICE	3	DIRECT HARVESTED
4110	PRELIMINARY RED GENETIC YIELD TRIAL-1	06/05/14	SVR&EC FRANKENMUTH	40	ALPHA LATTICE	3	DIRECT HARVESTED
4111	PRELIMINARY RED GENETIC YIELD TRIAL-2	06/05/14	SVR&EC FRANKENMUTH	80	ALPHA LATTICE	3	DIRECT HARVESTED
4112	PRELIMINARY RED GENETIC YIELD TRIAL-3	06/05/14	SVR&EC FRANKENMUTH	56	REC. LATTICE	3	DIRECT HARVESTED
4113	MIDWEST & CO-OP. REGIONAL TRIAL	06/05/14	SVR&EC FRANKENMUTH	48	ALPHA LATTICE	3	DIRECT HARVESTED
4914	ORGANIC YIELD TRIAL	06/16/14	CARO	36	SQ. LATTICE	4	DIRECT HARVESTED
4915	ORGANIC YIELD TRIAL	06/20/14	SNOVER	36	SQ. LATTICE	4	DIRECT HARVESTED
4216	STANDARD KIDNEY YIELD TRIAL	06/13/14	MRF MONTCALM	36	SQ. LATTICE	4	ROD PULLED
4217	PRELIMINARY BUSH KIDNEY YIELD TRIAL	06/13/14	MRF MONTCALM	30	REC. LATTICE	3	ROD PULLED
4218	STANDARD CRANBERRY YIELD TRIAL	06/13/14	MRF MONTCALM	30	REC. LATTICE	4	ROD PULLED
4219	WHITE MOLD NATIONAL YIELD TRIAL	06/13/14	MRF MONTCALM	64	SQ. LATTICE	3	DIRECT HARVESTED
4220	NATIONAL DRY BEAN DROUGHT TRIAL	06/05/14	SVR&EC FRANKENMUTH	24	ALPHA LATTICE	3	DIRECT HARVESTED

SVR&EC: SAGINAW VALLEY RESEARCH & EXTENSION CENTER; MRF: MONTCALM RESEARCH FARM

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.

ENTRICAN: FERTILIZER BROADCAST: 200 POUNDS OF 19-10-19 PRIOR TO PLANTING. 50 POUNDS 46-0-0 SIDE DRESSED ON JULY 17.
HERBICIDES APPLIED: 2 PT. SONALAN/1.25 QT EPTAM/2PT. DUAL PPI. 4 OZ. RAPTOR/1 PT REFLEX/1 PT BASAGRAN ON 7/10/14.
PESTICIDES APPLIED: 9 OZ. ASANA ON JULY 10.
IRRIGATION APPLIED: 4.00 INCHES ON WHITE MOLD TRIALS - 6 APPLICATIONS; 2.70 INCHES ON STANDARD YIELD TRIALS - 4 APPLICATIONS

EXPERIMENT 4101 STANDARD NAVY YIELD TRIAL								PLANTED: 6/4/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
N13131	N09175/N08007	25	40.8	21.7	47.0	94.0	1.0	53.0	5.5
N11264	N08003/MEDALIST	4	39.9	21.6	46.0	94.0	1.0	48.5	4.0
N12467	N08010/N08007	8	39.1	17.4	47.0	93.0	1.0	54.5	5.5
N13120	N08003/N05324	30	39.0	22.7	46.0	94.0	1.5	51.5	5.0
N12447	B09174/N09056	6	38.9	22.6	46.0	95.0	1.0	55.0	5.8
I14503	OB-1723-03	32	38.9	18.5	46.0	98.0	2.0	50.5	3.8
N13139	N05324/MEDALIST	24	38.9	19.9	45.0	94.0	1.5	52.5	4.8
N13142	N08007/N09046	29	37.7	19.3	48.0	96.0	1.0	52.5	5.5
N12454	B09174/N09056	2	37.6	21.2	46.0	95.0	1.0	53.0	4.8
N13115	N08003/N05324	31	37.5	21.1	45.0	94.0	1.5	50.5	5.8
N12457	B09174/N09056	10	37.1	20.3	46.0	93.0	1.0	49.0	5.3
N11283	MEDALIST/N08003, **ALPENA**	13	36.8	19.2	46.0	94.0	1.0	50.5	4.5
N12440	N09056/N09175	1	36.6	20.6	47.0	95.0	1.0	49.5	5.0
I08902	**HYLAND T9905**	11	36.5	22.9	46.0	96.0	1.5	49.5	4.0
I14502	**FATHOM**	36	36.1	24.9	41.0	99.0	2.0	49.0	3.0
I14504	OB-4048-03	34	36.0	19.7	47.0	96.0	2.0	47.5	3.8
N11257	N07009/MEDALIST	16	35.8	19.2	46.0	93.0	1.0	50.0	5.0
N11298	MEDALIST//B05054/B04588	15	34.9	21.2	46.0	95.0	1.0	49.5	4.0
I11264	COOP 03019, **MERLIN**	5	34.8	20.9	47.0	98.0	2.0	49.5	4.0
N13140	N05324/MEDALIST	22	34.7	19.3	46.0	94.0	1.0	52.0	4.8
I08958	Mayflower/Avanti, **MEDALIST**	20	34.5	19.9	47.0	96.0	1.5	52.5	3.8
N13124	N08007/N05324	23	34.5	18.9	46.0	94.0	1.0	51.5	5.3
N13122	N08003/N05324	33	34.4	23.1	45.0	94.0	1.5	51.0	5.0
N12453	N09065/N09050	12	34.3	21.8	45.0	93.0	1.5	48.5	4.8
N14247	B11343/B11271	17	33.4	18.9	47.0	95.0	1.0	58.0	5.8
N13135	N10102/N09046	26	33.3	18.4	48.0	94.0	1.0	50.5	4.8
N12466	N08010/N08007	7	33.1	17.4	48.0	94.0	1.0	48.0	4.5
N13108	VIGILANT//AVALANCHE/N09054	35	32.8	21.4	46.0	94.0	1.0	47.5	4.0
N11231	N05311//BMD12/B04587	9	32.0	17.1	46.0	93.0	1.0	48.0	4.5
I14527	ND070326	27	31.4	20.9	47.0	94.0	1.0	49.5	4.3
I92002	C-20*3//GTS-0801/Seafarer, **VISTA**	3	31.2	19.2	47.0	95.0	2.0	51.0	4.0
I12301	**INDI**	21	30.3	18.7	46.0	94.0	1.0	49.0	4.0
N14246	B10238/B11271	14	30.1	16.9	46.0	93.0	1.0	49.5	5.0
N13136	N10102/B09200	28	29.2	18.1	43.0	93.0	1.0	48.0	3.8
I13416	ND02-220-01N	19	28.3	20.4	48.0	93.0	1.5	50.0	2.8
N11277	N08010/N08007	18	26.2	18.5	48.0	93.0	1.0	50.0	4.0
MEAN (36)			34.9	20.1	45.9	94.3	1.3	50.6	4.5
LSD (.05)			4.1	1.0	1.9	1.5	0.6	3.6	0.8
CV (%)			9.9	4.2	2.5	0.9	26.7	4.2	15.7

EXPERIMENT 4102 STANDARD BLACK YIELD TRIAL								PLANTED: 6/4/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
B12720	B09175/Eclipse	18	46.1	26.7	47.0	94.0	1.0	50.5	5.0
B13218	B09175/I09215	26	43.7	28.6	47.0	96.0	1.5	53.5	5.0
B12724	B09184/B09135	23	43.5	22.5	47.0	95.0	1.0	51.5	5.5
B11371	B05055/B04587	5	42.9	22.1	47.0	95.0	1.0	52.0	5.8
B11363	B04644/B07554	17	41.3	22.8	48.0	94.0	1.0	51.5	4.8
I14528	ND071206	8	41.2	23.4	48.0	97.0	2.0	52.0	3.8
B13223	PR0443-151/B09175	28	41.1	24.4	47.0	96.0	2.0	52.5	5.5
B13225	PR0443-151/B09175	24	41.0	24.2	47.0	96.0	2.0	53.0	4.8
B12715	Zorro/N09056	21	40.3	21.0	46.0	93.0	1.0	49.0	4.0
I13436	**GTS-1103**	13	39.5	23.7	48.0	96.0	2.0	52.5	4.0
B13204	B09174/VCW54-1	25	39.2	27.5	47.0	96.0	2.0	51.0	5.0
B13220	B09175/TARS-MST1	27	38.4	22.5	46.0	94.0	1.5	51.0	5.0
I07116	T-39/Midnight, **SHANIA**	9	37.8	20.7	48.0	97.0	2.0	51.0	3.3
I14518	96-148	12	37.5	25.6	48.0	96.0	1.5	51.0	2.5
B12712	B07554//Jaguar/B07554	7	37.4	21.2	46.0	93.0	1.5	50.5	4.8
I03390	ND9902621-2, **ECLIPSE**	30	37.4	20.9	47.0	93.0	1.0	51.5	4.5
I13419	NDF09304	6	37.1	19.2	46.0	93.0	1.0	48.5	4.8
B11311	B04587//ZORRO/DPC-1	19	36.8	20.2	47.0	94.0	1.0	50.0	5.0
B04554	B00103*/X00822, **ZORRO**	20	35.5	22.2	48.0	95.0	1.0	53.0	4.5
I14505	COB-83-03	14	35.2	23.0	47.0	95.0	1.5	49.0	3.5
B11364	B04644/B07554	16	35.1	22.7	47.0	94.0	1.5	51.0	4.3
B12711	B07554//Jaguar/B07554	10	35.1	23.7	48.0	93.0	1.0	49.5	4.3
B11312	B04587//B05070/B05044	2	34.3	21.9	47.0	94.0	1.0	48.5	4.0
B13213	B09175/JAGUAR	29	34.3	26.0	47.0	93.0	1.0	46.5	3.8
B10244	B04644/ZORRO, **ZENITH**	1	34.2	22.0	47.0	92.0	1.0	50.5	4.0
B12710	B07554//Jaguar/B07554	4	33.0	24.1	47.0	93.0	1.0	46.0	3.8
B12721	B09175/Eclipse	3	32.8	24.3	47.0	93.0	1.0	49.0	4.5
I81066	SEL-BTS,**T-39**	22	30.5	21.3	48.0	96.0	3.0	46.0	2.8
I14506	COB-698-03	15	28.4	22.5	47.0	94.0	1.5	44.5	3.5
B12713	B07554//Jaguar/B07554	11	28.2	20.8	47.0	92.0	1.0	46.5	4.0
MEAN (30)			37.3	23.0	46.9	94.2	1.4	50.1	4.3
LSD (.05)			3.3	1.4	1.0	1.9	0.6	3.1	0.7
CV (%)			7.6	5.0	1.3	1.2	24.7	3.6	12.9

EXPERIMENT 4103 PRELIMINARY NAVY YIELD TRIAL								PLANTED: 6/4/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
N14230	N11275/N11256	30	45.1	18.4	49.0	95.0	1.7	54.7	6.3
N14231	N11275/N11264	31	44.0	22.6	46.0	94.0	1.3	53.0	5.3
N14215	N11256/N11292	15	43.4	20.8	46.0	93.0	1.0	49.0	4.7
N14218	N11256/N11298	18	42.8	18.9	49.0	94.0	1.0	52.0	5.7
N14202	N11249/N11256	2	42.7	23.7	48.0	96.0	2.0	54.0	5.7
N14223	N11257/N11256	23	42.4	18.9	48.0	95.0	2.0	52.7	5.3
N14241	N11283/N11264	41	42.3	22.2	47.0	93.0	1.3	51.3	4.7
N14209	N11256/N11262	9	42.2	22.3	46.0	92.0	1.0	52.3	5.3
N14238	N11283/N11249	38	42.0	20.1	46.0	93.0	1.0	52.7	5.0
I11264	COOP 03019, **MERLIN**	47	41.7	21.2	47.0	96.0	1.7	51.3	4.0
N14240	N11283/N11264	40	41.6	20.3	47.0	93.0	1.3	50.3	4.7
N14208	N11256/N11262	8	41.6	21.9	45.0	92.0	1.0	51.7	4.7
N14229	N11275/N11256	29	41.5	18.0	46.0	94.0	1.0	52.7	6.0
N14206	N11256/N11258	6	41.5	20.0	46.0	93.0	1.0	50.3	5.7
N14212	N11256/N11262	12	41.3	20.9	47.0	94.0	1.0	50.7	5.7
N14243	N11284/N11277	43	41.2	19.6	48.0	93.0	1.0	51.7	5.7
N14214	N11256/N11278	14	40.9	24.2	47.0	94.0	1.7	52.7	3.7
N14217	N11256/N11292	17	40.8	18.1	47.0	93.0	1.0	52.0	5.7
N14201	N11249/N11256	1	40.8	19.2	49.0	95.0	1.3	54.7	6.0
N14216	N11256/N11292	16	40.3	20.0	47.0	93.0	1.0	50.0	5.3
N14205	N11256/N11258	5	40.2	19.7	46.0	93.0	1.0	50.7	5.3
N14221	N11257/N11249	21	40.1	20.9	46.0	94.0	1.0	51.7	5.3
N14224	N11257/N11280	24	40.0	19.2	47.0	93.0	1.0	50.3	5.0
N14210	N11256/N11262	10	39.9	24.3	46.0	93.0	1.0	52.0	5.3
N14204	N11256/N11249	4	39.7	17.6	46.0	93.0	1.0	51.0	5.0
N14233	N11277/N11282	33	39.6	19.9	45.0	92.0	1.0	50.0	4.3
N14219	N11257/N11249	19	39.5	19.5	45.0	94.0	1.0	52.3	5.3
N14242	N11283/N11282	42	39.3	20.7	47.0	93.0	1.0	48.7	4.0
N14225	N11257/N11280	25	39.1	20.8	46.0	94.0	1.3	52.0	5.3
N11283	MEDALIST/N08003, **ALPENA**	46	39.0	19.4	47.0	94.0	1.0	51.3	5.0
N14228	N11262/N11257	28	38.8	20.0	46.0	92.0	1.0	49.7	5.0
N14222	N11257/N11256	22	38.8	19.1	47.0	93.0	1.0	49.3	5.0
N14239	N11283/N11264	39	38.5	20.2	46.0	93.0	1.0	50.0	4.7
N14234	N11277/N11284	34	37.9	21.5	47.0	93.0	1.0	50.0	4.7
N14226	N11258/N11262	26	37.7	19.9	45.0	93.0	1.0	48.7	5.0

EXPERIMENT 4103 PRELIMINARY NAVY YIELD TRIAL								PLANTED: 6/4/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
N14237	N11283/N11249	37	37.5	20.5	47.0	92.0	1.0	49.0	4.3
N14211	N11256/N11262	11	37.1	17.2	47.0	92.0	1.3	50.3	5.0
N14213	N11256/N11278	13	37.0	18.7	47.0	93.0	1.0	48.7	5.0
N14232	N11275/N11264	32	37.0	21.8	47.0	93.0	1.0	51.0	4.3
I08958	Mayflower/Avanti, **MEDALIST**	48	36.9	20.5	46.0	95.0	1.3	51.0	4.3
N14235	N11277/MERLIN	35	36.8	18.2	50.0	93.0	1.0	49.7	5.7
N14207	N11256/N11258	7	36.0	17.1	46.0	93.0	1.0	49.7	4.7
N14203	N11249/N11283	3	34.7	17.4	46.0	93.0	1.0	51.0	5.3
N14227	N11262/N11249	27	34.6	18.1	46.0	92.0	1.0	50.0	4.0
N14244	B09197/B11334	44	34.0	17.1	49.0	93.0	1.0	49.7	4.7
N14220	N11257/N11249	20	32.1	17.0	45.0	92.0	1.0	49.7	5.0
N14236	N11283/N11249	36	31.9	19.8	46.0	92.0	1.0	48.7	4.0
N14245	B09197/N11283	45	31.8	17.4	45.0	94.0	1.0	49.7	4.7
MEAN (48)			39.3	19.9	46.4	93.4	1.1	50.9	5.0
LSD (.05)			3.8	0.8	1.5	0.9	0.3	2.0	0.8
CV (%)			7.1	3.0	1.9	0.7	20.5	2.9	11.0

EXPERIMENT 4104 PRELIMINARY BLACK YIELD TRIAL								PLANTED: 6/4/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
B14311	B11338/B10241	11	51.3	22.0	47.0	94.0	1.0	51.7	5.7
B14302	B09197/B11334	2	49.5	19.5	49.0	94.0	1.0	52.0	6.7
B11555	I82054/B07554	27	49.4	26.4	47.0	97.0	1.3	50.3	3.7
B14303	B09197/B11334	3	46.1	20.6	48.0	94.0	1.0	52.3	6.0
B14307	B11271/B11343	7	44.9	25.5	47.0	93.0	2.0	53.7	4.7
B14310	B11338/B10241	10	44.9	20.7	47.0	93.0	1.0	48.7	5.3
B10244	B04644/ZORRO, **ZENITH**	34	43.1	23.6	48.0	93.0	1.0	50.0	4.7
B14308	B11301/B10222	8	43.0	21.0	51.0	94.0	1.0	52.0	5.7
B11569	I82054/B07554	30	42.9	23.9	49.0	99.0	2.0	53.3	3.3
B14309	B11338/B10222	9	42.8	19.1	47.0	94.0	1.0	52.3	5.0
B11551	I82054/B07554	28	42.6	31.9	49.0	99.0	2.7	49.0	3.3
B11548	I82054/B07554	26	41.7	24.1	50.0	103.0	2.0	54.7	3.3
B14313	B11343/B09196	13	41.6	20.2	48.0	93.0	1.0	50.0	5.7
B14312	B11343/B09196	12	41.6	18.5	47.0	93.0	1.0	49.7	4.7
B11519	I82054/B07554	25	41.5	22.3	50.0	95.0	1.3	47.3	4.0
B04554	B00103*/X00822, **ZORRO**	33	41.4	22.5	47.0	95.0	1.3	50.7	4.7
B14316	I11265/B10202	16	41.2	18.5	51.0	93.0	1.0	49.3	4.7
I07116	T-39/Midnight, **SHANIA**	35	40.7	22.4	49.0	97.0	2.0	52.0	4.0
B95556	B90211/N90616, **JAGUAR**	36	40.4	21.1	47.0	92.0	1.0	49.3	4.0
B14304	B10213/B11271	4	38.0	19.8	50.0	94.0	1.7	52.3	5.7
B11567	I82054/B07554	29	38.0	24.2	52.0	96.0	2.0	50.3	3.7
B14314	B09197//B10203/I09129	14	37.6	23.6	49.0	94.0	1.7	51.0	5.0
B14301	N11277/B09197	1	37.6	21.1	48.0	93.0	1.0	48.0	5.0
B14305	B10213/B11343	5	36.4	20.1	49.0	92.0	1.0	49.3	4.7
B14315	B09197//B10203/I09129	15	36.0	20.5	48.0	93.0	2.0	48.3	4.7
I81010	JAPON3/MAGDALENE, **BUNSI**	32	34.0	22.4	40.0	98.0	2.7	45.0	3.3
B14306	B10222/B09197	6	31.2	19.2	51.0	93.0	1.0	51.0	5.0
I07112	R99 NO NOD	31	28.5	20.1	47.0	95.0	1.3	49.3	3.7
B14318	Zorro*3/R99	18	13.6	19.1	47.0	101.0	1.3	51.0	3.3
B14324	Zorro*3/R99	24	12.2	19.2	48.0	100.0	1.3	49.3	3.3
B14323	Zorro*3/R99	23	10.5	19.8	48.0	100.0	1.0	49.0	3.3
B14319	Zorro*3/R99	19	10.4	19.3	49.0	101.0	1.0	49.3	3.3
B14320	Zorro*3/R99	20	10.4	17.8	49.0	101.0	1.3	51.3	3.0
B14317	Zorro*3/R99	17	10.2	19.6	48.0	97.0	1.0	47.3	3.3
B14321	Zorro*3/R99	21	10.0	17.9	48.0	99.0	1.0	48.3	3.7
B14322	Zorro*3/R99	22	8.8	17.8	48.0	101.0	1.0	49.0	3.0
MEAN (36)			34.3	21.3	48.0	95.9	1.4	50.2	4.3
LSD (.05)			6.5	1.6	1.1	2.2	0.2	1.6	0.3
CV (%)			14.0	5.5	1.3	1.7	11.0	2.3	5.7

EXPERIMENT 4106 STANDARD GREAT NORTHERN YIELD TRIAL									PLANTED: 6/4/14
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
G13479	Eldorado/G09312	19	34.8	30.5	42.0	92.0	1.0	46.5	4.8
G12901	G07321/Fuji	1	33.7	27.0	46.0	95.0	1.0	49.5	4.0
G13444	G07302//G08274/P08410	23	33.1	36.2	40.0	91.0	1.0	46.5	5.0
G14530	P11518/G11405	35	32.9	35.0	48.0	95.0	1.0	58.5	5.0
G13423	Powderhorn//Eldorado/G09312	27	32.7	36.0	42.0	93.0	1.5	49.0	4.5
G13468	G08259//Eldorado/G08210	21	31.7	35.7	45.0	94.0	1.5	49.0	5.3
G11463	G07309//G04207/I07130	8	31.2	39.5	44.0	94.0	2.0	48.0	3.8
G13412	Powderhorn//G09301/Eldorado	14	30.3	31.7	43.0	91.0	1.0	48.5	4.5
G13450	G08217//P08372/P08410	20	30.2	33.1	42.0	91.0	1.0	48.0	5.3
G11438	G07309/P08401	2	30.1	38.9	43.0	94.0	1.5	46.0	4.0
G13408	Powderhorn//G09301/Eldorado	17	29.9	36.4	40.0	90.0	1.0	46.5	3.0
G11440	G07309/P08401	5	29.3	37.0	44.0	93.0	1.5	46.5	4.3
G13406	Powderhorn//G09301/Eldorado	16	29.2	34.6	40.0	91.0	1.0	46.5	3.8
G13452	G08217//P08372/P08410	28	29.1	32.6	41.0	90.0	1.0	48.0	5.0
G13456	G08217//P08372/P08410	25	28.9	30.0	42.0	90.0	1.0	47.0	5.0
G13424	Powderhorn//Eldorado/G09312	15	28.8	37.4	46.0	93.0	1.5	45.0	3.5
G93414	**MATTERHORN**	26	28.7	34.7	43.0	91.0	2.0	46.5	3.8
G13465	Matterhorn/P05436//Eldorado	13	28.7	37.1	46.0	91.0	1.5	49.5	4.5
I13430	GN10-7	36	28.6	49.4	40.0	95.0	3.0	45.0	3.3
G11429	G07309//G05241/B04588	3	27.9	32.7	47.0	95.0	2.0	48.0	3.8
G11464	G07309//G07302/BMN13	7	27.8	42.8	42.0	92.0	1.0	45.5	3.3
G12508	P08410/G08275	11	27.7	33.1	45.0	91.0	1.0	44.0	4.0
G12502	P08410/G07302	6	27.6	36.0	44.0	91.0	1.0	44.0	3.5
G13417	Powderhorn//G09305/Eldorado	18	27.3	36.3	42.0	91.0	1.0	45.5	3.8
G13447	G08217//G08215/P07407	31	27.2	30.8	42.0	91.0	1.0	49.5	4.5
G13469	G08259//Eldorado/G08210	24	26.7	36.1	46.0	93.0	1.5	47.5	3.0
G13467	Matterhorn/P05436//Eldorado	12	26.1	37.2	47.0	95.0	1.5	51.5	3.0
G13425	Powderhorn//Eldorado/G09312	22	25.9	36.0	42.0	91.0	1.0	47.0	3.8
G08254	G04514/Matterhorn, **POWDERHORN**	10	25.6	36.1	41.0	92.0	1.0	49.0	4.5
G11431	G07309//G05241/B04588	4	25.2	33.7	44.0	94.0	1.0	47.0	3.8
G13480	Eldorado/G08263	9	24.1	37.6	43.0	93.0	1.0	48.0	3.5
G14529	P08522/G11404	34	23.6	35.4	41.0	92.0	1.0	49.5	5.0
G13426	Powderhorn//Eldorado/G09312	29	23.6	31.2	42.0	91.0	1.5	46.5	4.0
G14528	P08522/G11404	33	23.0	35.7	43.0	91.0	1.0	46.0	4.5
G13409	Powderhorn//G09301/Eldorado	30	21.4	31.0	43.0	91.0	1.0	45.5	3.0
G05922	HIME TEBO*4/MATTERHORN,**FUJI**	32	17.4	29.9	45.0	95.0	2.5	42.0	3.3
MEAN (36)			28.1	35.1	42.9	92.1	1.3	47.4	4.1
LSD (.05)			3.6	0.6	1.4	0.4	0.5	1.4	0.6
CV (%)			11.0	1.6	1.9	0.3	22.8	1.8	12.9

EXPERIMENT 4107 STANDARD PINTO YIELD TRIAL								PLANTED: 6/4/14	
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**	1	39.5	47.4	41.0	96.0	2.0	49.5	4.8
P14814	P08522/LONG'S PEAK	23	38.6	37.6	49.0	95.0	1.5	49.0	5.0
P14815	P08522/LONG'S PEAK	24	37.8	39.4	47.0	92.0	1.0	47.5	5.5
P14811	P08403/G11405	20	37.6	36.6	43.0	92.0	1.0	48.0	4.8
P14812	P09425/P08161	21	37.5	40.1	44.0	92.0	1.5	48.0	4.3
P14801	P08162/P11518	10	36.9	38.1	49.0	96.0	2.5	49.0	3.3
P14802	P08162/P11518	11	36.8	40.1	48.0	95.0	1.5	52.0	4.3
P14804	P08162/P11518	13	36.7	37.2	47.0	95.0	2.0	52.0	4.3
P14809	P08162/G11404	18	36.6	38.1	48.0	96.0	2.5	46.5	3.0
I07113	PNE-6-94-75/Kodiak, **LAPAZ**	4	36.0	39.3	46.0	95.0	1.0	51.5	4.0
P11519	SANTA FE/P07806	2	35.9	41.6	49.0	96.0	2.0	51.5	3.8
P14806	P08162/P11518	15	35.6	37.4	48.0	95.0	2.0	50.0	3.5
P14818	P09402/P11522	27	35.3	33.8	42.0	94.0	1.0	49.0	4.0
P13701	G09305/ELDORADO	7	34.9	41.0	43.0	92.0	1.5	48.5	4.5
P14810	P08403/ND040111-1	19	34.5	48.0	47.0	93.0	1.0	51.0	3.3
P14816	P08522/LONG'S PEAK	25	34.5	39.1	45.0	92.0	1.0	48.0	5.0
P11523	P04203/P06125	6	34.3	36.1	43.0	92.0	1.0	46.0	4.8
P13704	ELDORADO*/P09401	9	33.7	40.1	42.0	92.0	1.0	45.5	3.8
P14817	P09425/P08175	26	33.4	36.2	48.0	93.0	1.0	47.5	4.3
P14805	P08162/P11518	14	33.4	37.0	47.0	94.0	1.0	46.5	4.0
P14821	P11518/G11405	30	33.2	35.8	47.0	96.0	1.5	51.5	4.0
P12604	P07406/P08401	8	33.1	41.7	44.0	92.0	1.0	46.5	4.0
P14820	P11518/G11405	29	33.0	42.8	47.0	95.0	1.0	53.0	3.8
P14803	P08162/P11518	12	32.9	38.4	49.0	97.0	2.0	51.5	3.5
P14819	P09402/P11522	28	32.4	32.1	41.0	94.0	1.0	49.0	4.3
P14808	P08162/P11518	17	32.1	32.6	48.0	94.0	1.5	51.5	3.8
P14813	P09425/P08161	22	32.1	40.4	44.0	92.0	1.0	49.5	5.5
P12609	P08362/P08401	5	32.0	35.7	43.0	93.0	1.0	48.0	4.3
P14807	P08162/P11518	16	30.7	33.4	45.0	93.0	1.0	47.5	3.8
P12606	P07406/P08401	3	29.0	37.7	46.0	94.0	1.0	45.5	3.0
MEAN (30)			34.7	38.5	45.5	93.6	1.4	49.0	4.1
LSD (.05)			4.4	0.8	2.0	1.7	0.6	2.2	0.6
CV (%)			10.8	1.8	2.6	1.1	24.4	2.6	11.8

EXPERIMENT 4108 STANDARD RED/PINK YIELD TRIAL **PLANTED: 6/5/14**

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R12845	SR9-5/R09508	2	44.5	36.8	45.0	95.0	1.0	52.0	5.8
I13401	**SR 09303**	1	43.7	31.2	45.0	95.0	1.5	51.0	3.8
S14705	Rosetta/S11707	32	40.9	41.5	43.0	94.0	1.5	48.0	5.0
R13752	R98026/I11207	21	40.3	39.9	45.0	95.0	1.0	51.0	4.8
R12843	SR9-5/R09508	7	39.7	37.6	45.0	93.0	1.5	50.0	5.5
R12844	SR9-5/R09508	3	39.6	39.0	44.0	94.0	1.5	52.0	4.8
S08418	S02754/S04503, **ROSETTA**	13	39.0	38.1	45.0	95.0	1.0	52.5	5.0
S14702	S11707/S08419	29	38.8	43.3	46.0	94.0	1.0	50.0	4.5
S14706	Rosetta/S11707	33	38.5	40.3	43.0	92.0	1.0	49.0	5.5
S14701	Rosetta/PK7-2	28	38.0	31.9	48.0	95.0	2.0	48.5	3.3
R13537	R98026/X10316	19	37.0	36.7	44.0	94.0	2.0	50.5	3.5
S14703	S11707/S08419	30	36.5	40.5	46.0	96.0	1.0	51.0	4.5
S14704	S11707/S08419	31	36.3	37.3	43.0	96.0	1.0	49.0	5.5
R13526	X10308/R08514	17	35.8	40.0	43.0	92.0	1.5	50.5	3.8
R98026	R94037/R94161, **MERLOT**	16	35.4	38.3	41.0	97.0	2.0	51.0	3.5
S14708	Rosetta/S11707	35	35.2	42.4	42.0	95.0	1.0	50.0	5.8
S12906	Rosetta/NDZ06209	8	35.0	34.7	43.0	94.0	1.5	48.5	3.3
R13771	R98026/I11207	22	34.6	35.5	43.0	94.0	2.0	48.5	3.3
R13609	I11210/R98026	20	34.6	35.5	45.0	94.0	1.5	47.5	3.0
R14605	R08512/I10140	27	34.4	31.4	46.0	96.0	1.0	52.5	5.5
R13538	R98026/X10316	18	34.4	34.0	46.0	93.0	1.5	50.0	3.3
R12859	R08512/SR9-5	6	34.2	35.7	40.0	91.0	1.0	48.5	4.5
R12857	R08512/SR9-5	9	33.9	37.6	41.0	92.0	1.0	45.5	4.0
S14707	Rosetta/S11707	34	33.5	38.5	41.0	93.0	1.0	49.0	5.5
R12860	R08512/SR9-5	10	33.5	37.1	42.0	91.0	1.0	47.0	4.3
S00809	R94142/X94076, **SEDONA**	4	32.7	41.4	45.0	95.0	3.0	49.5	3.3
R14602	R08512/I10140	24	32.0	27.8	49.0	96.0	1.5	49.5	4.5
S14709	S11707/X11425	36	32.0	38.5	42.0	94.0	1.0	51.5	4.3
S12904	Rosetta/PK9-4	12	31.4	34.0	44.0	92.0	1.0	46.0	3.3
R14603	R08512/I10140	25	31.0	32.2	49.0	98.0	2.0	52.0	3.8
R14601	I10140//G09303/Merlot	23	30.9	27.4	49.0	97.0	1.5	47.5	4.0
R12832	SR9-5/Merlot	15	30.5	33.8	40.0	91.0	1.0	47.5	3.0
S12909	PK9-7/Rosetta	11	29.0	35.4	41.0	92.0	1.0	50.5	3.0
R12858	R08512/SR9-5	14	28.3	35.9	41.0	92.0	1.0	49.0	3.8
S12911	PK9-7/Rosetta	5	27.6	38.8	42.0	93.0	1.0	50.0	3.0
R14604	R08512/I10140	26	27.5	25.6	43.0	91.0	1.0	44.5	3.8
MEAN (36)			35.0	36.3	43.6	93.7	1.3	49.5	4.2
LSD (.05)			3.2	0.9	2.3	1.9	0.6	2.1	0.6
CV (%)			7.7	2.1	3.2	1.2	27.2	2.6	12.8

EXPERIMENT 4109 PRELIMINARY GREAT NORTHERN YIELD TRIAL								PLANTED: 6/5/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
G14509	G11404/P07863	9	46.8	42.6	43.0	95.0	2.0	52.5	4.3
G14506	G11469/G11417	6	46.1	34.4	46.0	95.0	2.0	52.0	5.0
G14510	G11471/G11469	10	45.5	34.9	47.0	99.0	2.0	49.5	4.0
G14507	G09329/G10412	7	42.9	35.8	45.0	96.0	1.5	51.0	5.0
G13467	Matterhorn/P05436//Eldorado	28	42.6	40.9	46.0	98.0	2.5	54.0	3.3
G14505	G11429/P08175	5	42.5	29.9	44.0	92.0	1.0	49.5	5.0
G14503	G11404/G11469	3	41.9	38.8	42.0	91.0	2.0	49.5	5.0
G14521	P08396/G08157	21	41.5	39.2	44.0	99.0	2.5	52.5	3.3
G14523	P08403/G11405	23	41.2	40.3	40.0	92.0	1.0	49.0	5.0
G14519	P08162/G11404	19	41.2	41.1	44.0	93.0	1.5	49.5	4.7
G14520	P08369/G09303	20	39.6	34.1	46.0	93.0	1.0	50.5	5.0
G14525	P09425/G11429	25	39.2	42.1	40.0	93.0	1.5	49.0	4.7
G14513	G11402/G08254	13	39.0	39.7	43.0	94.0	2.0	51.0	4.0
G14504	G11429/P08175	4	38.7	32.2	43.0	93.0	1.5	48.5	4.7
G14511	G11417/G11404	11	38.4	38.6	41.0	91.0	1.5	49.5	5.0
G93414	**MATTERHORN**	32	38.3	37.3	42.0	92.0	1.5	47.5	4.7
G14517	G09303/I09207	17	38.2	35.4	42.0	91.0	2.0	50.0	4.3
G14514	G11402/G08254	14	37.9	37.5	43.0	93.0	1.0	48.5	5.3
G14515	G09303/I09207	15	37.7	33.8	43.0	91.0	2.0	52.0	4.7
G14501	G08254/G09312	1	37.5	37.1	44.0	93.0	1.5	49.0	4.7
G14512	G11417/G11404	12	37.5	37.5	43.0	91.0	1.5	47.0	4.7
G14524	P09425/G11429	24	37.4	46.0	43.0	91.0	1.0	50.0	5.3
G12901	G07321/Fuji	29	37.3	28.6	48.0	97.0	2.0	54.5	4.3
G08254	G04514/Matterhorn, **POWDERHORN**	31	37.3	36.2	42.0	91.0	1.0	50.5	4.3
G14508	G09329/G10412	8	36.4	36.5	45.0	93.0	1.0	50.5	5.7
G14526	P11518/G11417	26	36.4	39.7	44.0	92.0	1.0	51.0	4.7
G14518	P08162/G11404	18	36.1	39.0	43.0	91.0	1.5	46.0	4.0
G14502	G11404/G09312	2	35.5	32.9	46.0	93.0	1.0	46.0	4.3
G14527	P11518/G11417	27	35.4	37.2	42.0	93.0	1.5	52.5	5.7
G14516	G09303/I09207	16	35.2	34.7	42.0	91.0	2.0	49.5	4.0
G14522	P08403/G11404	22	34.9	38.5	43.0	91.0	2.0	53.5	4.7
G05922	HIME TEBO*4/MATTERHORN,**FUJI**	30	25.8	32.2	45.0	95.0	2.5	46.0	3.0
MEAN (32)			38.8	37.0	43.3	93.0	1.6	50.1	4.6
LSD (.05)			2.4	1.7	1.7	0.8	0.9	1.8	0.7
CV (%)			4.6	3.2	2.3	0.5	30.7	2.0	11.1

EXPERIMENT 4110 PRELIMINARY RED YIELD TRIAL-1 **PLANTED: 6/5/14**

NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R13628	I11210/R98026	28	41.6	35.3	42.0	103.0	2.0	50.0	4.5
R13632	I11210/R98026	32	37.8	43.1	40.0	102.0	1.0	47.5	4.5
R13613	I11210/R98026	13	37.7	32.4	49.0	105.0	3.0	45.0	5.5
R98026	R94037/R94161, **MERLOT**	40	37.6	40.1	42.0	103.0	2.0	47.5	3.5
R13627	I11210/R98026	27	36.4	38.9	39.0	102.0	1.0	50.0	3.5
R13608	I11210/R98026	8	36.4	36.9	41.0	102.0	1.0	35.0	3.5
R13635	I11210/R98026	35	36.4	36.7	40.0	107.0	4.5	40.0	3.0
R13603	I11210/R98026	3	33.9	37.7	44.0	102.0	1.5	47.5	4.5
R13606	I11210/R98026	6	33.4	31.5	39.0	103.0	3.5	37.5	3.5
R13611	I11210/R98026	11	33.1	36.3	48.0	107.0	2.5	47.5	3.5
R13626	I11210/R98026	26	33.1	32.7	44.0	102.0	1.5	42.5	2.0
R13610	I11210/R98026	10	31.5	32.6	42.0	105.0	5.5	30.0	1.0
R13615	I11210/R98026	15	31.5	33.5	44.0	102.0	2.5	40.0	4.5
R13609	I11210/R98026	9	31.3	34.4	47.0	102.0	2.5	35.0	4.0
R13616	I11210/R98026	16	30.6	36.8	48.0	106.0	3.5	42.5	3.5
R13607	I11210/R98026	7	30.5	33.5	44.0	102.0	3.0	40.0	4.0
R13630	I11210/R98026	30	30.4	36.8	41.0	104.0	1.0	45.0	3.5
R13605	I11210/R98026	5	28.9	28.7	49.0	114.0	4.0	50.0	1.5
R13612	I11210/R98026	12	28.8	33.5	48.0	105.0	6.0	45.0	2.5
R13634	I11210/R98026	34	28.4	27.5	44.0	102.0	1.0	32.5	2.5
R13621	I11210/R98026	21	28.0	34.1	41.0	102.0	1.0	42.5	4.0
R13622	I11210/R98026	22	27.6	36.0	42.0	102.0	1.5	45.0	3.5
I11210	SER95 (CIAT)	39	26.6	31.8	39.0	102.0	1.0	37.5	3.0
R13602	I11210/R98026	2	26.4	28.0	41.0	102.0	1.0	37.5	3.5
R13624	I11210/R98026	24	26.3	26.0	43.0	102.0	1.5	35.0	1.5
R13623	I11210/R98026	23	26.3	42.1	39.0	102.0	1.0	42.5	4.0
R13625	I11210/R98026	25	25.7	33.6	39.0	102.0	1.0	40.0	2.5
R13620	I11210/R98026	20	25.5	30.5	39.0	102.0	1.0	45.0	3.0
R13619	I11210/R98026	19	25.2	34.9	41.0	102.0	1.0	37.5	3.5
R13601	I11210/R98026	1	25.2	30.4	43.0	102.0	3.0	35.0	2.5
R13636	I11210/R98026	36	24.2	34.4	39.0	102.0	1.0	37.5	1.0
I11207	SER48 (CIAT)	37	23.9	34.9	39.0	102.0	7.0	27.5	1.0
R13618	I11210/R98026	18	23.8	36.3	38.0	102.0	1.5	35.0	2.5
I11209	SER94 (CIAT)	38	22.8	29.1	40.0	102.0	1.5	35.0	4.0
R13633	I11210/R98026	33	22.0	30.6	39.0	102.0	2.0	32.5	1.0
R13604	I11210/R98026	4	21.6	33.5	39.0	102.0	1.0	35.0	1.0
R13629	I11210/R98026	29	19.9	41.5	40.0	102.0	2.5	25.0	1.0
R13614	I11210/R98026	14	18.8	26.8	43.0	102.0	1.0	35.0	1.5
R13617	I11210/R98026	17	18.3	30.4	40.0	102.0	1.0	27.5	1.0
R13631	I11210/R98026	31	14.6	29.5	39.0	102.0	2.5	30.0	1.0
MEAN (40)			28.5	33.8	41.7	103.0	2.2	39.2	2.9
LSD (.05)			4.0	2.2	1.9	1.3	1.3	7.7	1.4
CV (%)			10.2	4.8	2.6	0.7	35.7	11.6	29.8

EXPERIMENT 4111 PRELIMINARY RED YIELD TRIAL-2								PLANTED: 6/5/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R13752	R98026/I11207	52	42.7	39.8	43.0	102.0	1.0	50.0	5.0
R13754	R98026/I11207	54	39.8	30.5	46.0	102.0	1.0	42.5	4.0
R13765	R98026/I11207	65	39.6	39.8	42.0	104.0	6.5	32.5	1.0
R13761	R98026/I11207	61	39.5	37.3	40.0	102.0	5.5	30.0	1.0
R13769	R98026/I11207	69	38.8	42.8	41.0	102.0	2.0	42.5	4.0
R13741	R98026/I11207	41	38.4	39.6	44.0	102.0	7.0	30.0	1.0
R13770	R98026/I11207	70	37.9	39.2	44.0	102.0	2.0	42.5	3.5
R13717	R98026/I11207	17	37.9	35.0	43.0	102.0	6.5	27.5	1.0
R13707	R98026/I11207	7	37.8	38.2	45.0	102.0	4.0	40.0	3.5
R13748	R98026/I11207	48	37.7	36.1	47.0	102.0	1.5	55.0	5.5
R13734	R98026/I11207	34	37.0	36.0	41.0	102.0	4.5	40.0	2.5
R13710	R98026/I11207	10	36.5	36.6	46.0	102.0	3.0	42.5	5.0
R13773	R98026/I11207	73	36.1	39.9	43.0	102.0	2.5	40.0	3.5
R13760	R98026/I11207	60	36.0	37.4	45.0	102.0	1.0	50.0	4.5
R13712	R98026/I11207	12	35.7	37.3	42.0	102.0	5.0	32.5	1.5
R13771	R98026/I11207	71	35.4	36.0	41.0	103.0	2.0	50.0	4.5
R13755	R98026/I11207	55	35.2	37.1	40.0	102.0	5.0	30.0	1.5
R13718	R98026/I11207	18	35.2	36.7	46.0	102.0	6.0	35.0	1.5
R13745	R98026/I11207	45	35.2	33.1	46.0	102.0	7.0	25.0	1.0
R13713	R98026/I11207	13	34.9	34.0	43.0	102.0	1.0	47.5	5.0
R13758	R98026/I11207	58	34.2	41.2	40.0	102.0	4.5	35.0	2.0
R13732	R98026/I11207	32	34.1	39.9	40.0	102.0	1.5	45.0	3.5
R98026	R94037/R94161, **MERLOT**	80	34.1	39.2	43.0	102.0	4.0	45.0	2.5
R13739	R98026/I11207	39	33.1	44.8	42.0	102.0	1.0	50.0	3.0
R13744	R98026/I11207	44	32.9	44.2	39.0	102.0	1.0	45.0	3.0
R13735	R98026/I11207	35	32.9	34.5	42.0	102.0	5.0	37.5	1.5
R13728	R98026/I11207	28	32.8	37.9	40.0	102.0	5.0	35.0	2.0
R13743	R98026/I11207	43	32.7	36.9	40.0	102.0	1.0	45.0	4.0
R13753	R98026/I11207	53	32.3	33.2	46.0	102.0	3.0	35.0	3.0
R13715	R98026/I11207	15	32.3	37.9	46.0	102.0	7.0	22.5	1.0
R13704	R98026/I11207	4	32.2	37.5	46.0	103.0	5.0	35.0	2.0
R13733	R98026/I11207	33	32.0	37.9	40.0	102.0	2.0	45.0	2.5
R13763	R98026/I11207	63	31.9	38.1	46.0	102.0	7.0	25.0	1.0
R13736	R98026/I11207	36	31.9	38.4	41.0	102.0	1.0	55.0	5.0
R13723	R98026/I11207	23	31.7	34.0	41.0	102.0	4.5	35.0	1.0
R13722	R98026/I11207	22	31.7	43.2	39.0	102.0	1.0	35.0	3.5
R13721	R98026/I11207	21	31.6	39.1	40.0	102.0	7.0	35.0	1.0
R13757	R98026/I11207	57	31.4	35.3	47.0	102.0	7.0	20.0	1.0
R13724	R98026/I11207	24	31.3	35.7	41.0	102.0	2.0	50.0	3.5
R13775	R98026/I11207	75	30.6	33.0	42.0	102.0	1.5	40.0	4.0
R13742	R98026/I11207	42	30.2	35.7	44.0	102.0	1.0	55.0	5.0
R13731	R98026/I11207	31	29.7	37.1	39.0	102.0	6.0	30.0	1.0

EXPERIMENT 4111 PRELIMINARY RED YIELD TRIAL-2								PLANTED: 6/5/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R13737	R98026/I11207	37	29.6	39.9	42.0	102.0	3.5	40.0	1.0
R13759	R98026/I11207	59	29.6	34.2	46.0	102.0	5.5	35.0	2.0
R13727	R98026/I11207	27	29.5	39.5	40.0	102.0	5.5	27.5	1.0
I11210	SER95 (CIAT)	79	29.5	30.9	40.0	102.0	1.0	30.0	3.5
R13768	R98026/I11207	68	29.5	30.1	42.0	102.0	7.0	25.0	1.0
R13725	R98026/I11207	25	29.2	32.1	42.0	102.0	1.0	42.5	4.0
R13750	R98026/I11207	50	28.9	33.7	40.0	102.0	3.5	40.0	2.5
R13716	R98026/I11207	16	28.8	38.2	39.0	102.0	7.0	30.0	1.0
R13746	R98026/I11207	46	28.5	32.8	44.0	102.0	7.0	27.5	1.0
I11207	SER48 (CIAT)	77	28.4	35.7	39.0	102.0	5.5	27.5	2.0
R13767	R98026/I11207	67	28.4	36.6	41.0	102.0	7.0	25.0	1.0
R13708	R98026/I11207	8	28.4	36.6	39.0	103.0	1.5	37.5	2.5
R13740	R98026/I11207	40	28.4	35.0	42.0	102.0	4.0	40.0	1.5
R13730	R98026/I11207	30	28.3	43.8	39.0	102.0	1.5	42.5	1.0
R13702	R98026/I11207	2	28.2	42.7	39.0	102.0	1.0	47.5	4.0
R13729	R98026/I11207	29	28.1	34.1	48.0	102.0	7.0	25.0	1.0
R13711	R98026/I11207	11	27.3	37.6	42.0	102.0	1.5	50.0	2.5
R13738	R98026/I11207	38	27.3	35.4	40.0	102.0	1.0	42.5	4.5
R13776	R98026/I11207	76	27.2	35.2	45.0	102.0	6.0	40.0	1.0
R13726	R98026/I11207	26	27.1	32.5	45.0	102.0	7.0	22.5	1.0
R13720	R98026/I11207	20	27.0	36.7	39.0	102.0	1.0	42.5	1.0
R13756	R98026/I11207	56	26.8	34.2	41.0	102.0	7.0	17.5	1.0
I11209	SER94 (CIAT)	78	26.4	29.6	41.0	102.0	1.0	32.5	1.5
R13774	R98026/I11207	74	26.1	37.4	40.0	102.0	1.0	45.0	2.5
R13764	R98026/I11207	64	26.1	28.8	45.0	102.0	7.0	25.0	1.0
R13709	R98026/I11207	9	26.1	40.6	40.0	102.0	2.0	42.5	2.0
R13762	R98026/I11207	62	25.8	29.6	45.0	102.0	7.0	25.0	1.0
R13719	R98026/I11207	19	25.5	36.3	40.0	102.0	5.5	40.0	1.0
R13747	R98026/I11207	47	25.5	37.8	45.0	102.0	5.0	35.0	2.0
R13706	R98026/I11207	6	25.5	32.6	41.0	102.0	2.5	45.0	1.5
R13714	R98026/I11207	14	24.9	40.7	39.0	102.0	2.5	40.0	1.0
R13766	R98026/I11207	66	24.6	37.8	41.0	102.0	7.0	22.5	1.0
R13751	R98026/I11207	51	24.3	36.0	43.0	102.0	3.0	37.5	1.5
R13705	R98026/I11207	5	23.9	35.9	41.0	102.0	6.0	27.5	1.0
R13749	R98026/I11207	49	23.9	34.6	39.0	102.0	1.0	35.0	1.5
R13772	R98026/I11207	72	21.0	40.2	39.0	102.0	7.0	30.0	1.0
R13701	R98026/I11207	1	20.8	38.0	39.0	102.0	7.0	30.0	1.0
R13703	R98026/I11207	3	18.8	35.1	39.0	102.0	1.5	37.5	1.0
MEAN (80)			30.8	36.7	41.8	102.1	3.9	36.8	2.2
LSD (.05)			3.7	2.0	2.0	0.6	1.5	8.4	1.4
CV (%)			8.9	4.0	2.9	0.4	23.6	13.7	38.3

EXPERIMENT 4112 PRELIMINARY RED YIELD TRIAL-3								PLANTED: 6/5/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R12844	SR9-5/R09508	54	50.5	40.0	46.0	103.0	1.0	50.0	5.0
R13832	R98026/I11209	32	48.1	35.7	50.0	112.0	6.0	35.0	1.5
R13806	R98026/I11209	6	46.0	30.8	50.0	107.0	5.0	40.0	5.0
R13831	R98026/I11209	31	45.4	31.4	41.0	106.0	1.0	42.5	5.5
R13845	R98026/I11209	45	44.8	30.3	47.0	102.0	2.5	40.0	4.5
R13848	R98026/I11209	48	44.0	36.4	48.0	105.0	1.0	50.0	5.5
R13526	X10308/R08514	55	44.0	41.4	46.0	102.0	1.0	45.0	4.5
R13803	R98026/I11209	3	43.7	31.6	40.0	102.0	1.0	42.5	5.5
R13801	R98026/I11209	1	43.4	33.1	50.0	105.0	4.0	45.0	5.5
R13836	R98026/I11209	36	43.2	32.8	42.0	102.0	1.0	37.5	2.0
R13821	R98026/I11209	21	43.1	41.2	49.0	104.0	2.0	50.0	6.0
R13822	R98026/I11209	22	43.1	37.5	47.0	102.0	2.0	40.0	3.0
R13834	R98026/I11209	34	43.1	29.8	47.0	103.0	4.5	40.0	5.0
R13804	R98026/I11209	4	41.2	37.6	43.0	102.0	3.5	40.0	3.5
S08418	S02754/S04503, **ROSETTA**	56	39.5	40.4	43.0	102.0	1.0	37.5	3.0
R13811	R98026/I11209	11	39.1	33.7	40.0	105.0	4.5	40.0	1.5
R13810	R98026/I11209	10	39.1	33.1	40.0	102.0	3.5	32.5	2.5
R13805	R98026/I11209	5	39.0	32.3	43.0	102.0	1.5	35.0	3.0
R13840	R98026/I11209	40	39.0	35.2	40.0	103.0	1.0	42.5	3.0
R13818	R98026/I11209	18	38.8	32.6	41.0	110.0	3.0	40.0	3.0
R13807	R98026/I11209	7	38.6	40.2	47.0	105.0	5.0	40.0	3.0
R12859	R08512/SR9-5	12	38.5	37.1	41.0	102.0	1.0	40.0	3.5
R13825	R98026/I11209	25	38.2	40.7	40.0	105.0	2.0	40.0	3.5
R98026	R94037/R94161, **MERLOT**	53	37.0	40.4	46.0	102.0	2.0	42.5	4.0
R13842	R98026/I11209	42	36.9	34.2	47.0	104.0	2.0	42.5	4.5
R13809	R98026/I11209	9	35.1	37.2	47.0	103.0	6.0	35.0	3.5
R13841	R98026/I11209	41	34.9	32.2	40.0	102.0	1.0	35.0	1.0
R13802	R98026/I11209	2	34.2	36.2	41.0	102.0	5.0	35.0	2.0
R13828	R98026/I11209	28	33.9	35.3	46.0	102.0	2.5	37.5	3.0
R13833	R98026/I11209	33	33.8	34.3	34.0	102.0	1.0	32.5	3.0
R13813	R98026/I11209	13	33.6	37.0	46.0	104.0	2.5	35.0	2.5
R13819	R98026/I11209	19	33.1	32.5	42.0	102.0	1.0	37.5	3.0
R13815	R98026/I11209	15	32.9	32.3	40.0	102.0	2.0	35.0	3.5
R13837	R98026/I11209	37	32.9	32.6	40.0	102.0	1.0	32.5	1.5
I11210	SER95 (CIAT)	52	32.6	31.9	41.0	102.0	1.0	32.5	3.0

EXPERIMENT 4112 PRELIMINARY RED YIELD TRIAL-3								PLANTED: 6/5/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R13820	R98026/I11209	20	32.6	42.7	40.0	102.0	2.0	37.5	1.5
R13843	R98026/I11209	43	32.6	35.0	37.0	102.0	1.5	35.0	3.0
R13823	R98026/I11209	23	32.5	35.3	41.0	105.0	1.0	37.5	3.0
R13808	R98026/I11209	8	32.4	40.9	40.0	107.0	4.0	37.5	2.5
R13847	R98026/I11209	47	32.2	32.9	39.0	104.0	6.5	27.5	1.5
R13835	R98026/I11209	35	32.0	32.5	42.0	102.0	3.0	35.0	2.5
R13839	R98026/I11209	39	31.6	37.3	40.0	102.0	2.0	32.5	1.0
R13844	R98026/I11209	44	30.8	33.6	40.0	106.0	2.5	32.5	1.5
R13816	R98026/I11209	16	30.6	34.5	47.0	102.0	5.0	40.0	2.0
R13814	R98026/I11209	14	29.2	29.6	43.0	103.0	5.0	35.0	1.5
I11207	SER48 (CIAT)	50	29.1	36.0	43.0	102.0	5.0	25.0	1.0
R13817	R98026/I11209	17	28.8	32.9	40.0	103.0	4.0	32.5	1.0
R13826	R98026/I11209	26	28.4	33.7	40.0	102.0	1.0	35.0	1.5
R13849	R98026/I11209	49	27.9	31.7	48.0	102.0	4.0	32.5	2.5
R13838	R98026/I11209	38	27.8	30.8	40.0	102.0	1.0	32.5	3.0
R13824	R98026/I11209	24	27.1	38.6	40.0	107.0	3.5	40.0	4.5
I11209	SER94 (CIAT)	51	26.3	29.9	40.0	102.0	1.0	25.0	2.0
R13846	R98026/I11209	46	25.7	29.7	44.0	102.0	1.0	37.5	2.5
R13827	R98026/I11209	27	25.2	37.1	45.0	108.0	2.5	37.5	2.5
R13829	R98026/I11209	29	25.0	30.9	48.0	102.0	7.0	27.5	1.0
R13830	R98026/I11209	30	22.3	38.4	40.0	102.0	1.0	32.5	1.0
MEAN (56)			35.6	34.9	42.8	103.4	2.7	37.2	3.0
LSD (.05)			4.2	1.6	0.7	2.1	0.8	6.4	1.3
CV (%)			8.8	3.4	0.9	1.2	17.2	10.3	26.1

EXPERIMENT 4113 MRPN/CDBN YIELD TRIAL								PLANTED: 6/5/14	
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**	10	47.8	47.7	43.0	97.0	2.0	52.0	5.0
I14509	PT11-13	2	47.3	39.6	44.0	92.0	2.0	52.0	4.0
R11806	X07714/X07710	12	46.7	34.9	48.0	96.0	2.0	47.5	4.7
G13467	Matterhorn/P05436//Eldorado	40	46.3	42.5	46.0	98.0	2.0	56.0	4.3
P11519	SANTA FE/P07806	42	44.8	42.9	49.0	99.0	2.0	52.5	4.3
I14531	CO 14790-3	31	44.4	42.4	48.0	99.0	2.0	53.5	4.0
I07113	PNE-6-94-75/Kodiak, **LAPAZ**	28	43.0	39.3	46.0	93.0	1.0	53.5	5.0
I13435	PT12-37	3	42.3	40.4	48.0	94.0	2.0	52.0	4.3
I13458	ISB 19	7	40.4	42.6	40.0	93.0	4.0	41.5	3.3
G13479	Eldorado/G09312	41	39.8	33.5	43.0	93.0	1.0	51.5	6.3
G08254	G04514/Matterhorn, **POWDERHORN**	11	39.6	36.5	42.0	91.0	1.5	51.0	5.0
G13424	Powderhorn//Eldorado/G09312	47	39.5	37.4	45.0	96.0	1.5	51.5	4.7
R12859	R08512/SR9-5	16	39.1	35.4	41.0	92.0	1.0	51.0	5.7
I99117	**BUSTER**	25	38.6	42.0	41.0	89.0	3.0	42.5	3.7
S08418	S02754/S04503, **ROSETTA**	9	38.6	39.0	45.0	95.0	1.0	51.0	5.0
R13526	X10308/R08514	46	38.3	38.9	46.0	94.0	2.0	52.5	5.0
I09118	ND060197	13	37.7	35.6	43.0	90.0	3.0	46.5	3.3
I14536	NE2-13-17	38	37.7	49.9	40.0	92.0	3.0	46.0	3.3
I14520	SF103-8	18	37.6	37.5	42.0	94.0	2.0	50.0	4.7
P12606	P07406/P08401	43	37.3	41.9	46.0	95.0	1.5	52.0	5.0
I14535	NE1-13-26	37	36.5	48.5	41.0	92.0	3.0	46.5	3.7
I14534	NE1-13-18	36	36.4	42.4	41.0	96.0	2.0	48.0	4.0
I14529	CO 91167-15	29	35.8	42.1	43.0	90.0	3.0	46.0	3.7
G12901	G07321/Fuji	44	35.7	27.9	45.0	96.0	2.0	52.5	4.3
I14519	23ST-27	17	35.7	38.7	46.0	90.0	2.5	48.0	4.0
I14530	CO 86660-14	30	35.6	42.6	44.0	92.0	2.0	54.5	5.0
I14533	ND101366	33	35.2	36.8	42.0	92.0	2.0	48.5	4.0
I13450	CO 91212-4	4	34.7	41.8	46.0	97.0	1.5	53.0	4.3
I98313	CO51715, **MONTROSE**	24	34.5	41.4	41.0	88.0	4.0	35.0	3.0
I13459	ISB 20	8	34.3	44.7	40.0	89.0	3.0	42.5	3.0
R11801	X07712/X07721	23	34.1	36.1	41.0	90.0	2.0	47.0	4.0
I11238	ND090713	34	34.0	41.3	41.0	94.0	2.0	47.5	3.7
BC373	UCD 9634	14	33.9	35.6	41.0	92.0	2.0	51.0	4.0
I14510	ISB-P1	5	32.2	40.8	39.0	92.0	2.0	52.5	5.0
I14532	CO 15542-1(1)	32	32.0	40.0	43.0	93.0	3.0	43.0	3.7

EXPERIMENT 4113 MRPN/CDBN YIELD TRIAL								PLANTED: 6/5/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
I14511	ISB-P3	6	31.6	40.9	40.0	91.0	1.5	53.0	4.7
I10113	ND080412	35	31.6	35.0	43.0	95.0	3.0	46.5	3.7
G93414	**MATTERHORN**	26	31.1	34.9	43.0	91.0	2.0	48.0	4.0
BC374	UCD 9623	15	28.7	38.2	40.0	89.0	1.0	46.5	3.7
S12906	Rosetta/NDZ06209	48	27.5	35.0	43.0	94.0	1.0	51.5	4.0
C06808	I01800/C03129, **BELLAGIO**	27	27.4	60.2	41.0	92.0	2.0	49.0	4.0
I14524	L11PS252	22	27.0	37.4	40.0	88.0	2.0	48.5	3.3
I14537	NE2-13-25	39	26.9	49.2	39.0	89.0	2.5	45.5	3.7
I14521	L11PS205	19	26.5	43.4	39.0	88.0	1.5	48.5	4.0
I84002	NW410//VICTOR/AURORA, **OTHELLO**	1	26.0	41.6	38.0	85.0	3.0	42.5	3.0
G05922	HIME TEBO*4/MATTERHORN, **FUJI**	45	25.2	29.5	46.0	97.0	2.5	43.5	3.3
I14523	L11PS211	21	22.9	44.6	40.0	85.0	1.5	44.0	3.3
I14522	L11PS206	20	19.3	39.0	37.0	87.0	2.0	48.5	3.3
MEAN (48)			35.4	40.2	42.5	92.2	2.1	48.7	4.1
LSD (.05)			3.4	1.7	2.0	1.3	0.3	0.7	0.6
CV (%)			7.0	3.1	2.8	0.8	7.7	0.9	10.9

EXPERIMENT 4914 STANDARD ORGANIC YIELD TRIAL-FINDLAY							PLANTED: 6/16/14		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	WM (1-9)
P07863	AN-37/P02630, **ELDORADO**	22	31.5	45.6	41.0	1.5	43.8	4.3	2.5
B12724	B09184/B09135	11	28.9	20.9	47.0	1.0	42.5	4.8	4.0
B11551	I82054/B07554	15	27.4	28.8	50.0	2.5	41.3	2.3	6.5
P11519	SANTA FE/P07806	23	26.9	37.7	49.0	1.5	42.5	4.3	3.0
R13526	X10308/R08514	29	26.6	36.2	47.0	1.8	53.8	3.8	4.5
R11806	X07714/X07710, **GYPSY ROSE**	35	26.4	31.5	50.0	2.8	41.3	3.5	4.0
S08418	S02754/S04503, **ROSETTA**	30	25.6	31.9	44.0	1.0	51.3	4.0	5.0
B12720	B09175/Eclipse	10	25.1	22.6	47.0	1.3	36.3	4.5	6.5
P13701	G09305/Eldorado	26	25.0	38.2	43.0	1.0	38.8	4.8	4.5
P12606	P07406/P08401	24	24.2	35.4	46.0	1.5	40.0	3.5	3.0
N12440	N09056/N09175	5	24.0	20.2	48.0	1.0	37.5	4.0	3.0
B04554	B00103*/X00822, **ZORRO**	8	23.3	20.0	46.0	1.3	47.5	5.0	8.0
G12901	G07321/Fuji	20	22.4	26.3	44.0	1.8	48.8	3.5	8.0
R11801	X07712/X07721, **DESERT SONG**	34	21.9	33.4	42.0	3.0	35.0	2.3	6.5
N13140	N05324/MEDALIST	3	21.6	19.8	48.0	1.3	36.3	4.3	4.5
G08254	G04514/Matterhorn, **POWDERHORN**	19	21.4	34.0	43.0	2.3	42.5	4.0	6.0
B11555	I82054/B07554	16	21.4	23.1	50.0	2.8	40.0	2.8	9.0
B10244	B04644/ZORRO, **ZENITH**	7	21.3	21.2	47.0	1.0	35.0	3.8	5.5
R98026	R94037/R94161, **MERLOT**	27	21.2	32.1	44.0	2.3	50.0	3.0	7.0
B11548	I82054/B07554	14	21.1	23.8	50.0	1.8	46.3	3.8	2.5
G13467	Matterhorn/P05436//Eldorado	21	21.0	37.3	45.0	1.3	42.5	3.5	5.5
P12609	P08362/P08401	25	20.9	34.8	44.0	1.8	36.3	4.5	4.5
B12710	B07554//Jaguar/B07554	9	20.7	21.5	49.0	1.0	32.5	4.0	3.5
R12859	R08512/SR9-5	28	20.6	31.2	42.0	1.0	41.3	4.5	4.0
B11567	I82054/B07554	17	20.3	23.1	50.0	2.5	42.5	2.5	8.0
N11257	N07009/MEDALIST	6	20.1	18.7	49.0	1.3	46.3	4.5	6.0
Y11405	FR-07-AZP-14-06	36	19.6	48.7	40.0	1.0	35.0	5.0	2.5
I11264	COOP 03019, **MERLIN**	2	19.1	20.3	47.0	1.0	28.8	3.8	1.5
K08961	K04604/USDK-CBB-15, **SNOWDON**	31	19.1	62.9	35.0	1.3	33.8	4.5	1.8
N11283	MEDALIST/N08003, **ALPENA**	1	18.9	18.3	48.0	1.3	40.0	4.3	6.5
B11519	I82054/B07554	13	18.9	22.3	50.0	1.0	36.3	3.8	5.9
K90902	BEA/50B1807//LASSEN, **BELUGA**	32	17.5	55.1	39.0	1.5	37.5	4.3	3.5
N12466	N08010/N08007	4	16.9	18.1	49.0	1.3	38.8	4.3	6.0
K90101	CHAR/2*MONT, **RED HAWK**	33	16.4	51.8	36.0	1.0	32.5	3.5	2.0
I07112	R99 NO NOD	12	15.7	20.6	44.0	1.3	35.0	3.3	2.0
B11569	I82054/B07554	18	14.7	21.6	50.0	2.3	45.0	2.8	8.0
MEAN (36)			21.9	30.2	45.4	1.5	40.4	3.9	4.9
LSD (.05)			4.7	1.9	1.5	0.7	7.0	1.1	3.0
CV (%)			18.2	5.3	2.0	38.9	14.8	24.6	37.0

EXPERIMENT 4915 STANDARD ORGANIC YIELD TRIAL-BERDEN								PLANTED: 6/16/14		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	WM (1-9)
P07863	AN-37/P02630, **ELDORADO**	22	22.4	43.7	48.0	102.0	2.0	52.5	5.3	2.5
S08418	S02754/S04503, **ROSETTA**	30	22.0	33.7	47.0	101.0	1.0	52.0	5.0	3.0
B10244	B04644/ZORRO, **ZENITH**	7	19.8	21.8	48.0	98.0	1.0	50.3	5.0	4.8
R13526	X10308/R08514	29	19.7	36.9	48.0	100.0	1.8	52.3	4.5	5.5
R98026	R94037/R94161, **MERLOT**	27	19.6	34.2	47.0	101.0	2.0	52.5	4.0	7.3
G08254	G04514/Matterhorn, **POWDERHORN**	19	19.1	36.7	46.0	97.0	1.5	48.8	4.3	5.0
P13701	G09305/Eldorado	26	19.1	40.8	47.0	99.0	1.5	48.8	4.8	4.8
I11264	COOP 03019, **MERLIN**	2	17.5	20.5	48.0	104.0	1.8	49.5	4.0	3.5
P11519	SANTA FE/P07806	23	16.5	40.1	49.0	104.0	2.3	52.8	4.8	4.0
G13467	Matterhorn/P05436//Eldorado	21	16.3	35.4	48.0	100.0	2.0	53.0	5.3	4.0
G12901	G07321/Fuji	20	16.1	26.2	45.0	103.0	2.0	52.8	4.0	6.8
I07112	R99 NO NOD	12	16.0	19.4	45.0	102.0	2.0	47.5	3.8	3.0
N13140	N05324/MEDALIST	3	15.1	19.5	47.0	99.0	1.5	50.3	5.3	2.8
P12609	P08362/P08401	25	14.7	36.8	46.0	97.0	1.0	47.3	4.3	5.0
R12859	R08512/SR9-5	28	14.4	34.1	46.0	97.0	1.0	47.0	3.8	6.3
N11283	MEDALIST/N08003, **ALPENA**	1	14.2	18.4	47.0	98.0	1.0	51.5	5.5	4.0
B12710	B07554//Jaguar/B07554	9	13.2	21.3	46.0	97.0	1.0	48.5	4.5	3.5
K08961	K04604/USDK-CBB-15, **SNOWDON**	31	12.9	67.9	39.0	95.0	1.0	47.0	4.5	0.9
B12724	B09184/B09135	11	12.6	21.3	48.0	97.0	1.0	47.0	4.3	4.8
N12440	N09056/N09175	5	12.6	19.0	47.0	97.0	1.0	47.0	4.3	4.3
P12606	P07406/P08401	24	12.6	36.3	46.0	99.0	1.8	50.3	4.0	6.5
R11806	X07714/X07710, **GYPSY ROSE**	35	12.2	28.2	50.0	101.0	3.0	45.3	4.0	6.3
B11555	I82054/B07554	16	11.6	23.7	47.0	103.0	3.5	45.3	2.8	8.5
B11551	I82054/B07554	15	11.4	26.2	50.0	105.0	3.5	43.3	2.8	6.5
N11257	N07009/MEDALIST	6	11.3	19.3	47.0	103.0	1.5	50.3	4.8	3.5
B04554	B00103*/X00822, **ZORRO**	8	11.0	20.5	47.0	98.0	1.5	50.5	4.5	6.0
K90902	BEA/50B1807//LASSEN, **BELUGA**	32	11.0	60.6	43.0	101.0	1.5	48.3	4.5	1.5
B12720	B09175/Eclipse	10	10.9	23.2	47.0	96.0	1.0	49.3	4.8	5.5
R11801	X07712/X07721, **DESERT SONG**	34	10.8	37.2	46.0	98.0	3.3	45.0	3.8	7.3
Y11405	FR-07-AZP-14-06	36	10.2	53.0	42.0	101.0	1.8	49.3	4.0	2.5
K90101	CHAR/2*MONT, **RED HAWK**	33	9.2	56.1	39.0	101.0	1.0	46.0	4.0	1.3
B11548	I82054/B07554	14	8.6	21.4	51.0	103.0	2.5	47.3	3.5	4.8
B11569	I82054/B07554	18	8.5	21.4	49.0	103.0	2.8	45.5	3.0	8.3
N12466	N08010/N08007	4	7.7	17.5	48.0	97.0	1.5	48.0	3.5	6.5
B11567	I82054/B07554	17	7.5	22.4	45.0	102.0	3.3	43.8	2.8	8.8
B11519	I82054/B07554	13	6.6	19.3	50.0	100.0	2.3	45.0	2.8	7.8
MEAN (36)			13.7	31.0	46.3	99.8	1.8	48.6	4.2	4.9
LSD (.05)			1.8	1.3	1.5	1.4	0.5	1.5	0.6	1.5
CV (%)			11.2	3.7	2.0	1.2	22.6	2.6	11.8	25.8

EXPERIMENT 4216 STANDARD KIDNEY YIELD TRIAL								PLANTED: 6/13/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
K11306	K06621/USDK-CBB-15	13	39.6	62.1	39.0	100.0	2.0	48.5	5.0
K13908	K07921//K08971/K08233	20	38.7	60.2	38.0	98.0	2.0	47.0	3.5
Y11405	FR-07-AZP-14-06	30	37.6	55.1	42.0	100.0	1.0	48.5	5.0
K11709	K06012//K06014/K07715	10	36.9	59.3	39.0	95.0	1.0	45.5	4.5
K11714	K08601/K08233	31	36.5	68.8	41.0	98.0	1.0	49.0	5.5
K13909	K07921//K08971/K08233	17	36.3	59.2	37.0	96.0	1.0	45.5	4.5
I14516	NY104	32	36.1	66.4	38.0	94.0	1.0	44.5	4.0
K11919	K04607/USWK-CBB-17	8	36.1	52.6	37.0	95.0	1.0	46.0	4.5
I11201	Pink Panther//ZAA/Montcalm, **CLOUSEAU**	7	35.8	82.3	38.0	96.0	1.5	48.0	4.0
I14515	DBY-60-1	29	35.3	51.9	37.0	94.0	2.0	43.5	3.5
I14513	DBY-28-1	27	34.9	49.5	44.0	97.0	2.5	45.0	4.0
K08961	K04604/USDK-CBB-15, **SNOWDON**	1	34.9	77.1	37.0	97.0	1.0	48.0	4.5
I90013	**CELRK**	5	34.6	69.0	38.0	95.0	1.0	45.5	4.0
K12803	K07921//K08971/K08233	9	34.2	60.4	38.0	96.0	1.5	45.0	4.0
K13902	K06939/WALLACE//K08938	16	33.9	61.8	38.0	99.0	1.0	46.5	5.0
K11917	K04607/USWK-CBB-17	2	33.5	55.8	37.0	95.0	1.0	46.0	4.0
K11710	K06012//K06014/K07715	11	33.2	60.1	38.0	100.0	1.5	47.5	4.0
K11916	K04607/USWK-CBB-17	4	33.2	56.4	37.0	95.0	1.0	46.5	4.0
I13420	ND061210, **TALON**	21	33.2	61.7	42.0	98.0	1.5	47.0	4.0
I13422	ACUG 10-W1, **YETI**	23	31.8	66.0	42.0	100.0	1.5	47.0	4.0
K90101	CHAR/2*MONT, **RED HAWK**	12	31.7	61.0	40.0	99.0	1.0	46.5	4.0
I14507	**GTS-104**	34	31.4	62.9	41.0	100.0	1.5	49.0	4.0
K11914	K04604/USWK-CBB-17	6	31.1	59.7	37.0	97.0	1.0	47.0	4.0
K01234	Mutant of Red Hawk, **REDCOAT**	36	30.9	63.6	40.0	99.0	1.0	46.0	4.0
K90902	BEA/50B1807//LASSEN, **BELUGA**	14	30.9	61.8	42.0	100.0	1.0	49.0	4.5
K13602	CELRK/BADILLO	19	30.9	55.3	38.0	94.0	1.5	44.5	3.5
I14508	**IG-INF**	35	30.8	71.9	40.0	103.0	2.0	48.0	3.5
I10105	Montcalm/DRK15, **MAJESTY**	24	30.6	84.1	46.0	100.0	1.5	49.5	4.0
K11918	K04607/USWK-CBB-17	3	30.2	58.7	37.0	96.0	1.0	45.5	4.0
K13907	K07921//K08971/K08233	18	30.0	59.2	37.0	94.0	1.5	44.0	4.0
I14517	NY105	33	29.8	82.1	37.0	97.0	1.5	48.0	4.0
K74002	**MDRK/CN(3)-HBR(NEB#1), MONTCALM**	15	28.6	67.5	41.0	105.0	2.5	46.0	3.0
I11233	OAC 07-L1, **OAC INFERNO**	25	27.1	67.1	40.0	104.0	2.5	49.0	3.0
I14514	DBY-54-1	28	27.0	51.5	44.0	97.0	2.5	43.5	3.5
I13421	ND061106, **ROSIE**	22	26.3	59.0	40.0	98.0	1.0	45.5	4.0
I14512	DBY-24-2	26	14.1	48.7	44.0	101.0	3.5	47.5	3.5
MEAN (36)			32.4	62.5	39.3	97.6	1.5	46.6	4.1
LSD (.05)			3.7	2.9	1.3	3.7	0.6	2.7	0.6
CV (%)			8.5	3.4	2.0	2.2	24.0	3.4	9.1

EXPERIMENT 4217 PRELIMINARY KIDNEY YIELD TRIAL								PLANTED: 6/13/14	
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**	28	42.3	72.8	37.0	98.0	1.0	48.0	5.0
K14810	K11907/K11304	20	41.7	54.7	38.0	97.0	1.0	43.5	4.5
K14703	Isabella/Snowdon	7	41.4	62.7	37.0	101.0	1.0	47.5	4.0
I11201	Pink Panther//ZAA/Montcalm, **CLOUSEAU**	27	40.3	77.3	38.0	100.0	2.0	49.0	4.0
K14814	Clouseau/K11308	24	40.2	57.3	38.0	95.0	1.0	43.0	4.0
K14801	Isabella/Snowdon	11	39.5	65.4	38.0	100.0	1.0	48.0	4.0
K14702	Isabella/Snowdon	6	39.5	62.5	37.0	98.0	1.0	45.0	4.0
K14815	Clouseau/K11308	25	38.7	58.4	37.0	94.0	1.0	45.0	3.5
K14701	Isabella/Snowdon	5	38.4	68.8	37.0	96.0	1.0	45.0	4.0
K14808	K11907/Isabella	18	37.7	57.1	37.0	98.0	1.0	47.5	5.0
K14805	Snowdon/Isabella	15	36.9	74.1	38.0	98.0	1.0	45.0	4.5
K14812	X11426/K11302	22	36.6	58.4	37.0	99.0	1.0	46.0	4.0
K14802	K10902//K08920/K10902	12	36.6	75.4	37.0	98.0	1.0	47.5	4.5
K14104	K08222/K11803	4	36.2	69.2	39.0	101.0	0.9	48.5	4.0
K14803	K10902//K08920/K10902	13	35.6	68.1	38.0	96.0	1.1	46.0	5.0
K14807	Snowdon/Isabella	17	33.7	64.4	37.0	98.0	1.0	48.0	5.0
K14103	Isabella/I11201	3	33.6	61.8	38.0	98.0	1.0	46.0	4.0
K14816	ISABELLA/K08961	30	33.6	65.9	37.0	97.0	1.0	46.5	4.5
K14813	X11426/K11302	23	33.1	62.4	38.0	100.0	1.0	47.0	5.0
K14704	Wallace/Clouseau	8	33.0	51.8	39.0	95.0	1.0	43.5	3.0
K90101	CHAR/2*MONT, **RED HAWK**	26	32.6	66.5	38.0	102.0	1.5	47.5	4.0
K14804	K10902//K08920/K10902	14	32.3	65.8	38.0	95.0	1.0	44.0	4.5
K14811	X11426/K11302	21	32.3	57.9	38.0	99.0	1.0	47.5	5.0
K14101	K11911/K11304	1	32.3	66.3	39.0	97.0	1.0	46.5	5.0
K14806	Snowdon/Isabella	16	31.8	68.1	39.0	98.0	1.0	46.5	5.0
K14809	K11907/Isabella	19	31.6	52.7	39.0	98.0	1.0	44.0	4.0
K14102	Isabella/I11201	2	29.5	65.5	43.0	97.0	1.0	49.0	4.0
K14706	Wallace/Clouseau	10	28.3	51.8	37.0	98.0	1.0	42.5	4.0
K14705	Wallace/Clouseau	9	24.7	53.9	37.0	97.0	1.0	45.5	4.5
K11925	K99974/XANA	29	23.4	102.3	38.0	100.0	1.5	46.5	4.0
MEAN (30)			34.9	64.6	37.8	97.7	1.1	46.2	4.3
LSD (.05)			4.1	4.4	0.6	2.7	0.3	3.7	0.5
CV (%)			8.5	5.0	0.9	1.6	17.2	4.6	7.0

EXPERIMENT 4218 STANDARD CRANBERRY YIELD TRIAL								PLANTED: 6/13/14	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
C14502	C08714/I11269	24	43.4	57.2	38.0	100.0	1.5	48.5	4.5
C14504	C08714/I11269	26	43.0	57.1	38.0	98.0	1.0	49.5	6.0
I92014	**ETNA**	1	41.7	75.1	38.0	97.0	1.5	47.5	4.0
C13411	CAPRI/I08969	14	41.1	60.2	39.0	95.0	1.0	47.5	5.0
C14501	C08714/I11269	23	40.7	53.6	37.0	98.0	1.0	46.0	4.5
C11373	C08706/C08712	4	39.8	69.4	38.0	99.0	1.0	48.0	5.0
C14506	C08714/I11269	28	37.0	54.8	38.0	100.0	1.5	46.5	5.0
C13413	C07411/C08712	13	35.9	71.4	38.0	98.0	1.0	47.5	5.0
C11223	CAPRI/X06150	11	35.6	64.5	39.0	100.0	1.5	46.5	4.5
C13414	C08714/BELLAGIO	20	35.5	70.9	38.0	98.0	1.5	49.0	5.0
C13417	C08712/X09111	15	35.4	67.7	38.0	96.0	1.0	44.5	4.0
C11320	C05617/CBB-20	5	35.2	58.8	38.0	95.0	1.5	44.5	4.0
C14505	C08714/I11269	27	35.0	54.3	37.0	97.0	1.0	46.5	4.5
C13410	CAPRI/I08969	18	34.2	60.0	38.0	95.0	2.0	47.0	5.0
C13406	C08714//C08717/CAPRI	17	34.1	69.3	39.0	97.0	1.0	44.5	4.0
C11269	C07401//CBB-20/C05653	2	34.0	65.9	39.0	98.0	2.0	45.5	4.0
C11258	C07401//CBB-20/C05617	6	33.8	63.0	39.0	97.0	1.0	44.0	4.0
C14507	C08714/I11269	29	33.4	52.7	37.0	97.0	1.0	43.5	4.0
C13404	BELLAGIO/I08969	21	33.3	67.4	38.0	96.0	1.5	46.0	4.0
C13416	C08712/X09111	16	32.9	68.6	38.0	98.0	1.0	46.0	4.0
K08961	K04604/USDK-CBB-15, **SNOWDON**	30	32.8	77.6	38.0	98.0	1.5	48.0	4.5
C11260	C07401//CBB-20/C05617	10	32.7	60.7	37.0	95.0	2.0	45.5	4.0
C11266	C07401//CBB-20/C05653	3	31.2	60.8	38.0	97.0	1.0	48.0	4.5
C14503	C08714/I11269	25	29.5	51.3	37.0	96.0	1.0	43.0	4.0
C11263	C07401//CBB-20/C05617	7	29.1	66.4	38.0	95.0	1.0	45.5	4.0
C99833	CARDINAL/K94803,**CAPRI**	12	28.9	72.2	38.0	101.0	3.0	47.0	3.5
C11259	C07401//CBB-20/C05617	9	27.6	59.7	37.0	96.0	1.0	46.5	4.0
C13403	BELLAGIO/I08969	19	25.6	70.8	38.0	98.0	1.0	44.5	4.0
C11212	C05617/C07411	8	23.3	66.1	39.0	100.0	1.0	48.0	4.0
C13402	BELLAGIO/I08969	22	22.5	70.6	39.0	95.0	1.5	45.5	4.5
MEAN (30)			33.9	63.9	37.8	97.2	1.3	46.3	4.4
LSD (.05)			3.3	3.1	1.1	2.9	0.6	3.0	0.5
CV (%)			7.1	4.1	1.7	1.8	26.9	3.7	6.6

EXPERIMENT 4219 NATIONAL WHITE MOLD YIELD TRIAL								PLANTED: 6/13/14			
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	WM (1-9)	WM %
P07863	AN-37/P02630, **ELDORADO**	38	33.8	43.6	44.0	101.0	2.0	52.3	5.0	6.0	66.7
I14520	SF103-8	64	31.8	43.6	45.0	104.0	2.0	50.3	5.0	4.0	44.4
R12832	SR9-5/Merlot	45	31.0	37.1	43.0	98.0	1.7	53.3	4.3	4.0	44.4
G08254	G04514/Matterhorn, **POWDERHORN**	32	30.1	43.6	44.0	97.0	1.3	48.3	5.3	2.5	27.8
G13438	G09330//G09308/X09107	36	28.4	37.0	44.0	100.0	1.3	51.3	4.7	4.0	44.4
R12844	SR9-5/R09508	46	27.9	37.8	47.0	99.0	1.3	50.7	4.7	2.5	27.8
G13467	Matterhorn/P05436//Eldorado	34	27.2	39.2	44.0	99.0	2.0	55.0	4.3	5.0	55.6
I08933	37-2, USPT-WM-12	**10**	27.0	45.7	44.0	98.0	1.7	47.7	5.3	2.0	22.2
S08418	S02754/S04503, **ROSETTA**	53	26.8	39.5	45.0	102.0	1.3	49.3	5.0	3.0	33.3
I13444	031-A-11	**9**	26.8	43.9	42.0	104.0	2.0	49.7	4.3	3.0	33.3
B10244	B04644/ZORRO, **ZENITH**	**5**	26.5	23.3	45.0	98.0	1.0	49.3	5.3	3.5	38.9
B12724	B09184/B09135	25	26.4	25.2	44.0	100.0	1.0	48.0	5.0	3.5	38.9
P13701	G09305/ELDORADO	42	26.4	41.1	44.0	96.0	1.0	49.3	5.3	4.0	44.4
G12901	G07321/Fuji	**8**	26.3	31.3	44.0	100.0	1.0	52.0	5.0	4.5	50.0
B04554	B00103*/X00822, **ZORRO**	20	25.5	24.1	44.0	100.0	1.0	51.0	5.3	2.0	22.2
B12710	B07554//Jaguar/B07554	22	25.2	24.7	44.0	99.0	1.0	48.0	4.3	4.0	44.4
R13771	R98026/I11207	52	24.7	34.0	44.0	99.0	2.0	51.0	3.7	7.5	83.3
B11555	I82054/B07554	29	24.5	27.5	45.0	103.0	1.3	51.3	4.0	6.5	72.2
B12720	B09175/Eclipse	23	24.2	26.1	45.0	98.0	1.0	49.0	4.3	7.5	83.3
R13609	I11210/R98026	50	23.7	32.8	50.0	99.0	2.0	49.3	3.3	7.0	77.8
N12454	B09174/N09056	17	23.6	22.2	44.0	100.0	1.0	50.3	5.3	2.0	22.2
R98026	R94037/R94161, **MERLOT**	43	23.6	37.4	48.0	103.0	1.7	53.7	4.0	4.5	50.0
P12606	P07406/P08401	40	23.4	39.8	45.0	98.0	1.3	50.3	4.3	4.0	44.4
N12440	N09056/N09175	15	23.3	21.4	44.0	99.0	1.0	50.3	5.3	2.5	27.8
R13752	R98026/I11207	51	22.9	40.0	45.0	99.0	1.3	52.0	5.0	3.5	38.9
P11519	SANTA FE/P07806	39	22.4	41.1	50.0	104.0	2.0	57.0	4.3	6.5	72.2
R13526	X10308/R08514	48	21.8	39.5	50.0	100.0	1.0	55.0	4.7	5.5	61.1
N13140	N05324/MEDALIST	16	21.7	22.5	46.0	101.0	1.0	51.0	5.7	2.5	27.8
BC373	UCD 9634	37	21.0	38.7	44.0	102.0	2.3	49.7	3.3	4.5	50.0
B11363	B04644/B07554	21	21.0	24.8	46.0	99.0	1.0	48.7	5.0	1.0	11.1
G93414	**MATTERHORN**	33	20.9	38.5	43.0	95.0	1.7	48.0	4.0	6.5	72.2
G13424	Powderhorn//Eldorado/G09312	35	20.3	41.4	44.0	100.0	1.3	50.0	4.3	5.0	55.6
I13401	SR 09303	44	20.2	29.8	48.0	99.0	1.3	51.0	3.3	8.5	94.4
N13124	N08007/N05324	18	20.1	20.1	45.0	98.0	1.0	51.0	5.7	3.5	38.9
P12609	P08362/P08401	41	19.9	41.2	45.0	98.0	1.3	48.0	4.3	6.5	72.2
I81010	JAPON3/MAGDALENE, **BUNSI**	**2**	19.9	24.9	39.0	105.0	2.7	43.3	4.0	2.0	22.2
S12906	Rosetta/NDZ06209	54	19.8	38.9	45.0	102.0	1.7	49.3	4.3	5.5	61.1
N12467	N08010/N08007	13	19.6	20.9	45.0	99.0	1.3	51.7	4.7	5.0	55.6
N13131	N09175/N08007	19	19.4	21.6	45.0	98.0	1.0	49.0	4.7	5.5	61.1
B12721	B09175/Eclipse	24	19.4	26.8	45.0	98.0	1.0	48.7	4.3	3.5	38.9

EXPERIMENT 4219 NATIONAL WHITE MOLD YIELD TRIAL								PLANTED: 6/13/14			
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	WM (1-9)	WM %
B11548	I82054/B07554	27	18.8	23.9	48.0	103.0	1.7	51.0	4.7	4.5	50.0
N12466	N08010/N08007	12	17.9	19.6	48.0	100.0	1.3	51.0	4.3	6.5	72.2
N11257	N07009/MEDALIST	14	17.7	21.0	48.0	100.0	1.0	49.7	4.7	3.5	38.9
I14519	23ST-27	63	17.6	40.7	44.0	95.0	2.3	47.3	3.0	9.0	100.0
C11266	C07401//CBB-20/C05653	55	17.5	62.4	38.0	95.0	1.0	46.0	4.7	5.0	55.6
R12859	R08512/SR9-5	**7**	17.3	40.3	44.0	96.0	1.0	46.0	4.0	5.0	55.6
I89011	**BERYL**	**3**	17.3	35.9	43.0	95.0	3.7	38.0	2.0	9.0	100.0
I11264	COOP 03019, **MERLIN**	11	17.2	23.0	44.0	102.0	1.0	50.0	4.3	2.0	22.2
S12911	PK9-7/Rosetta	47	16.9	43.5	45.0	101.0	1.7	47.7	4.0	3.0	33.3
B11551	I82054/B07554	28	16.5	29.5	49.0	105.0	3.0	50.3	2.7	8.0	88.9
K11709	K06012//K06014/K07715	57	16.2	60.9	39.0	103.0	1.7	46.7	4.3	3.0	33.3
N11283	MEDALIST/N08003, **ALPENA**	**6**	15.9	21.1	44.0	98.0	1.0	48.7	4.3	4.0	44.4
R13538	R98026/X10316	49	15.8	34.4	50.0	100.0	1.7	54.3	4.0	4.5	50.0
B11519	I82054/B07554	26	15.6	21.5	50.0	97.0	1.7	49.7	3.0	8.5	94.4
K11306	K06621/USDK-CBB-15	58	14.8	63.8	41.0	102.0	1.3	47.7	5.3	2.5	27.8
K13902	K06939/WALLACE//K08938	61	14.0	66.9	38.0	104.0	1.0	45.7	4.7	1.5	16.7
K11914	K04604/USWK-CBB-17	60	13.5	64.4	37.0	101.0	1.0	46.0	4.3	1.0	11.1
C11269	C07401//CBB-20/C05653	56	13.1	64.1	38.0	98.0	1.7	45.0	4.0	2.0	22.2
K08961	K04604/USDK-CBB-15, **SNOWDON**	62	12.4	77.1	37.0	96.0	1.0	45.0	4.3	2.0	22.2
B11569	I82054/B07554	31	11.7	25.2	48.0	105.0	2.3	51.0	3.3	9.0	100.0
K11916	K04607/USWK-CBB-17	59	11.4	56.6	37.0	96.0	1.0	42.3	4.0	1.0	11.1
I96417	**G122**	**1**	10.5	45.4	40.0	104.0	2.0	48.7	3.7	4.0	44.4
B11567	I82054/B07554	30	10.4	25.0	48.0	103.0	2.7	49.3	3.3	3.5	38.9
I14554	ASR1002	**4**	2.2	15.7	37.0	100.0	1.0	30.0	1.7	4.0	44.4
MEAN (64			20.6	36.2	44.0	99.8	1.5	49.1	4.3	4.4	48.6
LSD (.05)			4.6	2.0	2.1	2.4	0.5	2.9	0.9	1.7	18.5
CV (%)			16.5	4.0	2.9	1.8	23.9	4.3	15.9	22.7	22.7

EXPERIMENT 4120 DRY BEAN DROUGHT YIELD TRIAL								PLANTED: 6/5/14	
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, **ZENITH**	23	43.2	24.0	48.0	94.0	1.0	52.8	5.7
I14541	(Black Rhino)x(SEN 10 (SB-DT1)	4	41.3	28.6	46.0	92.0	1.2	47.8	4.0
I14546	(USPT-ANT)x('Matterhornx98078-5-1-5-1)	9	40.0	43.1	40.0	92.0	2.6	48.3	3.3
I05834	ND020351, **STAMPEDE**	20	39.6	43.9	45.0	94.0	2.2	48.4	4.7
R12859	R08512/SR9-5	22	39.5	37.0	41.0	94.0	1.7	51.4	5.7
G08254	G04514/Matterhorn, **POWDERHORN**	21	39.5	41.1	41.0	94.0	0.9	52.9	5.3
B04554	B00103*/X00822, **ZORRO**	24	39.0	23.0	48.0	95.0	0.9	53.7	5.3
I14552	10486 (TARS-MST1)	15	38.1	25.6	46.0	93.0	1.3	47.9	5.0
I14544	(BelMiDak RMR10xB01741)x('BAT 477xL88-63)	7	36.7	24.3	49.0	92.0	1.9	48.2	3.7
G93414	**MATTERHORN**	17	36.7	36.7	41.0	90.0	2.2	47.5	4.0
I14549	Merlotx(98020-3-1-6-2xTacana)	12	33.9	32.3	49.0	97.0	1.8	50.2	4.0
I14550	Merlotx(98020-3-1-6-2xTacana)	13	33.8	29.5	50.0	97.0	2.1	50.9	3.3
I14553	Merlotx(05F-5055-1x98020-3-1-6-2)	16	33.3	38.2	44.0	93.0	0.8	50.5	4.7
I14538	(Tacana x VAX6)	1	32.7	25.5	46.0	94.0	1.9	50.4	4.0
I14542	(MoralesxXAN 176)x('EAP 9503-32A)	5	31.9	32.1	46.0	91.0	2.0	49.9	4.0
I14548	Merlotx(MerlotxSER 16)	11	30.8	43.4	42.0	91.0	3.4	41.4	3.3
I14543	(Tacana x VAX6)	6	30.7	28.1	48.0	91.0	2.5	46.5	3.3
R98026	R94037/R94161, **MERLOT**	19	29.9	41.8	39.0	90.0	2.9	46.7	3.0
BC138	**Marquis**	18	29.9	36.4	41.0	88.0	4.4	35.3	3.0
I14545	(Matterhorn)x(SER 21)	8	27.6	34.0	44.0	91.0	3.9	35.7	2.3
I14539	(MoralesxXAN 176)x('BAT 477xB98311)	2	27.0	23.2	47.0	91.0	1.9	48.2	3.7
I14551	10457	14	24.7	31.5	40.0	89.0	3.5	38.3	3.0
I14547	(ABCP8)x(TARS-PT03-1xVAX 6)	10	24.7	25.7	47.0	89.0	2.8	44.2	3.0
I14540	(BAT 477xL88-63)x('BelMiDak RMR10xB01741)	3	19.8	19.7	49.0	91.0	1.6	45.9	3.3
MEAN (24)			33.5	32.0	44.7	92.0	2.2	47.2	3.9
LSD (.05)			5.3	1.4	2.0	2.1	0.6	4.0	0.2
CV (%)			11.4	3.2	2.6	1.4	15.8	4.8	3.1

USDA-ARS Black Bean Breeding Efforts for Improved Nutritive Value

Karen A Cichy, Carolina Astudillo, and Scott Shaw

A black bean breeding program is underway focused on improving the nutritive value of beans by increasing the concentration of iron and zinc in the seed. Iron deficiency is a major cause of anemia (Balarajan et al., 2011). An estimated two billion people suffer from iron deficiency, making it the most widespread nutritional disorder in the world (HarvestPlus, 2014). Zinc is an important enzyme cofactor and component of proteins, and is needed for DNA synthesis, RNA transcription, and cell division (Chasapis et al., 2012). Human Zn deficiency symptoms are quite varied, including reduced immune function, fetal brain cell development and child's growth, reproductive and cognitive development (Hambidge, 2000). Mild to moderate zinc deficiency is common, especially in populations consuming vegetarian diets rich in unrefined cereals (Sandstead, 1991). Biofortification of staple foods such as wheat and dry beans with Fe and Zn is one agricultural science based approach being developed and applied to combat micronutrient malnutrition (Bouis et al., 2011).

Black beans are the ideal market class to target for improving nutritive value as a breeding objective. Michigan is the major producer of black beans in the U.S. An estimated 19 percent of U.S. black beans are exported and Mexico is a major market for these beans (Zahniser and Wells, 2014). Therefore, by improving the nutritional quality of U.S grown black beans, there is an opportunity to improve the health of bean consumers in the U.S. and Latin America and perhaps have greater impact since consumption of dry beans is nearly 4 times higher in Mexico than the U.S with 11 kg and 3 kg annual per capita consumption, respectively (Zahinser, 2010; USDA-ERS 2010).

Materials and Methods: This project began in 2012 with the evaluation of seed iron and zinc levels in a diverse set of bean germplasm as part of the Bean Coordinated Agriculture Project. Two-fold variability in seed iron and zinc levels were identified within commercial bean varieties from the U.S. and Canada (Grusak, personal communication). Hybridizations between high mineral lines and high yielding, Michigan adapted black beans began in 2013. In 2013, F_2 lines were evaluated at the Saginaw Valley Research Farm and F_3 seed of selected lines were

sent to Puerto Rico for advancement. On June 6, 2014, seed of thirty F_4 lines along with three commercial checks were planted at the Saginaw Valley Research Farm in 4-row plots 6.4 m in length with 0.5 m row spacing. Standard agronomic practices were followed to ensure optimal growing conditions. Seed was direct harvested with a Hege 140 plot combine on September 17, 2014. Moisture adjusted yield per plot was measured at 16% moisture on cleaned seed and used to calculate yield per hectare and 100 seed weight. A subsample of 100 seed of each of the lines was freeze dried and ground to powder with a Geno/Grinder 2000 (SpexCertiPrep, Metuchen, NJ) and zircon grinding balls. Plant tissue samples sent to A & L Laboratories (Fort Wayne, IN) for mineral analysis using induced coupled plasma spectroscopy and total nitrogen using the Dumas method. Percent protein was calculated by multiplying the percent nitrogen by the conversion factor (6.25).

Results: Seed yield averaged 2308 kg per hectare, the highest yielding breeding line was at 3563 kg per hectare, which was 40% higher than the commercial check variety Zorro. Average seed Zn concentration was 28 ppm and Fe was 56 ppm. The highest seed Zn concentration was 35 ppm, which is about 25% higher than the Zn concentration of the commercial checks. The highest seed Fe concentration was 72 ppm, which was also about 25% higher than the Fe concentration of the commercial checks. Iron concentrations of up to 120 ppm have been recorded in bean germplasm screening (HarvestPlus, 2014), so the values observed here are well below the potential. Seed protein was also evaluated as there is renewed interest from the food industry in increasing the protein concentration of beans. Protein levels ranged from 18 to 23% and averaged 21%. A significant negative correlation between seed yield and seed protein ($r = -0.43$) and seed zinc ($r = -0.37$) was observed. No negative correlation between seed yield and seed Fe concentration was found. This work will continue with additional field evaluations and crossing new sources of high seed iron and zinc.

Table 1: Seed weight, yield, and seed protein, iron, and zinc concentration of 30 USDA-ARS black bean breeding lines and three commercial check varieties grown at the Saginaw Valley Research Farm in 2014 sorted by seed yield.

ID	Seed Wt. (100 seed)	Seed Yield (kg/ha)	Seed protein (%)	Seed Zn (ppm)	Seed Fe (ppm)
BEL1302-1	23.7	3563	19.54	28.11	59.54
BEL1303-4	19.7	3244	17.76	22.25	48.41
BEL1305-6	23.2	3147	21.63	29.36	68.38
BEL1303-2	21.8	3019	21.36	27.13	49.77
BEL1301-1	23.5	2995	21.06	26.29	47.48
BEL1303-6	21.6	2914	18.89	25.52	48.21
BEL1303-1	20.5	2885	20.78	25.42	52.74
BEL1303-9	23.7	2863	20.23	29.05	54.59
BEL1306-1	18.3	2829	20.33	26.03	58.86
Zenith	23.0	2677	19.32	27.31	54.00
BEL1303-3	21.4	2664	18.86	26.25	49.50
BEL1303-10	22.5	2658	20.73	28.25	71.99
BEL1304-2	23.1	2544	21.93	29.59	57.20
BEL1301-4	23.4	2520	22.68	33.02	56.81
BEL1303-7	17.2	2267	19.77	25.19	48.25
BEL1303-5	21.0	2261	20.29	27.68	53.26
BEL1305-2	21.8	2237	21.98	30.15	68.21
Zorro	20.3	2204	19.36	27.51	55.30
BEL1305-4	22.5	2196	22.72	27.86	61.36
BEL1305-5	24.7	2193	21.84	30.29	70.74
BEL1304-1	20.0	2155	20.63	27.14	44.21
BEL1301-5	24.1	2011	21.12	28.32	64.54
Eclipse	18.4	1858	19.28	26.51	48.76
BEL1304-5	22.1	1850	22.73	30.61	52.82
BEL1304-6	19.4	1837	20.76	27.08	48.18
BEL1305-3	24.3	1788	21.35	26.51	56.29
BEL1303-8	18.2	1785	22.21	34.89	50.46
BEL1301-3	24.0	1657	23.05	29.71	66.09
BEL1305-1	22.7	1552	20.44	27.33	61.62
BEL1304-4	17.1	1515	22.03	29.14	52.81
BEL1301-2	22.6	1481	21.93	28.54	62.46
BEL1304-7	18.8	1469	21.34	29.55	46.45
BEL1304-3	18.9	1316	20.78	29.33	47.30
Average	**21.4**	**2307.7**	**20.9**	**28.1**	**55.7**

References:

Balarajan Y, Ramakrishnan U, Ozaltin E, Shankar AH, Subramanian SV. 2011. Anaemia in low-income and middle-income countries. Lancet 378, 2123-2135.

Bouis HE, Hotz C, McClafferty B, Meenakshi JV, Pfeiffer WH. 2011. Biofortification: A new tool to reduce micronutrient malnutrition. Food Nutrition Bulletin 32:S31-S40.

Chasapis CT, Loutsidou AC, Spiliopoulou CA, Stefanidou ME. 2012. Zinc and human health: an update. Arch. Toxicology 86, 521-534.

Hambidge M, 2000. Human zinc deficiency. Journal Nutrition. 130, 1344S-1349S.

HarvestPlus Biofortification Progress Brief August 2014 http://www.harvestplus.org/sites/default/files/Biofortification_Progress_Briefs_August2014_WEB_2.pdf

Sandstead HH.1991. Zinc-deficiency - a public-health problem. American Journal of Diseases of Children. 145, 853-859.

U.S. Department of Agriculture, Economic Research Service. 2010. Dry edible beans, historic data. http://www.ers.usda.gov/briefing/drybeans/

Zahniser S, Vera Torres M. Cuéllar Álvarez JA, López López NF, Bhatta R. 2010. Vegetable and Melons Outlook No. (VGS-341-01) 41 pp, December 2010.

Zahniser, S. and H.F. Wells. 2014. USDA-ERS Vegetables and Pulses Outlook No. (VGS-354) 37 pp, September 2014. http://www.ers.usda.gov/media/1680744/vgs-354-sa1.pdf

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Sugarbeet Nitrogen Response Following Corn

Kurt Steinke and Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conventional, 30-in. row
Planting Date: May 6, 2014 (Harvest 10/16/14)	**N Rates**: See below
Soil Type: Clay loam; 2.7 OM; 8.0 pH; 41 ppm P; 162 ppm K	**Population**: 4 ¼ in. spacing
Variety: Crystal RR059	**Replicated**: 4 replications

N Trt. (Total lb. N/A)	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
0 – Check	7668	287	26.4	18.8	96.8	55	3.4
40	9377	291	32.8	18.8	96.4	73	4.4
80	9336	279	33.0	18.4	96.5	64	3.8
120	9653	276	34.6	18.2	96.6	72	4.5
160	11448	280	40.7	18.5	96.2	71	4.4
200	12131	284	43.0	18.5	96.3	82	4.9
240	11281	260	42.8	17.6	95.7	138	8.7
$LSD_{(0.10)}$[a]	**1291**	**NS**	**3.3**	**0.6**	**0.4**	**13**	**0.8**

[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	1375	1375	1276
40	1700	1680	1557
80	1674	1634	1510
120	1731	1671	1541
160	2052	1972	1820
200	2175	2075	1914
240	2022	1902	1742
$LSD_{(0.10)}$[a]	**208**	**208**	**196**

[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 $50/ton base payment with volume and quality incentives, an N price of $0.50/lb., and trucking costs of $3.75/T.

Summary: Trial was conducted to more accurately determine sugarbeet nitrogen fertilizer needs and nitrogen response following corn. All treatments received 40 lbs. N/A as 28%, 20 lbs. P_2O_5/A, 50 lbs. K_2O/A. and 2 lbs. Mn/A as starter placed 2x2 on May 6 (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 May 29 and were lightly cultivated to avoid N volatilization.

Cool spring conditions as a carry-over effect from the winter of 2013-2014 delayed soil warming as 2-inch soil temperatures did not permanently exceed 50 degrees F until after May 22. Despite the cool spring conditions, consistent soil moisture throughout the growing season resulted in high tonnage and good quality. Nitrogen treatments receiving 160 lb. total N (40 N as 2x2 and 120 N sidedress) resulted in the best combination of tonnage and sugar quality. Nitrogen rates greater than 160 lbs N did not significantly increase yield or RWSA. For those growers wanting to fertilizer at lower N rates, 40 lbs. N as a 2x2 at planting resulted in similar tonnage, RWST, RWSA, and sugar quality as both the 80 and 120 N rates.

When factoring in the economics of N fertilizer application and increased trucking for additional tonnage, 160 lbs total N still resulted in the most profitable N application rate with greater N rates not improving the overall economics of beet production. At sub-optimal N application rates, 40 lbs total N as a 2x2 resulted in similar economic returns as both the 80 and 120 N rates. This is an important result to keep in mind for those growers wishing to pursue early-harvest premiums as beets receiving near optimal N rate applications (160 N) will require a longer growing season (Sept. and into Oct.) in order to capitalize on the benefits of the greater N application rate. No significant differences in residual soil N after harvest were present among the 7 N rates in the study.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

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, 30-in. row
Planting Date: May 6, 2014 (Harvest 10/16/14)	**N Trts**: See below
Soil Type: Clay loam; 2.7 OM; 8.0 pH; 41 ppm P; 162 ppm K	**Population**: 4 ¼ in. spacing
Variety: Crystal RR059	**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	11095	281	39.5	18.5	96.3	79	4.9	1989
75:25	10806	283	38.4	18.4	96.5	81	5.0	1958
50:50	10835	288	38.3	18.5	96.6	69	4.3	1943
25:75	10650	277	38.2	18.4	96.1	99	6.1	1909
0:100	11448	280	40.7	18.5	96.3	99	4.4	2052
$LSD_{(0.10)}$[a]	**NS**	**NS**	**NS**	**NS**	**0.3**	**13**	**0.6**	**NS**

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

[b] Gross grower payment based upon a $50/ton base payment with volume and quality incentives.

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. P_2O_5/A, 50 lbs. K_2O/A. and 2 lbs. Mn/A as starter placed 2x2 on May 6. 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 the 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 source of PCU was ESN, Environmentally Smart Nitrogen.

Despite moist growing conditions throughout the season, few significant differences were noticed between treatments regardless of the blending ratio. Tonnage, % sugar, and gross grower payment data indicated no significant advantage to including PCU in sugarbeet N applications. One explanation for the poor sugarbeet response to PCU application could be the lack of individual large rainfall events as only 3 rainfall events greater than 1-inch occurred throughout the growing season. Typically significant N loss conditions must occur in order to see the benefit to slow-release sources of N.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Organic Sources of Nitrogen in Sugarbeet Production

Kurt Steinke and Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conventional, 30-in. row
Planting Date: May 6, 2014 (Harvest 10/16/14)	**N Trts**: See below
Soil Type: Clay loam; 2.7 OM; 8.0 pH; 41 ppm P; 162 ppm K	**Population**: 4 ¼ in. spacing
Variety: Crystal RR059	**Replicated**: 4 replications

N Trt. 160 lb N/A Total	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N	Gross Grower Payment ($/A)[b]
40 UAN 2x2 120 Urea Sd	11448	280	40.7	18.5	96.3	71	4.4	2052
1 T/A Biotic 40 UAN 2x2 13 Urea Sd	11743	293	40.3	18.9	96.7	71	4.4	2105
1 T/A Herbrucks 40 UAN 2x2 66 Urea Sd	10676	282	37.4	18.6	96.5	72	4.3	1914
2 T/A Herbrucks 40 UAN 2x2 13 Urea Sd	11445	287	39.6	18.9	96.4	76	4.5	2052
$LSD_{(0.10)}$[a]	**NS**	**NS**	**NS**	**NS**	**0.3**	**NS**	**NS**	**NS**

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

[b] Gross grower payment based upon a $50/ton base payment with volume and quality incentives.

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. P_2O_5/A, 50 lbs. K_2O/A. and 2 lbs. Mn/A as starter placed 2x2 on May 6. 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 120 N urea sidedress on May 29, 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.

Few significant differences were realized amongst any of the treatments. The organic-based N products produced similar and in some cases improved sugar quality parameters as compared to the soluble N standard treatment. The economics of organic N applications including price per pound of N and delivery of product need to be considered in addition to any perceived or realized benefits to soil health. The concern of spring-applied organic N products reducing beet quality was not substantiated during the 2014 growing season.

SVREC 2014 SH2 Sweet Corn Variety Trial

Ben Phillips Michigan State University Extension
One Tuscola St Saginaw, MI 48607
Office: 989.758.2502 Email: phill406@msu.edu

A sweet corn variety trial was planted at the Saginaw Valley Research and Extension Center (3775 S Reese Rd, Frankenmuth, MI 438734). Seminis, Syngenta, Crookham, and Illinois Foundation Seed Inc. generously donated publicly available sh2 sweet corn seeds.

The 24 randomized plots consisted of three replications of eight sh2 varieties (Table1). Dual Magnum (1pt/a) and 120lb of N from urea was applied to the field approximately two weeks before planting. The soil type was a Tappan-Londo loam with a poor-moderate drainage classification, typical of Michigan's Saginaw Valley.

On 27 June 2014, sweet corn was machine-planted at a rate of one seed per ten inches. Each plot had four rows, 27 feet long and 30 inches apart, and a five ft break (east-west) between varieties. On 16 July 2014, the plots were thinned. Plots were hoed on 16 July, and 4 Aug. No further pesticide plot treatments were applied.

Sweet corn was harvested on 22 September (day 87), and measurements were taken on the same day as harvest. One entire inner row of each plot was tallied for harvestable ears, and five ears were randomly chosen to measure their length and diameter, tip fill (number of ears with a full tip), and pest damage (number of ears containing insects. Plots were also assessed for plant height (3 levels: short, medium, tall), wind lodging (yes or no), and disease presence (1-3 severity ranking). A locally respected sweet corn family was tasked with tasting and rating all eight varieties for sweetness.

Results

Overall, EX08767143 and SC1336 had the best disease resistance, tallest height, and were the highest yielding sweet corn in bushels/A and ears/plant (Figure 1 and Table 1). However, despite reaching their predicted maturity date, neither was uniformly mature and both lacked sweetness according to our tasters. The other tall variety, AP426, also lacked sweetness, and contained the highest proportion of earworms. The two shortest varieties, XTH2475 and AP358, had two of the highest sweetness ratings. Michigan had a milder than average summer this year, and so flavor development may have been more a function of weather than genetics. For most varieties, one plot in three received wind damage and lodged. However, SC1336 did not lodge in any plots, and XTH2475 showed lodging in all plots. Rust and northern corn leaf blight were found in all plots to some level. Varieties EX08767143 and SC1336 consistently had the lowest level of disease pressure, while BSS30761 and XTH20173 had the highest level. Given more ripening time, the two Seminis varieties, EX08767143 and SC1336, show a lot of potential.

Special thanks to Paul Horny, Dennis Fleishman, and Wayne Hecht, who helped immensely at all stages of the trial. Also thanks to Hidden Harvest Food Donor coordinator, Jeremiah Janze, Dominic, and the picking volunteers of Saginaw's Teen Challenge.

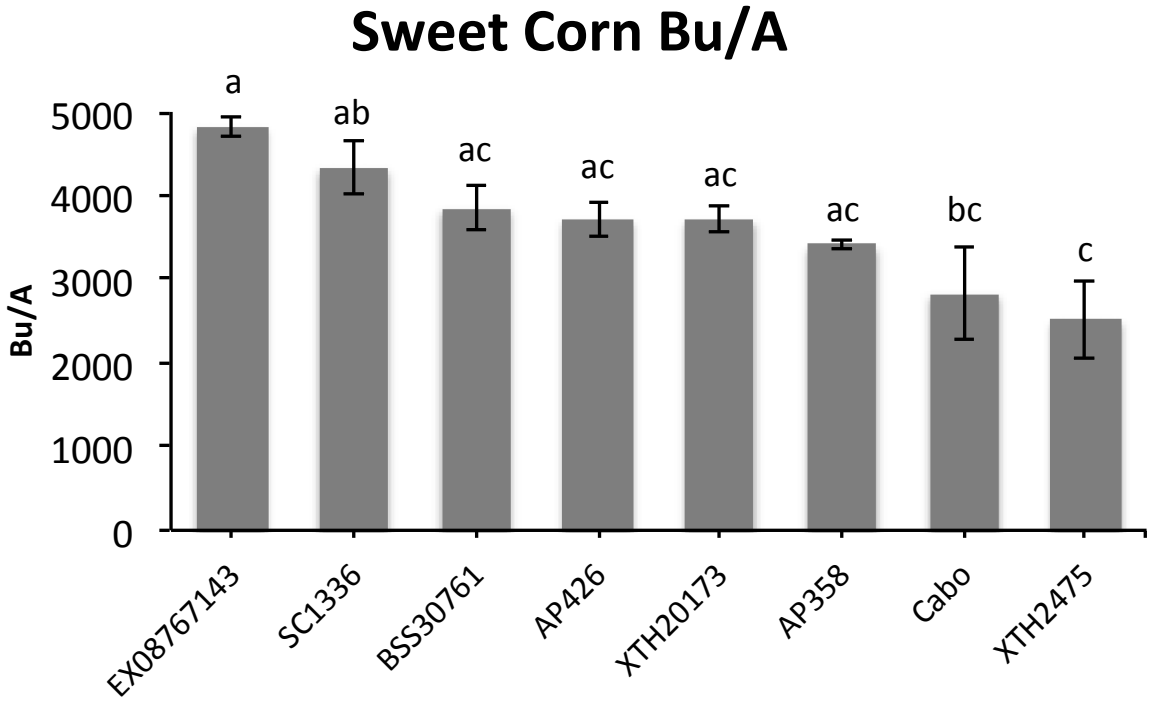

Figure 1. Performance in bushels/a (Bu/A) of eight sh2 sweet corn cultivars at the Saginaw Valley Research and Extension Center, Frankenmuth, Michigan. The trial was planted at 30-inches between rows and 10-inches in the row (21,000 plants/acre). All cultivars were harvested at 87 days after planting.

Table 1. Measured characteristics of eight sh2 sweet corn cultivars at the Saginaw Valley Research and Extension Center, Frankenmuth, Michigan. The trial was planted at 30-inches between rows and 10-inches in the row (21,000 plants/acre). All cultivars were harvested at 87 days after planting.[1] Seed companies: SM = Seminis, SY = Syngenta, CR = Crookham, IFSI = Illinois Seed Foundation Inc. [2] Tip fill is the percentage of 5 ears with full tips. [3] Worm tip is the percentage of 5 ears with worms in them. [4] Lodging represents the quantity of the three plots in which lodging occurred. [5] Height was a 3-category variable with 1 as the shortest, 2 and medium height, and 3 as the tallest. [6] Disease Resistance was a 3-category variable with 1 as the high disease occurrence, 2 as medium disease occurrence, and 3 as low disease occurrence. [7] Sweetness was measured 1-10 with 1 as not very sweet, and 10 as very sweet.

Variety	Co.[1]	Predicted Maturity (days)	Color	Average Length (in.)	Average Diameter (in.)	L:D	% Tip Fill[2]	% Worm Tip[3]	Ears/ Plant	Bu/A	Lodging[4]	Height[5]	Disease Resistance[6]	Sweetness[7]
EX08767143	SM	80	BI	8.10	2.41	3.36	0.87	0.33	1.12	4828.03	1/3	3	3	5.5
SC1336	SM	83	Y	8.18	2.47	3.32	0.93	0.40	1.01	4340.80	0/3	3	3	5.5
BSS30761	SY	82	BI	7.96	2.44	3.26	0.93	0.13	0.89	3853.57	1/3	2	1	8
AP426	CR	78	BI	7.83	2.43	3.22	0.80	0.60	0.86	3720.68	1/3	3	2	6
XTH20173	IFSI	73	BI	7.48	2.45	3.05	0.80	0.27	0.86	3720.68	1/3	2	1	7.5
AP358	CR	78	BI	7.96	2.38	3.34	0.53	0.47	0.79	3410.63	1/3	1	2	8.5
Cabo	SY	80	BI	8.13	2.74	2.99	0.93	0.33	0.63	2834.81	1/3	2	2	9
XTH2475	IFSI	74	BI	8.23	2.66	3.10	1.00	0.27	0.58	2524.75	3/3	1	2	9

Wheat Breeding and Genetics at Michigan State University

Eric Olson, Plant Soil and Microbial Sciences

Wheat is planted on approximately 500,000 acres annually in Michigan and provides the foundation of a value chain extending from farmers to flour millers and the food products industry. The Michigan State University Wheat Breeding and Genetics program (MSU-WBG) supports the wheat industry of Michigan by developing high yielding soft winter wheat varieties with exceptional quality and disease resistance that meet the demands of wheat growers and end-users.

The Saginaw Valley as a Target Environment

Three of the four highest yielding wheat producing counties in Michigan are located in the Saginaw Valley region including Bay, Tuscola and Saginaw counties accounting for approximately 15% of all wheat produced in Michigan (nass.usda.gov). This region represents a major target environment for Michigan wheat varieties. In wheat variety development, selection in target environments is necessary to produce a genotype with adaptation and high yield potential. MSU-WBG has begun using the SVREC for selection and yield testing in wheat variety development.

2014 Headrow Nursery

A total of 1,936 genotypes derived from single F_4 to F_9 plants that represent potential varieties were planted in two replicates at SVREC in fall of 2013. Data were collected on heading date and anthesis (Figure 1). Truncation selection was applied and lines flowering at 159 Julian days or earlier were advanced for yield testing in 2015. A total of 699 headrows were harvested from the nursery.

Future Wheat Breeding Activities at SVREC

MSU-WBG will conduct early generation selection and yield testing activities at SVREC in 2015 and beyond. Early generation MSU-WBG material planted in fall of 2014 includes all bulk F_3 populations and single replicates of all headrows. Additionally, a preliminary yield trial has been planted that includes 700 genotypes planted in a single rep augmented design. Testing and selection at SVREC greatly expands MSU-WBG capacity. Selection and testing in the Saginaw Valley will translate into higher yielding wheat varieties and enhance profitability of the Michigan wheat industry.

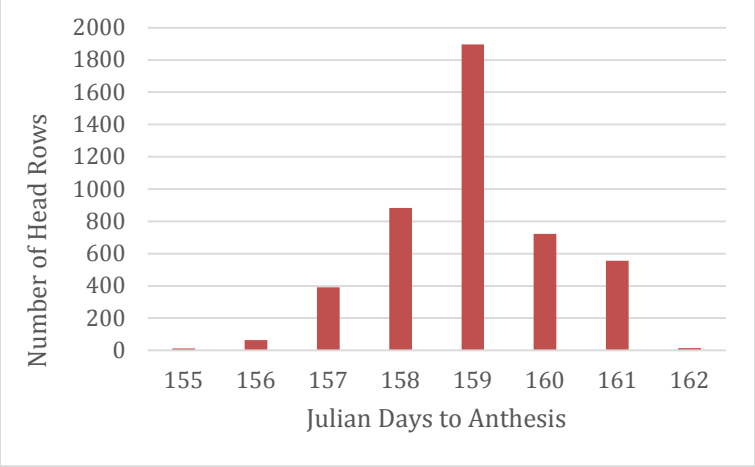

Figure 1. Distribution of Anthesis in Headrows at SVREC

2014 White Mold Fungicide Trial - G. Varner

Montcalm Research Farm, Entrican, Michigan

Treatment	Rate	Applic. Code	Incidence %infection	Severity %severity	% Pick	YIELD
UTC			70	55	4.2	1618
Proline	5.7 oz	2	48	36	3.1	2192
Proline+Ser Opt	5.7 oz+32 oz	2	48	34	2.5	2201
Pulpulse	8 oz	2	31	20	2.5	2505
Propulse+Ser Opt	8 oz+32 oz	2	32	20	1.9	2707
Endura	8 oz	2	20	12	2.3	2510
Omega	8 oz	2	20	12	2.0	2544
Aproach	12 oz	2	47	33	3.0	2424
Aproach+Endura	12 oz+8 oz	1	31	19	2.7	2517
Aproach+Omega	12 oz+8 oz	1	34	22	4.0	2601
Cruzin+Sun+SN+Bionic	32+26+32+.1oz	2	62	47	4.6	1842
Endura+Omega	8 oz+8 oz	1	33	17	2.8	2458
		LSD .O5 =	16	13	1.2	597
		C. V. =	31%	37%	27.5%	17.7%

Application Code:100% or First Bloom and 7-10 days after 100% bloom, 1=First Bloom Spray
Rating Date % infection "rating" on September 17, % Incidence, %severity
Merlot Small Red Beans planted in 20" rows. Population of 115,680. Irrigation of two .5 inch per week.
Planted:June 13 Harvested: September 29, First Spray: August 1, Second Spray: August 8
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.

2014 Eastern Huron County White Mold FungicideTrial

Buckley Creek Farms Inc.-Cooperative Elevator Co.-Ruth, MI

Treatment	Rate	Applic. Code	Incidence %infection	Severity %severity	% Pick	YIELD
UTC			98	94	22.5	222
Proline	5.7 oz	2	91	87	20.3	591
Proline+Ser Opt	5.7 oz+32 oz	2	92	88	20.8	496
Pulpulse	8 oz	2	77	73	9.2	1395
Propulse+Ser Opt	8 oz+32 oz	2	87	84	13.95	627
Endura	8 oz	2	85	82	10.3	830
Omega	8 oz	2	79	71	7.7	1256
Aproach	12 oz	2	92	89	17.3	509
		LSD .O5 =	7	12	2.6	331
		C. V. =	6.4%	10.7%	14.3%	21.4%

Ruby (09304) small reds planted in 22 inch rows.
Planted: June 18, First Spray: July 26, Second Spray: August 6, Harvested: September 26
Rating Date % infection "rating" on September 17, % Incidence, %severity

Control of Rhizoctonia crown and root rot with fungicides, 2014.

W. W. Kirk and R. L. Schafer;
Department of Plant, Soil and Microbial Sciences, Michigan State University, East Lansing, MI 48824

Sugar beet cv. ACH RR-824 was PAT-treated and planted at the Michigan State University Bean and Beet Farm, Richville, MI on 23 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), GS 2-4 (B), GS 4-6 (C) and GS 6-8 (D). Applications were made at planting (A); and banded applications on 13 Jun at GS 2-4 (B), 25 Jun at GS 4-6 (B) and 30 Jun at GS 6-8 (D), respectively. Cercospora leaf spot was controlled with an application of Eminent 125SL (13 fl oz) + Koverall 75DF (1.5 lb) on 25 Jul and Inspire 2.08EC (7 fl oz) + Koverall 75DF (1.5 lb) on 15 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 relative to the not-treated, not-inoculated check was rated up to 19 days after planting (DAP) and again 88 DAP on 19 Aug. The relative rate of emergence was not calculated in 2014 as stand was compromised by weather conditions at planting and emergence values for each plot were calculated relative to the not-treated, not-inoculated check in each replicate block to reduce variability across the trial. The change in plant stand was calculated. Plots were inoculated at planting by spreading *R. solani* Anastemoses Group 2.2 (IIIB) infested millet across all plants in each plot. Incidence of infected plants was evaluated on 146 DAP. Samples of 50 beets per plot were harvested 146 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 (^{o}F) was 57.8, 62.3, 66.2, 67.4, 60.0 and 51.5 (May, Jun, Jul, Aug, Sep, and to 10 Oct, respectively) and the number of days with maximum temperature >90^{o}F over the same period was 0 for each month. Average daily relative humidity (%) over the same period was 64.5, 63.9, 73.3, 63.1, 60.0 and 72.1. Average soil temperature at 2" depth over the same period was 57.0, 67.2, 69.8, 70.6, 63.3 and 55.5. Average soil moisture (% of field capacity) at 2" depth over the same period was 37.0, 37.2, 44.5, 51.9, 49.3 and 50.9. Precipitation over the same period was 3.06, 2.74, 4.17, 3.90, 3.03 and 0.64".

Plant stand was compromised by weather conditions at planting and emergence values for each plot were calculated relative to the not-treated, not-inoculated check in each replicate block to reduce variability across the trial. Treatments with final plant stand less than 57.5% were significantly different from the not-inoculated not-treated check (100.0%) in terms of plant stand. Soil temperature and moisture conditions enhanced moderate development of crown and root rot throughout the season although severe symptoms did not appear until Aug. Treatments with final plant stand less than 52.1% were significantly different from the not-inoculated not-treated check (100.0%) in terms of plant stand

88 DAP. The change in plant stand between the evaluations between 88 and 19 DAP indicated the impact of crown and root rot during the growing season and values that were positive indicated a decrease in plant stand over that period. Treatments with a significant decrease in plant stand in comparison to the not-inoculated not-treated check (100.0%) were indicated by a decrease greater than 11.9%. The inoculated check had a decrease in plant stand of 19.4%. Treatments with a significant decrease in plant stand in comparison to the inoculated not-treated check were indicated by a decrease greater than 1.4%. 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 (100%), data not shown. No treatments had a significantly lower severity index of crown and root rot on the beet roots and ranged from 14.1 (A13836 439SE 0.46 fl oz/1000 ft. row applied at GS 4-6) to 21.4 (Aproach 2.08SC 0.8 fl oz/1000 ft. row at planting) but were not significantly different to the inoculated not-treated check (14.1). 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 14.1. There were no differences among treatments in terms of marketable beet roots and due to the onset of severe Rhizoctonia root rot during the latter part of the season the range was from 65 to 75% marketable and all treatments had significantly higher marketable yield values in comparison to the inoculated check. The non-inoculated not-treated check and the inoculated not-treated check had 75 and 49% 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 relative to not-inoculated check[a] 11 Jun 19 DAP[b] (%)		Plant stand relative to not-inoculated check[a] 19 Aug 88 DAP (%)		Percentage decrease in plant stand from 19 to 88 DAP 19 Aug (negative values indicate increase)		Crown and root rot Severity[c] 146 DAP		Crown and root rot Marketable beets (%)	
Inoculated Check……..	81.3	ab[d]	64.4	ab	19.4	a	30.9	a	49	b
Not-inoculated Check……	100.0	a	100.0	a	-1.4	bc	14.1	b	75	a
Equation 2.08SC 0.4 fl oz (BD[e])…..	78.2	ab	75.6	ab	0.1	bc	19.7	b	65	a
Equation 2.08SC 0.8 fl oz (BD)……	70.9	ab	71.9	ab	-2.9	bc	14.6	b	73	a
Quadris 2.08SC 0.8 fl oz (BD)……..	78.2	ab	78.4	ab	-2.5	bc	14.4	b	74	a
A18126 45WG 0.574 oz (C)…….	74.6	ab	68.5	ab	7.0	abc	15.3	b	75	a
A18126 45WG 0.574 oz (A)…….	70.3	ab	68.1	ab	4.7	abc	15.0	b	72	a
Quadris 2.08SC 0.6 fl oz (C)…….	65.4	ab	68.7	ab	-7.3	c	16.9	b	72	a
Quadris 2.08SC 0.6 fl oz (A)…….	67.3	ab	68.2	ab	-2.9	bc	14.9	b	73	a
A13836 439SE 0.46 fl oz (C) …...…	85.7	ab	83.2	ab	1.4	bc	14.1	b	75	a
A13826 45SE 0.46 fl oz (A) …….	57.5	ab	52.1	ab	8.9	abc	18.3	b	67	a
Aproach 2.08SC 0.6 fl oz (A)……..	79.3	ab	72.5	ab	7.7	abc	15.1	b	73	a
Aproach 2.08SC 0.8 fl oz (A)……..	61.9	ab	61.1	ab	1.8	abc	21.4	ab	65	a
Aproach 2.08SC 0.6 fl oz (C)……	70.3	ab	66.4	ab	5.2	abc	18.3	b	67	a
Proline 4SC 0.33 fl oz (A)…….	58.5	ab	56.8	ab	3.0	abc	17.3	b	67	a
Serenade Soil 1.34F 1.84 fl oz (A)…	57.5	ab	56.8	ab	0.0	bc	17.6	b	68	a
Serenade Soil 1.34F 3.67 fl oz (A)…	67.4	ab	58.7	ab	11.9	ab	16.7	b	69	a
Serenade Soil 1.34F 1.84 fl oz (A); Proline 4SC 0.33 fl oz (C)…….	72.8	ab	71.5	ab	0.2	bc	14.4	b	74	a
Proline 4SC 0.33 fl oz (C)…….	58.9	ab	55.6	ab	3.8	abc	18.4	b	68	a
Serenade Soil 1.34F 3.67 fl oz (A); Proline 4SC 0.33 fl oz (C)……	81.7	ab	83.4	ab	-2.7	bc	17.4	b	69	a
Proline 4SC 0.33 fl oz (A); Quadris 2.08SC 0.6 fl oz (C)…….	60.4	ab	53.9	ab	9.5	abc	14.4	b	75	a
Quadris 2.08SC 0.6 fl oz (A)…….	61.4	ab	58.9	ab	3.5	abc	18.1	b	67	a
Quadris 2.08SC 0.6 fl oz (C)…….	69.0	ab	67.8	ab	1.6	abc	15.3	b	73	a
GWN-10338 1.5SC 2 fl oz (A)…….	45.0	b	44.6	b	0.2	bc	17.6	b	68	a
GWN-10338 1.5SC 2 fl oz (AC)…..	83.2	ab	80.9	ab	1.1	bc	19.9	b	66	a
GWN-10338 1.5SC 2 fl oz (C)……..	80.3	ab	78.1	ab	2.0	abc	16.4	b	72	a
Priaxor 4.17SC 0.344 fl oz (C)……..	81.4	ab	82.3	ab	-2.5	bc	18.0	b	71	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 and expressed relative to the not-treated, not-inoculated check

[b] DAP = days after planting on 23 May.

[c] Severity of crown and root rot was measured as an index calculated as described in the text

[d] Means followed by same letter are not significantly different at $p = 0.05$ (Fishers LSD).

[e] Application dates; A= 23 May; B= 13 Jun at GS 2-4, C=25 Jun at GS 4-6; D= 30 Jun at GS 6-8.

Efficacy of application of foliar fungicides for control of Cercospora leaf spot in sugar beet, 2014.

W. W. Kirk, R. L Schafer. Department of Plant, Soil and Microbial Science
Michigan State University, East Lansing, MI 48824

Sugar beet cv. ACH RR-824 was PAT-treated and planted at the Michigan State University Bean and Beet Farm, Richville, MI on 25 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). 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 35 or 45 Beetcast disease severity values were recorded in the area on 8 and 15 Jul, respectively (Ontario Weather Network, Ridgetown, ON, Canada), applications were initiated on 8 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 (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 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≥ 50% severity. Beetroots were machine-harvested on 10 Oct 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 (°F) was 57.8, 62.3, 66.2, 67.4, 60.0 and 51.5 (May, Jun, Jul, Aug, Sep, and to 10 Oct, respectively) and the number of days with maximum temperature >90°F over the same period was 0 for each month. Average daily relative humidity (%) over the same period was 64.5, 63.9, 73.3, 63.1, 60.0 and 72.1. Precipitation over the same period was 3.06, 2.74, 4.17, 3.90, 3.03 and 0.64". There were 182 Beetcast DSV values accumulated in the Saginaw area from 1 May to 10 Sep at Richville, MI.

Weather conditions during the growing season at Richville, MI were moderately conducive for the development of Cercospora leaf spot (CLS) for most of the season and of note was the lack of hot and humid conditions during Jul. CLS reached an index of about 5.3, 8.0 and 9.0 in the not-treated control by 14, 26 Aug and 10 Sep, respectively. CLS severity (%) reached 4.0, 21.3 and 42.5% in the not-treated control during the same period (not all data not shown in table). All treatments had significantly less CLS severity (%) than the not-treated control (42.5%) by 10 Sep. Treatments with CLS RAUDPC values less than 6.0 were significantly different to the not-treated control (12.0) by 10 Sep. Treatments with CLS indices less than 7.5 had significantly less Cercospora leaf spot than the not-treated control (9.0) by 10 Sep. No treatments had significantly greater yield per acre than the untreated control (28.5 t) and the range in yield was from 20.4 to 40.5 as a result of the inconsistent stand and may not have reflected intensity of CLS pressure. Treatments with sugar content (%) greater than 16.8% had significantly greater sugar content than the not-treated control (16.2%). No treatments had significantly greater recoverable white sucrose per acre (RWSA) than the untreated control (6806 lb) and the range in RWSA was from 4731 to 10408 lb.

Treatment and rate	Cercospora leaf spot Severity (%) 10 Sep 13 DAFA[a]		Cercospora leaf spot RAUDPC[b] (0-100) 10 Sep		Bayer 0-10 scale[c] 10 Sep		Yield (t)	Sugar content (%)		RWSA[d] (lb)
Not-treated check……..	42.5	a[e]	12.0	a	9.0	a	28.5	16.2	k	6806
Inspire XT 4.16SL 7 fl.oz (B-E[f])……	13.8	efg	4.5	b-e	7.5	a-e	26.9	16.7	g-k	6489
Eminent VP 1ME 13 fl.oz (B-E)……..	3.0	klm	0.7	g-l	4.5	i-l	35.9	17.5	a-e	9154
Manzate Max 4FL 51 fl.oz (B-E); Inspire XT 4.16SL 7 fl.oz (B); Priaxor 4.17SC 6 fl.oz (C); Proline 480 SC 480SC 5.7 fl.oz (D); Super Tin 4L 4FL 8 fl.oz (E)……	2.0	lm	0.3	l	3.8	kl	28.8	17.5	a-d	7257
Manzate Max 4FL 51 fl.oz (B-E); Inspire XT 4.16SL 7 fl.oz (BD); Super Tin 4L 4FL 8 fl.oz (C); Cuprofix Ultra 40 Disperss 40DF 3 lb (E)…	7.0	h-l	2.1	e-h	6.3	d-h	40.5	17.4	a-g	10408
Manzate Max 4FL 51 fl.oz (B-E); Super Tin 4L 4FL 8 fl.oz (BD); Inspire XT 4.16SL 7 fl.oz (C); Cuprofix Ultra 40 Disperss 40DF 3 lb (E)…	2.8	klm	0.7	g-l	3.8	kl	26.9	17.3	a-h	6909
Manzate Max 4FL 51 fl.oz (A-E); Inspire XT 4.16SL 7 fl.oz (BD); Super Tin 4L 4FL 8 fl.oz (C); Cuprofix Ultra 40 Disperss 40DF 3 lb (E)…	5.3	i-m	1.0	f-l	5.5	g-j	35.4	17.8	a	9374
Manzate Max 4FL 51 fl.oz (A-E); Super Tin 4L 4FL 8 fl.oz (BD); Inspire XT 4.16SL 7 fl.oz (C); Cuprofix Ultra 40 Disperss 40DF 3 lb (E)…	5.0	i-m	1.6	f-k	6.0	e-i	27.3	17.0	c-j	6620
Topguard 1.04SC 14 fl.oz + Koverall 75DF 2 lb + NIS (B-E)……..	2.0	lm	0.4	jkl	3.8	kl	34.4	17.4	a-e	8718
Topguard 1.04SC 14 fl.oz + Koverall 75DF 2 lb + Cercobin 4.11SC 15.3 fl.oz (BD); Headline 2.09EC 9.6 fl.oz + Super Tin 4L 6 fl.oz + Cercobin 4.11SC 15.3 fl.oz + NIS (CE)…..	1.0	m	0.4	kl	3.0	l	37.1	16.7	f-k	9270
Topguard 1.04SC 14 fl.oz + Cercobin 4.11SC 15.3 fl.oz (B-E)…….	8.8	g-j	2.2	d-g	6.8	c-h	28.1	17.4	a-f	7184
Topguard 1.04SC 14 fl.oz (B-E)…….	3.0	klm	0.6	h-l	4.5	i-l	27.2	17.6	abc	6950
Dithane F45 37F 3.2 pt (B-E); Proline 480 SC 480SC 5.7 fl.oz (B); Headline 2.09SC 9.6 fl.oz (C); Enable 2F 10 fl.oz + NIS[g] (D); Super Tin 4L 4FL 8 fl.oz (E)……	16.3	de	5.4	bc	7.8	a-d	22.9	17.4	a-f	5594
Dithane F45 37F 3.2 pt (B-E); Enable 2F 10 fl.oz + NIS L 8 fl.oz (B); Headline 2.09SC 9.6 fl.oz + NIS (C); Proline 480 SC 480SC 5.7 fl.oz + NIS (D); Super Tin 4L 4FL 8 fl.oz (E)……	7.5	h-l	2.5	c-f	6.5	c-h	29.8	17.2	a-h	7447
Enable 2F 2F 10 fl.oz + NIS (B-E)……..	10.3	f-i	1.3	f-l	6.5	c-h	35.1	17.3	a-h	8847
Manzate Max 4FL 51 fl.oz (B-E); Eminent VP 1ME 13 fl.oz + Badge 2.27EC 2 pt (C); Inspire XT 4.16SL 7 fl.oz (E); Super Tin 4L 4FL 8 fl.oz (F)…….	6.5	i-m	1.8	f-i	5.8	f-i	30.2	17.2	a-h	7634
Badge 2.27EC 2 pt (BD); Eminent VP 1ME 13 fl.oz + Manzate Max 4FL 51 fl.oz (C); Inspire XT 4.16SL 7 fl.oz + Manzate Max 4FL 51 fl.oz (E); Super Tin 4L 4FL 8 fl.oz (F)…….	7.8	h-k	2.3	def	6.0	e-i	26.1	16.9	d-j	6303
Manzate Max 4FL 51 fl.oz (BCEF); Eminent VP 1ME 13 fl.oz (C); Super Tin 4L 4FL 8 fl.oz (D); Proline 480 SC 480SC 5.7 fl.oz (E); Badge 2.27EC 2 pt (F)……..	7.5	h-l	1.9	fgh	6.5	c-h	32.6	17.3	a-h	8283
SA-0040306 100SL 40 fl.oz (B); Super Tin 4FL 8 fl.oz + Topsin 4.5FL 7.6 fl.oz (C); Headline 2.09SC 9 fl.oz +	5.3	i-m	1.4	f-l	5.5	g-j	29.2	17.6	a-d	7340

Treatment and rate	Cercospora leaf spot Severity (%) 10 Sep 13 DAFA[a]		Cercospora leaf spot RAUDPC[b] (0-100) 10 Sep		Bayer 0-10 scale[c] 10 Sep		Yield (t)	Sugar content (%)		RWSA[d] (lb)
Koverall 75DF 1.5 lb (D)……..										
SA-0040303 100SL 32 fl.oz (B); Topsin 4.5FL 7.6 fl.oz (C); Echo 100F 16 fl.oz (CD); Headline 2.09SC 9 fl.oz (D)……..	21.3	cd	5.4	bc	8.0	abc	20.4	16.4	jk	4731
SA-0040306 100SL 40 fl.oz (B); Super Tin 4L 4FL 8 fl.oz (C); Headline 2.09SC 9 fl.oz (D)……..	6.5	i-m	1.2	f-l	5.8	f-i	25.9	17.0	c-j	6480
Echo 100F 16 fl.oz (BCD)……	31.3	b	7.2	ab	8.5	ab	29.7	17.3	a-h	7561
SA-0040303 100SL 32 fl.oz (B); Super Tin 4L 4FL 8 fl.oz (CD); Topsin 4.5FL 7.6 fl.oz (C)…….	4.0	j-m	1.1	f-l	5.3	h-k	25.4	17.7	ab	6682
SA-0040303 100SL 24 fl.oz (B); Super Tin 4L 4FL 8 fl.oz (CD); Topsin 4.5FL 7.6 fl.oz (C)	17.5	de	4.9	bcd	7.8	a-d	30.7	16.4	jk	7205
SA-0040303 100SL 32 fl.oz (B); Super Tin 4L 4FL 8 fl.oz (C); Headline 2.09SC 9 fl.oz (D); Koverall 75DF 1.5 lb (CD)……	7.5	h-l	1.6	f-k	6.5	c-h	31.7	17.4	a-f	7965
SA-0040303 100SL 32 fl.oz (B); Super Tin 4L 8 fl.oz + Topsin 4.5FL 7.6 fl.oz (C); Headline 2.09SC 9 fl.oz + Koverall 75DF 1.5 lb (D)……..	10.0	f-i	1.5	f-k	7.0	b-g	26.5	16.9	d-j	6192
SA-0040307 100SL 32 fl.oz (B); Super Tin 4L 8 fl.oz + Topsin 4.5FL 7.6 fl.oz (C); Headline 2.09SC 9 fl.oz (D)……..	6.3	i-m	1.7	f-i	6.3	d-h	31.7	16.8	e-k	7832
SA-0040307 100SL 32 fl.oz (B); Super Tin 4L 8 fl.oz + Topsin 4.5FL 7.6 fl.oz (C); Headline 2.09SC 9 fl.oz + Koverall 75DF 1.5 lb (D)……..	7.5	h-l	1.6	f-j	6.5	c-h	29.6	17.8	a	6998
SA-0040307 100SL 32 fl.oz (B); Headline 2.09SC 9 fl.oz + Koverall 75DF 1.5 lb (C); Super Tin 4L 4FL 8 fl.oz (D)……	5.3	i-m	1.1	f-l	5.5	g-j	36.1	17.2	a-h	9213
Proline 480 SC 5.7 fl.oz (B); Super Tin 4L 4FL 8 fl.oz + Topsin 4.5FL 7.6 fl.oz (C); Headline 2.09SC 9 fl.oz (D)……..	6.3	i-m	1.3	f-l	6.3	d-h	35.5	17.4	a-e	9081
SA-0040306 100SL 40 fl.oz + Perfectose 100SC 56 fl.oz (B); Super Tin 4L 8 fl.oz (C); Headline 2.09SC 9 fl.oz (D)…….	4.0	j-m	1.0	f-l	4.0	jkl	28.3	17.1	b-i	6358
Minerva 1SC 13 fl.oz + SA-0012003 100SL 19 fl.oz (B); Super Tin 4L 8 fl.oz (CD); Topsin 4.5FL 7.6 fl.oz (C)…….	8.8	g-j	1.5	f-k	6.8	c-h	34.8	17.5	a-e	8957
Diffusion 60L 2 gal (B); Diffusion 60L 3 gal (CDE); Proline 480 SC 5.7 fl.oz (B); Super Tin 4L 4FL 8 fl.oz (C); Headline 2.09SC 9 fl.oz (D); Inspire XT 4.16SL 7 fl.oz (E)……...	15.0	ef	2.0	e-h	7.8	a-d	34.2	17.1	b-h	8562
Diffusion 60L 2 gal (B); Diffusion 60L 3 gal (CDE)……	26.3	bc	6.0	ab	8.5	ab	28.0	16.4	ijk	6803
p-value if NSD							0.3119			0.4565

[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 10 Sep, a period of 27 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 $\geq$ 50% severity

[d] RWSA = Recoverable White Sucrose per Acre (Ton* Recoverable White Sucrose per Ton of sugarbeet)

[e] Means followed by same letter are not significantly different at $p = 0.10$ (Fishers LSD)

[f] Application dates: A= 8 Jul; B= 15 Jul; C= 29 Jul; D= 5 Aug; E= 19 Aug; F= 28 [g] Induce applied at 0.25% v/v

Efficacy of application of foliar fungicides and Oxidate for control of Cercospora leaf spot in sugar beet, 2014.

W. W. Kirk, R. L Schafer. Department of Plant, Soil and Microbial Science
Michigan State University, East Lansing, MI 48824

Sugar beet cv. ACH RR-824 was PAT-treated and planted at the Michigan State University Bean and Beet Farm, Richville, MI on 25 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). 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 that were recorded in the area on 15 Jul, (Ontario Weather Network, Ridgetown, ON, Canada), applications were initiated on 17 Jul and four to eight applications were made as specified in the table below. Fungicides were applied with a hand-held R&D spray boom delivering 25 gal (80 p.s.i.) and using three XR11003VS nozzles per row. Weeds were controlled by cultivation and with Roundup Original Max 2.0 pt 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 14 Oct 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 (^{o}F) was 57.8, 62.3, 66.2, 67.4, 60.0 and 51.5 (May, Jun, Jul, Aug, Sep, and to 14 Oct, respectively) and the number of days with maximum temperature >90^{o}F over the same period was 0 for each month. Average daily relative humidity (%) over the same period was 64.5, 63.9, 73.3, 63.1, 60.0 and 72.1. Precipitation over the same period was 3.06, 2.74, 4.17, 3.90, 3.03 and 0.64". There were 182 Beetcast DSV values accumulated in the Saginaw area from 1 May to 10 Sep at Richville, MI.

Weather conditions during the growing season at Richville, MI were moderately conducive for the development of Cercospora leaf spot (CLS) for most of the season and of note was the lack of hot and humid conditions during Jul. CLS reached an index of about 5.3, 7.5 and 9.0 in the not-treated control by 14, 26 Aug and 10 Sep, respectively. CLS severity (%) reached 4.0, 15.0 and 45.0% in the not-treated control during the same period (not all data not shown in table). All treatments had significantly less CLS severity (%) than the not-treated control (45.0%) by 10 Sep. Treatments with CLS AUDPC values less than 455 were significantly different to the not-treated control (564) by 10 Sep. Treatments with CLS indices less than 8.5 had significantly less Cercospora leaf spot than the not-treated control (9.0) by 10 Sep. No treatments had significantly greater yield per acre than the untreated control (26.8 t) and the range in yield was from 24.7 to 30.2 as a result of the inconsistent stand and may not have reflected intensity of CLS pressure. Treatments with sugar content (%) greater than 15.8% had significantly greater sugar content than the not-treated control (15.6%). No treatments had significantly greater recoverable white sucrose per acre (RWSA) than the untreated control (6101 lb) and the range in RWSA was from 5695 to 6963 lb. No phytotoxicity was observed after any treatment.

Treatment and rate	Cercospora leaf spot Severity (%) 10 Sep 13 DAFA[a]		AUDPC[b] 10 Sep		Bayer 0-10 scale[c] 10 Sep		Yield (t)	Sugar content (%)		RWSA[d] (lb)
OxiDate 2.0 27L 80 fl oz (A-H)……	25.0	b	275	c	8.5	a	24.7	15.8	b	5695
OxiDate 2.0 27L 32 fl oz (A-H)……	31.3	b	455	ab	8.8	a	30.2	15.6	b	6963
Proline 480 SC 480SC 5.7 fl oz (A); Manzate Max 4FL 51 fl oz (ACEG); Super Tin 4L 4FL 8 fl oz (C); Headline 2.09SC 9 fl oz (E); Inspire XT 4.16SL 7 fl oz (G)……...	7.8	c	80	d	6.0	b	25.4	16.9	a	6353
Proline 480 SC 480SC 5.7 fl oz (A); OxiDate 2.0 27L 32 fl oz (ACEG); Super Tin 4L 4FL 8 fl oz (C); Headline 2.09SC 9 fl oz (E); Inspire XT 4.16SL 7 fl oz (G)……...	27.5	b	340	bc	8.5	a	27.1	16.2	ab	6511
Untreated Check……	45.0	a	564	a	9.0	a	26.8	15.6	b	6101
p-value if NSD							0.1975			0.3365

[a] DAFA= Days after final fungicide application

[b] AUDPC = The area under the percentage late blight disease progress curve calculated for each treatment from the date of the first evaluation to 10 Sep, a period of 27 days

[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 $\geq$ 50% severity

[d] RWSA = Recoverable White Sucrose per Acre (Ton* Recoverable White Sucrose per Ton of sugarbeet)

[e] Means followed by same letter are not significantly different at $p = 0.10$ (Fishers LSD)

[f] Application dates: A= 17 Jul; B= 24 Jul; C= 31 Jul; D= 7 Aug; E= 15 Aug ; F= 22 Aug; G= 28 Aug; H= 5 Sep