2017 RESEARCH REPORT

SAGINAW VALLEY

RESEARCH & EXTENSION CENTER

MICHIGAN STATE UNIVERSITY

AgBioRESEARCH

TABLE OF CONTENTS

SAGINAW VALLEY RESEARCH AND EXTENSION CENTER REPORT

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INTRODUCTION

The Michigan sugar beet grower cooperative, Michigan Sugar Company, and the Michigan dry bean growers and industry represented by the Michigan Bean Commission and Michigan Bean Shippers Association, donated the proceeds of the 120 acre Saginaw Valley Bean and Beet Research Farm, located in Saginaw County for 38 years, to Michigan State University in 2009. The 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. The Education Center was completed in 2016 and in 2017 has hosted numerous events and expanded the partners associated with the farm. An additional 150 acres was purchased with the help of funds from the Michigan Wheat Industry to expand wheat research in the region. 75 acres of land was sold in 2017 bringing the total acres to 400. 75 acres of the 150 acres bought is being leased by the previous tenant as per a previous agreement for the 2018 and 2019 season. 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 2017 season was the ninth season of research at the site. This research report is primarily a compilation of research conducted at the site in 2017. 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. The soil type on the newly purchased 150 acre site is the same classification, the pH averages 7.5, but does have a few low pH spots (6.5) which have been identified and were corrected with liming the fall of 2017. Soil test phosphorus averages 30 pounds P/acre and will be increased with heavier phosphorus applications prior to planting in the spring of 2018. Potassium averaged 230 pounds and that will be corrected also.

Weather – The monthly rainfall for 2017 collected with the automated rain gauge is given in Table 1. The monthly totals are given at the bottom of the table. Rainfall was above average in January, February, March, April, June and October and below average all other months. Planting in the spring was timely with good rains to help emergence. There was heavier rain on the Father's day weekend that created some variability in the dry bean plots. The rainfall total of 30.10" was above average. Maximum and minimum daily temperatures along with growing degree days (base 50^0F) are given in Table 2. The 2017 season was warm with 9 days above 90 degrees and 30 days above 85 degrees. The growing degree days for 2017 was 2605 which was above the 5 year average and the long term average. Rainfall was good early in the year, but the months of July, August and September were dry which lowered yields. The average yields for crops grown on the farm was: corn at 180 bushels/acre, soybeans at 50 bushels/acre, wheat at 90 bushels/acre, dry beans at 20 cwt/acre, and sugarbeets at 30 tons/acre.

GROWING DEGREE DAYS - SAGINAW VALLEY RESEARCH FARM

Base 50 (max + min / 2 - 50)

	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
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
2015	18.00	306.00	444.50	577.00	546.50	342.00	90.50	2324.50
2016	37.50	274.00	509.00	688.50	680.00	430.50	189.50	2809.00
2017	99.50	227.50	546.00	609.50	506.00	411.50	204.50	2604.50
AVERAGE	65.38	246.11	494.18	626.39	557.07	330.32	101.68	2421.12

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

MAXIMUM-MINIMUM AIR TEMPERATURES (F)
SAGINAW VALLEY RESEARCH & EXTENSION CENTER - 2017

	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	40	22	34	21	52	21	57	31	69	39	74	44
2	44	19	24	13	28	17	62	33	49	40	82	47
3	37	33	20	10	25	14	58	45	59	34	81	47
4	34	11	29	10	29	9	49	39	49	41	87	58
5	14	5	33	15	40	19	44	32	50	40	67	53
6	15	4	40	16	60	38	38	32	60	40	68	50
7	13	5	36	31	58	37	51	32	56	34	78	46
8	17	7	35	18	44	33	61	29	58	30	80	49
9	26	14	20	12	38	28	75	47	61	30	80	59
10	44	24	33	12	29	12	75	41	67	41	89	57
11	42	27	42	30	26	11	51	39	64	44	91	71
12	33	22	38	28	29	10	57	38	68	38	94	70
13	22	16	40	25	23	14	50	37	69	42	86	67
14	30	16	45	30	21	7	65	32	65	45	83	63
15	32	14	31	24	31	11	81	46	75	35	87	66
16	32	20	32	19	38	17	71	47	85	50	82	64
17	34	31	48	26	40	21	60	36	87	68	82	63
18	36	32	62	36	35	31	64	31	84	49	79	64
19	39	30	58	33	48	25	73	47	55	42	77	58
20	35	30	55	27	52	33	57	42	66	43	72	55
21	48	32	55	38	52	23	52	42	75	49	76	51
22	44	34	64	37	31	18	58	35	68	49	86	58
23	37	33	58	36	42	20	70	37	70	56	77	62
24	36	32	44	32	68	36	70	34	71	52	75	56
25	36	32	43	23	39	34	72	47	58	52	66	53
26	37	30	38	22	50	35	80	54	68	52	69	53
27	32	27	49	29	53	41	73	47	77	50	69	51
28	29	24	52	34	47	31	65	44	80	56	76	50
29	26	18			54	24	54	40	79	56	83	62
30	23	11			40	32	42	39	72	52	82	67
31	29	20			37	34			69	51		

MAXIMUM-MINIMUM AIR TEMPERATURES (F)
SAGINAW VALLEY RESEARCH & EXTENSION CENTER - 2017 cont.

	JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	80	63	85	61	68	40	69	38	43	32	45	25
2	81	59	86	61	74	38	77	42	51	39	49	31
3	77	53	82	58	77	52	85	53	47	32	50	25
4	81	52	71	59	82	54	76	50	45	34	56	35
5	86	52	74	53	69	48	74	44	57	43	57	27
6	88	60	77	52	65	41	65	54	46	33	36	24
7	85	64	75	54	63	44	82	60	45	29	29	23
8	77	59	80	49	64	42	77	55	45	24	30	21
9	82	56	83	57	64	38	78	53	41	19	29	14
10	76	63	83	58	69	36	67	50	23	15	27	14
11	87	59	80	61	73	41	55	47	35	13	28	10
12	81	67	75	57	80	44	56	42	37	31	28	9
13	82	66	78	51	79	43	71	53	42	31	20	12
14	76	63	81	58	79	58	61	56	47	26	20	-5
15	80	57	80	56	82	53	67	42	44	38	23	9
16	72	55	83	53	83	57	56	37	41	31	24	19
17	79	50	80	65	86	59	N/A	N/A	42	27	28	21
18	86	57	73	61	74	54	N/A	N/A	43	32	37	27
19	87	66	77	58	70	50	65	46	37	27	44	33
20	85	68	83	56	82	59	75	40	46	27	33	23
21	87	62	86	65	93	65	76	53	49	30	31	25
22	75	65	78	57	93	61	78	56	32	27	33	28
23	82	65	72	50	94	64	69	50	37	27	33	21
24	72	55	67	47	92	59	51	41	57	31	22	17
25	80	48	70	42	91	59	50	34	50	30	19	3
26	77	59	74	41	91	61	53	28	41	23	8	-2
27	79	58	75	48	73	54	52	38	39	22	12	-4
28	75	54	67	57	69	51	44	37	63	39	13	-6
29	80	49	75	57	65	48	48	36	43	28	15	7
30	84	52	90	58	64	42	45	32	46	28	14	-2
31	86	58	68	44			42	34			11	-4

MONTHLY PRECIPITATION, SAGINAW VALLEY RESEARCH FARM

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
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

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
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
2015	0.59	0.08	0.56	1.97	2.86	2.68	2.20	3.94	2.62	1.96	1.26	2.04	22.76
2016	0.94	0.73	4.09	1.30	1.59	1.51	3.47	5.15	2.03	2.11	2.14	0.81	25.87
2017	2.80	1.98	1.90	5.79	1.97	4.83	1.10	2.26	1.54	3.52	2.08	0.33	30.10
AVG.	1.15	1.06	1.36	2.65	2.66	2.55	2.28	2.93	2.82	2.40	2.22	1.23	25.33

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

PRECIPITATION - SAGINAW VALLEY RESEARCH & EXTENSION CENTER- 2017

Day:	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			0.31		0.31						0.03	
2	0.54		0.03		0.12				0.01		0.46	
3	0.19			0.76		0.04		0.19	0.03			
4	0.02			0.28	0.22	0.22		0.01	0.07	0.01	0.15	
5				0.16		0.03			0.89		0.13	0.01
6				1.36		0.01		0.29	0.01	0.10		
7		0.52	0.12	0.01			0.04	0.01	0.03	0.42		
8									0.03			
9								0.01			0.02	0.05
10	0.29			1.00	0.02		0.21					
11	0.33				0.02			0.16		0.7		
12	0.03	0.05						0.01		0.01		
13			0.02				0.11					
14										0.63		
15				0.18		0.34				0.18	0.37	
16					0.23		0.01		0.40			
17	0.85		0.02			0.97		0.56			0.08	0.01
18	0.01		0.03			0.54		0.03			0.77	0.21
19					0.01	0.3			0.07			
20	0.06		0.01	1.10								
21		0.03		0.04	0.68						0.01	
22	0.02	0.01				0.53	0.49	0.12				0.05
23	0.09				0.01	1.25	0.02			0.53		
24	0.13	0.79			0.22	0.17				0.84		
25	0.03	0.01	0.18		0.13	0.02				0.01	0.01	
26	0.16		0.26				0.10					
27				0.07		0.08	0.12			0.06		
28		0.57				0.08		0.07				
29				0.02		0.03		0.79		0.03		
30			0.82	0.81		0.22		0.01			0.05	
31	0.05		0.10									
TOTAL	2.80	1.98	1.90	5.79	1.97	4.83	1.10	2.26	1.54	3.52	2.08	0.33

Rainfall is measured in inches

2017 YEAR END TOTAL - 30.10 INCHES

Sugar beet activities of the USDA-ARS East Lansing conducted in cooperation with Saginaw Research & Extension Center during 2017

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Evaluation and rating plots were planted at the Saginaw Valley Research & Extension Center (SVREC) in Frankenmuth, MI in 2017 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 as well as germplasm screening for the National Plant Germplasm System. All trials were planted following normal fall and spring tillage operations with a USDA-ARS modified John Deere / Almaco research plot planter. The BSDF CLS nursery was planted on May 11, 2017, the BSDF CRR Roundup Ready nursery was planted on May 10, 2017, and the conventional CRR nursery was planted on May 15. All plots were 15 ft long planted on 20 in rows. BSDF entries were commercial or near-commercial varieties, and weeds were controlled with glyphosate at the recommended rates. For non-commercial entries, as in previous years, weeds were controlled by a pre-plant application of ethofumesate, followed by intervals of post-plant mixtures of phenmedipham, desmedipham, triflusulfuron methyl, and clopyralid (4 times), and finally with S-metolachlor. Hand weeding was done as needed to control larger weeds. The BSDF trials were thinned by hand with the generous help of Michigan Sugar Cooperative. Bolting beets were removed throughout the season. In the CLS nurseries, Quadris 2.08SC (azoxystrobin) was applied at 0.0091 kg/100 m row in a 14 cm band in-furrow at planting to help control Rhizoctonia damping-off.

Cercospora / Agronomic Nurseries:

The BSDF cooperative CLS evaluation nursery had entries from three companies, with a total of 171 entries evaluated (including 44 non-Roundup Ready entries). This nursery was 2-row with 4 replications. The nursery was inoculated on July 5 with a liquid spore suspension (approximately 1 x 10^3 spores/ml) of *Cercospora beticola*. Inoculum was produced from a mixture of leaves collected from the 2016 inoculated leaf spot nursery at the SVREC and 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 late August, after which regrowth started to outpace new disease development. In addition to commercial entries, 30 Plant Introductions (see below) and 100 USDA-ARS breeding lines and checks from two USDA cooperators (Ft. Collins, CO, East Lansing, MI) were evaluated in randomized replicated trials and rated for disease reaction on two dates. Fort Collins' entry ratings (65 entries) ranged from 2.3 to 6.6, excluding the checks EL50/2 (score 3.2) and F1042 (score 5.7) (overall mean 4.6, LSD 0.05 = 1.4) at the last rating.

East Lansing tested 35 breeding lines in the Cercospora nursery and in an adjacent agronomic nursery (NIC, Tables 1 and 2), in 1-row 4-rep randomized trials. The same entries were also inoculated with Alternaria on June 21 in a separate trial adjacent to the Cercospora nursery (Alt-Cerc, Tables 1 and 2), and were super-inoculated with Cercospora July 5, as above. Alternaria

inoculation followed methods developed on tomato, and ratings followed that of Cercospora. Yield was taken for these two trials (Alt-Cerc and Cerc) as well as from the NIC (Tables 1 and 2). Average plot weights in pounds are reported. Sugars were determined via near-infrared spectroscopy (NIR) with the assistance of Michigan Sugar Co.

Cercospora scores at the final of two ratings ranged from 3.25 to 6.00, with a mean of 4.1 (LSD 0.05 = 1.12) including the resistant EL50/2 (score 3.25) and susceptible F1042 (score = 6.00) (Table 2). Alternaria-Cercospora scores from the second of two ratings ranged from 3.75 to 7.00, with a mean of 4.7 (LSD 0.05 = 0.77) including the resistant EL50/2 (score 3.75) and susceptible F1042 (score = 7.00). Thus, Alternaria pre-inoculation appeared to increase Cercospora severity in all cases but three (Entries 931, 945, and 954, Table 1). More rapid Cercospora development may be occurring on the doubly infected beets since the first of two ratings proportionally showed a higher trial mean (mean = 2.99) in Alternaria inoculated plots than in Cercospora inoculated plots alone (mean = 1.66) (Table 1). Purity was negatively affected by Cercospora inoculation, as was stand and weight. This experiment was conducted to assess the potential for developing an Alternaria inoculation scheme, and to examine if interactions between leaf spot infections have a potential to affect yield. The magnitude of the differences of the same accession for each of the traits measured was highly variable, suggesting that this variability, specifically the yet to be determined genetic component, could be accessed for breeding.

Table 1: Comparison of trial means in Cercospora-inoculated (Cerc), Alternaria-inoculated with super-inoculation of Cercospora (Alt-Cerc), and non-inoculated entries (NIC). The same entries were in each trial (Table 2). nd = not done. Ratings for each disease nursery were done on different dates, with the Alt-Cerc nursery scored at the earlier date indicated in the column heading.

Field	Weight	Number of beets	Purity (NIR)	Sucrose (NIR)	Cercospora: AUG.10to18	Cercospora: AUG.25to30
Alt-Cerc	16.45	17.86	94.96	17.89	2.99	4.71
Cerc	15.70	17.44	94.94	18.22	1.66	4.09
NIC	21.50	19.56	96.13	18.37	nd	nd
mean	17.90	18.29	95.34	18.16	2.33	4.39
F-value	27.52***	5.86*	82.11 ***	3.43*	187.1 ***	30.89 ***
LSD 0.05	1.67	1.28	0.21	0.37	0.19	0.22

Breeding lines tested (Table 2) were an eclectic group of open-pollinated germplasm generated over the past 10 years for purposes of introgressing traits and expanding genetic diversity of traditional pools of East Lansing and Smooth-root germplasm. Traits of interest have been emergence and seedling vigor, nematode resistance, seedling Rhizoctonia resistance, higher sucrose, and Cercospora tolerance. Regards the latter, numerous selections from previous Plant Introduction nurseries and cooperator germplasm assessments have been intercrossed (with permission) with East Lansing materials and evaluated (Table 2). The highest sucrose was evident in a population from Kimberly ID (c/o Imad Eujayl, Entry 946) evaluated in the 2015 Cercospora nursery, intercrossed with 15 other populations in the 2016 greenhouse seed production, and harvested by seed parent. Many of these entries are candidates for germplasm release, and seed is available upon request.

Table 2: Agronomic performance East Lansing replicated trials of potential germplasm releases.

			Weight					Number of beets					Sucrose (NIR)				
Entry	Accession	Name	Alt-Cerc	Cerc	NIC	mean	st.dev.	Alt-Cerc	Cerc	NIC	mean	st.dev.	Alt-Cerc	Cerc	NIC	mean	st.dev.
946	EL-A16-00022	(entryK5)-KEMS8-600	13.0	14.0	13.0	13.33	0.58	9.8	16.3	10.3	12.08	3.62	19.06	19.08	20.75	19.63	0.97
932	EL-A021507	Mix: SR96+rhizomania	17.5	16.0	19.5	17.67	1.76	18.0	20.8	19.8	19.50	1.39	19.17	18.69	20.31	19.39	0.83
963	EL-A021482	EL50/2	16.5	20.5	17.0	18.00	2.18	16.3	21.0	16.3	17.83	2.74	20.22	19.15	19.96	19.78	0.56
940	EL-A16-00016	(entryFC16)-(Best FC LSR x Best EL LSR)...	15.0	15.5	20.5	17.00	3.04	14.0	18.5	15.5	16.00	2.29	18.57	18.43	19.88	18.96	0.80
949	EL-A16-00025	E50x07.33B	20.0	16.0	22.5	19.50	3.28	17.3	15.8	22.0	18.33	3.26	18.39	18.39	19.47	18.75	0.62
958	EL-A022776	EL64, pEL63	19.0	18.0	20.0	19.00	1.00	18.3	17.8	18.8	18.25	0.50	16.79	18.09	19.17	18.02	1.19
941	EL-A16-00017	(entryPI26)-China Ch-11	20.5	16.0	20.0	18.83	2.47	22.3	15.8	19.5	19.17	3.26	20.75	19.28	19.16	19.73	0.89
955	EL-A16-0001	FL042 Cerc Susc	6.0	13.0	10.0	9.67	3.51	9.8	12.0	12.0	11.25	1.30	15.87	17.09	18.94	17.30	1.55
948	EL-A16-00024	EL Cerc Sel n	17.0	13.0	25.0	18.33	6.11	19.0	17.0	20.3	18.75	1.64	18.31	18.08	18.90	18.43	0.42
945	EL-A16-00021	(entryFC12)-FC712/Monohy A4	16.5	11.0	21.0	16.17	5.01	23.0	12.8	21.8	19.17	5.59	18.54	19.19	18.79	18.84	0.33
950	EL-A16-00031	EL selection 2015 B&B	16.0	16.0	25.0	19.00	5.20	16.0	16.3	19.3	17.17	1.81	17.47	18.70	18.59	18.25	0.68
935	EL-A16-00008	CN927-202 5927-202 NN? x 08-5E	13.5	15.5	25.5	18.17	6.43	20.0	21.0	23.0	21.33	1.53	16.76	18.69	18.58	18.01	1.08
937	EL-A16-00013	SR Cerc	20.0	13.5	25.5	19.67	6.01	18.8	13.0	23.0	18.25	5.02	18.46	18.18	18.55	18.40	0.19
939	EL-A16-00015	FL024?(entryF23)	10.5	11.5	13.0	11.67	1.26	13.8	16.5	15.5	15.25	1.39	19.17	19.50	18.54	19.07	0.49
962	EL-A027152	SR100	23.0	16.0	22.0	20.33	3.79	21.0	18.5	21.3	20.25	1.52	17.98	17.75	18.47	18.07	0.37
943	EL-A16-00019	2014 Rhizoc	16.5	15.0	25.5	19.00	5.68	20.8	14.3	22.5	19.17	4.35	16.83	17.62	18.39	17.61	0.78
936	EL-A16-00012	EL50/2 cross	11.0	9.5	14.5	11.67	2.57	15.8	18.0	17.8	17.17	1.23	18.21	18.12	18.37	18.23	0.13
954	EL-A1402163	Nematode / Storage / Cerc / Rhizoc	15.5	16.0	27.5	19.67	6.79	16.8	19.3	23.3	19.75	3.28	16.56	17.19	18.34	17.36	0.90
947	EL-A16-00023	storage - SR102 parent	21.3	16.5	25.5	21.10	4.50	26.0	18.5	21.8	22.08	3.76	18.55	18.41	18.30	18.42	0.13
965	EL-A015030	SP7322	17.0	22.0	22.0	20.33	2.89	20.8	25.0	20.8	22.17	2.45	17.33	17.85	18.78	17.32	0.48
952	EL-A1402161	NIC Nematode Sucrose group	18.5	14.0	28.0	20.17	7.15	22.8	15.8	23.5	20.67	4.27	17.43	18.44	18.27	18.05	0.54
951	EL-A1402159	NIC Storage&SR Rhiz (Grp 7&8)	25.5	12.5	28.5	22.17	8.50	18.3	11.8	22.0	17.33	5.19	18.24	19.07	18.19	18.50	0.49
964	EL-A013699	fodder x sugar	13.0	16.0	17.5	15.50	2.29	16.8	16.3	17.3	16.75	0.50	17.52	17.24	18.15	17.64	0.47
953	EL-A1402162	Cercospora (Grp 1)	25.5	16.5	33.0	25.00	8.26	23.3	17.5	22.0	20.92	3.02	18.01	18.15	18.10	18.09	0.07
961	EL-A029770	EL62	14.0	17.0	23.5	18.17	4.86	17.0	19.8	20.8	19.17	1.94	17.19	19.20	18.04	18.14	1.01
957	EL-A12-00004	rhizoc, nema	15.0	14.0	15.5	14.83	0.76	14.8	19.3	16.5	16.83	2.27	17.74	18.59	18.03	18.12	0.43
938	EL-A16-00014	SR98xSF	18.0	15.0	21.5	18.17	3.25	19.8	16.0	19.3	18.33	2.04	19.75	17.92	17.85	18.51	1.08
944	EL-A16-00020	(entryFC20)-20071003H2...	11.0	17.0	12.0	13.33	3.21	12.8	19.5	15.3	15.83	3.41	18.22	16.51	17.71	17.48	0.88
959	EL-A024974	SR w/EL	20.5	18.0	20.5	19.67	1.44	17.8	22.0	19.8	19.83	2.13	17.94	16.72	17.71	17.46	0.65
892	EL-A015027	C869 CMS	10.5	10.5	12.5	11.17	1.15	16.5	16.3	15.0	15.92	0.80	16.65	18.35	17.54	17.51	0.85
931	EL-A010297	fodder x sugar	17.5	17.0	23.0	19.17	3.33	14.8	20.5	22.8	19.33	4.13	18.60	18.20	17.40	18.07	0.61
933	EL-A15-00005	storage	13.5	13.5	28.0	18.33	8.37	17.3	16.0	22.5	18.58	3.45	17.87	17.02	17.36	17.42	0.43
942	EL-A16-00018	(entryFC47)-FC1741 Population(rz2...	14.5	17.0	19.5	17.00	2.50	15.8	17.0	17.3	16.67	0.80	18.98	19.17	17.32	18.49	1.02
934	EL-A16-00007	PI 357361 germ test seln	19.0	14.5	24.0	19.17	4.75	23.3	16.5	21.8	20.50	3.54	14.84	17.73	15.95	16.17	1.46
956	EL-A027146	PI 355963 germ test seln	15.5	19.0	31.0	21.83	8.13	19.8	18.8	25.0	21.17	3.36	14.53	17.58	15.77	15.96	1.53
		mean	16.45	15.7	21.5			17.86	17.44	19.56			17.89	18.22	18.37		
		F-value	2.63 ***	0.78 ns	2.96 ***			2.67 ***	0.83 ns	2.87 ***			4.08 ***	1.13 ns	2.97 ***		
		LSD 0.05	7.28	10.25	9.18			6.22	8.83	5.68			1.82	2	1.66		

			Purity (NIR)					Cerc AUG.10to18				Cerc AUG.25to30				Regrowth
Entry	Accession	Name	Alt-Cerc	Cerc	NIC	mean	st.dev.	Alt-Cerc	Cerc	mean	st.dev.	Alt-Cerc	Cerc	mean	st.dev.	Cerc
933	EL-A15-00005	storage	95.19	94.87	96.08	95.38	0.63	2.75	1.00	1.88	1.24	4.00	3.25	3.63	0.53	1.75
941	EL-A16-00017	(entryPI26)-China Ch-11	95.71	94.42	96.77	95.63	1.18	2.25	1.25	1.75	0.71	3.75	3.25	3.50	0.35	1.50
946	EL-A16-00022	(entryK5)-KEMS8-600	95.13	94.75	97.04	95.64	1.23	3.00	1.00	2.00	1.41	4.50	3.25	3.88	0.88	1.75
963	EL-A021482	**EL50/2 (Resistant check)**	95.04	95.6	95.85	95.50	0.41	2.25	1.25	1.75	0.71	3.50	3.25	3.38	0.18	2.00
937	EL-A16-00013	SR Cerc	95.02	95.25	96.59	95.62	0.85	2.50	1.50	2.00	0.71	4.25	3.50	3.88	0.53	1.50
938	EL-A16-00014	SR98xSF	95.29	94.93	95.51	95.24	0.29	2.50	1.00	1.75	1.06	4.00	3.50	3.75	0.35	1.75
943	EL-A16-00019	2014 Rhizoc	93.81	95.65	96.29	95.25	1.29	3.00	1.00	2.00	1.41	4.25	3.50	3.88	0.53	1.75
947	EL-A16-00023	storage - SR102 parent	95.23	94.98	96.05	95.42	0.56	3.00	1.25	2.13	1.24	4.00	3.50	3.75	0.35	2.00
949	EL-A16-00025	E50x07.33B	94.76	94.61	96.13	95.17	0.84	2.00	1.00	1.50	0.71	4.25	3.50	3.88	0.53	2.00
953	EL-A1402162	Cercospora (Grp 1)	94.87	94.93	95.83	95.21	0.54	2.75	1.00	1.88	1.24	4.25	3.50	3.88	0.53	2.00
959	EL-A024974	SR w/EL	95.4	94.85	95.72	95.32	0.44	2.50	1.25	1.88	0.88	4.00	3.50	3.75	0.35	2.00
940	EL-A16-00016	(entryFC16)-(Best FC LSR x Best EL LSR) - n	95.15	94.93	96.21	95.43	0.68	2.50	1.50	2.00	0.71	4.00	3.75	3.88	0.18	1.75
950	EL-A16-00031	EL selection 2015 B&B	94.88	94.51	95.81	95.07	0.67	2.75	1.50	2.13	0.88	4.25	3.75	4.00	0.35	2.25
957	EL-A12-00004	rhizoc, nema	95.14	95.64	95.75	95.51	0.33	2.50	1.25	1.88	0.88	4.50	3.75	4.13	0.53	2.00
939	EL-A16-00015	FL024?(entryF23)	94.99	94.42	96.29	95.23	0.96	3.25	1.75	2.50	1.06	5.00	4.00	4.50	0.71	1.75
944	EL-A16-00020	(entryFC20)-20071003H2; LSR ((BGRC 455	94.8	94.11	95.39	94.77	0.64	3.00	1.75	2.38	0.88	5.00	4.00	4.50	0.71	2.00
948	EL-A16-00024	EL Cerc Sel n	95.39	95.8	96.19	95.79	0.40	2.50	1.25	1.88	0.88	4.25	4.00	4.13	0.18	2.00
951	EL-A1402159	NIC Storage&SR Rhiz (Grp 7&8)	94.8	95.07	96.12	95.33	0.70	2.75	1.25	2.00	1.06	4.25	4.00	4.13	0.18	2.25
954	EL-A1402163	Nematode / Storage / Cerc / Rhizoc	94.65	94.9	95.66	95.07	0.53	3.00	1.50	2.25	1.06	4.00	4.00	4.00	0.00	2.00
965	EL-A015030	SP7322	95.77	95	96.76	95.84	0.88	3.00	1.50	2.25	1.06	4.75	4.00	4.38	0.53	2.25
931	EL-A010297	fodder x sugar	94.64	94.58	96.74	95.32	1.23	2.75	1.25	2.00	1.06	4.25	4.25	4.25	0.00	2.50
932	EL-A021507	Mix: SR96+rhizomania	95.46	95.29	96.51	95.75	0.66	2.75	2.00	2.38	0.53	5.00	4.25	4.63	0.53	1.75
952	EL-A1402161	NIC Nematode Sucrose group	94.91	94.97	95.88	95.25	0.54	3.25	2.00	2.63	0.88	5.00	4.25	4.63	0.53	2.50
958	EL-A022776	EL64, pEL63	94.45	94.5	96.07	95.01	0.92	3.25	2.00	2.63	0.88	5.75	4.25	5.00	1.06	2.75
962	EL-A027152	SR100	94.59	93.88	95.87	94.78	1.01	2.75	1.75	2.25	0.71	4.50	4.25	4.38	0.18	2.25
964	EL-A013699	fodder x sugar	95.71	94.29	96.29	95.43	1.03	3.25	2.00	2.63	0.88	5.75	4.25	5.00	1.06	3.00
936	EL-A16-00012	EL50/2 cross	94.97	95.09	96.07	95.38	0.60	3.50	2.25	2.88	0.88	4.75	4.50	4.63	0.18	2.50
942	EL-A16-00018	(entryFC47)-FC1741 Population (rz1rz1RZ2	96.06	95.21	96.34	95.87	0.59	3.00	1.50	2.25	1.06	5.00	4.50	4.75	0.35	2.25
945	EL-A16-00021	(entryFC12)-FC712/Monohy A4	94.59	95.41	95.86	95.29	0.64	2.75	2.00	2.38	0.53	4.50	4.50	4.50	0.00	2.25
892	EL-A015027	C869 CMS	95.07	95.12	96.23	95.47	0.66	3.50	2.00	2.75	1.06	5.50	4.75	5.13	0.53	2.00
961	EL-A029770	EL62	95.19	95.05	96.71	95.65	0.92	3.50	2.50	3.00	0.71	5.00	4.75	4.88	0.18	3.00
934	EL-A16-00007	PI 357361 germ test seln	93.69	95.47	96.14	95.10	1.27	4.25	3.00	3.63	0.88	6.25	5.25	5.75	0.71	2.50
935	EL-A16-00008	CN927-202 5927-202 NN? x 08-5E	94.63	95.37	96.47	95.49	0.93	4.00	2.75	3.38	0.88	5.50	5.25	5.38	0.18	2.00
956	EL-A027146	PI 355963 germ test seln	93.97	94.52	95.75	94.75	0.91	3.50	2.50	3.00	0.71	6.00	5.25	5.63	0.53	2.75
955	EL-A16-0001	FL042 Cerc Susc	94.73	94.84	95.72	95.10	0.54	5.00	3.00	4.00	1.41	7.00	6.00	6.50	0.71	1.50
	mean		94.96	94.94	96.13			2.99	1.66			4.7	4.09			2.11
	F-value		1.05 ns	1.17 ns	0.94 ns			3.38 ***	3.07 ***			7.91 ***	2.72 ***			1.48 (*)
	LSD 0.05		1.4	1.15	1.12			0.9	0.93			0.77	1.12			0.91

In addition, 373 East Lansing CRB population F_7 Recombinant Inbreds (RI) from the cross C869 (susceptible) x EL50 (resistant) were examined in a non-randomized non-replicated trial to evaluate segregation for Cercospora reaction (Table 3). Each RI line was present in a single plot, and checks were replicated throughout the nursery. Two plots of the resistant check showed very high ratings, but were included in the analysis. Mean ratings of all RI lines were similar to the resistant check, but the range of ratings was greater than the resistant check if the two high data points were excluded (e.g. Range = 2). In any case, segregation for Cercospora in the CRB appears sufficient to begin choosing individual RI lines for deeper genetic analyses of Cercospora resistance. Alternaria and *beet western yellows virus* disease symptoms were present at sufficient levels to rate their range of reaction in the CRB7 population. Such segregation was not expected from the performance of the parents, but RI lines uncover genetic variation during their construction and can be used to deduce genetic control of detected segregation.

Table 3: CRB recombinant inbred lines rated for Cercospora (inoculated), Alternaria (not inoculated), and *beet western yellows virus* (not inoculated, BeetWY).

Population	N Rows	Cerc: 8/18	st.dev.	Cerc: 8/30	st.dev.	Sum Cerc	st.dev.	BeetWY	st.dev.	Range Cerc
CRB7	373	2.4	0.8	4.5	1.0	6.9	1.6	1.9	0.9	6.0
EL50/2	6	1.3	0.5	4.0	2.0	5.3	2.3	0.8	0.4	5.0
F1042 Cerc Susc	5	4.4	0.5	7.2	0.8	11.6	0.9	1.4	1.3	2.0
		Alt: 9/1	st.dev.	Alt: 9/15	st.dev.	Sum_Alt	st.dev.	Range Alt	Regrowth	st.dev.
CRB7	373	2.4	1.0	2.1	0.8	4.4	1.5	5.0	4.1	0.8
EL50/2	6	0.2	0.4	0.3	0.8	0.5	1.2	2.0	3.0	0.0
F1042 Cerc Susc	5	1.0	0.0	1.0	0.0	2.0	0.0	0.0	4.2	0.4

Rhizoctonia nurseries:

The BSDF cooperative CRR Eastern Evaluation Nursery had entries from four companies, with a total of 287 entries (24 entries were conventional varieties) plus two control varieties evaluated. This nursery was 1-row with 5 replications conducted in a double-blind fashion. In addition, 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 1.1 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 in the Roundup Ready nursery were dug with a modified single row harvester on August 15 and 16, and the conventional nursery on August 24. 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 4.1 to 6.4 (mean = 5.4), with the percent of roots classified as "harvestable" (less than 25% of the root rotted) ranging from 0% to 45% for the different varieties.

A small seedling Rhizoctonia selection nursery was also conducted at the SVREC in 2017, and included four entries derived from the resistant germplasm release SR98/2. The singular difference between conventional CRR and seedling trials was that the seedling nursery was inoculated on June 6 rather than July 11. Stand was marginally affected in these entries relative to control plots (data not shown). The one comparison for which sugars were taken (Entry 1017) is reported in Table 4, and neither stand nor yield appeared significantly affected by early inoculation.

Table 4: Agronomic evaluation of previous East Lansing germplasm releases, potential germplasm releases, and crop types. Bold is not significantly different from the best.

Entry	Accession	Name	Weight (lbs)	Purity (NIR)	Sucrose (NIR)
978	EL-A024969	SR101	19.33	95.66	**18.50**
985	EL-A012189	SR96	18.67	95.30	**18.18**
951	EL-A1402159	NIC Storage&SR Rhiz (Grp 7&8)	16.67	95.79	**17.92**
908	EL-A012200	EL52	12.67	94.22	**17.63**
983	EL-A012172	SR94	18.67	95.37	**17.56**
963	EL-A021482	EL50/2	8.00	94.97	**17.46**
1007	EL-A010286	SP85100	16.00	94.72	**17.26**
968	EL-A012174	SR97	17.33	94.77	**17.14**
909	EL-A013523	EL53 (2)	23.33	95.79	**17.09**
974	EL-A12-00002	SF"B3"	12.67	95.91	16.69
1009	EL-A010292	SP85550	20.00	94.53	16.62
954	EL-A1402163	Nematode / Storage / Cerc / Rhizoc	15.33	95.62	16.60
919	EL-A027007	EL63	16.67	95.97	16.45
1017	EL-A024953	**SR98 x Cerc (not inoculated)**	18.00	95.31	16.34
907	EL-A12-00030	EL51	8.67	94.84	16.30
988	EL-A024983	SR99	15.33	95.21	16.16
987	EL-A027149	SR98x	16.67	94.40	16.11
984	EL-A012168	SR95	18.00	96.53	16.10
887	EL-A15-00006	SR102	20.67	95.01	16.02
980	EL-A012187	SR80	28.67	95.92	15.95
916	EL-A021740	EL60	28.67	96.12	15.94
962	EL-A027152	SR100	22.00	94.34	15.90
E17	E17	E17 (legacy commercial hybrid)	18.67	93.95	15.90
981	EL-A012148	SR87	20.67	96.03	15.83
958	EL-A022776	EL64, pEL63	8.00	95.65	15.77
933	EL-A15-00005	storage	20.67	95.24	15.74
952	EL-A1402161	NIC Nematode Sucrose group	19.33	94.80	15.74
940	EL-A16-00016	(entryFC16)-(Best FC LSR x Best EL LSR)...	39.33	95.24	15.70
925	EL-A029687	SF"B2"	16.00	94.50	15.64
914	EL-A022775	EL58	15.33	97.40	15.61
910	EL-A021483	EL54 Hero M- fertile	11.33	97.07	15.52
961	EL-A029770	EL62	12.00	95.66	15.47
923	EL-A012858	EL0204	20.67	95.96	15.31
924	EL-A029686	SF"A"	8.67	95.35	15.24
915	EL-A029768	EL59	9.33	94.99	15.23
911	EL-A013698	EL55 "Old Seed"	12.00	96.04	15.19
921	EL-A027017	EL65	16.67	95.94	15.15
1017	*EL-A024953*	***SR98 x Cerc (seedling Rhizoc inoc)***	*20.67*	*94.29*	*15.13*
922	EL-A027143	EL66	16.67	95.54	15.10
996	EL-A022662	C37	13.33	93.79	14.95
917	EL-A029769	EL61	12.67	95.28	14.72
982	EL-A012191	SR93	22.67	95.44	14.66
904	EL-A012181	EL48	12.00	94.40	14.58
965	EL-A015030	SP7322	32.67	93.72	14.43
913	EL-A022809	EL57, SF Mixer "B"	11.33	94.47	14.24
997	EL-A009913	L19 (1992)	8.67	90.36	14.18
899	EL-A010299	EL42	8.67	95.10	13.49
1012	EL-A029004	M1-3	18.67	93.42	12.81
1016	EL-A024967	storage selections	12.00	92.63	12.14
912	EL-A022799	EL56	7.33	93.26	10.90
1018	EL-A011917	LUCULLUS Swiss chard	7.33	86.71	10.13
995		Ruby Queen table beet	2.00	89.44	9.38
989	EL-A1402169	Rhubarb Swiss chard	8.00	80.05	8.06
994	EL-A1400588	W357B table beet	2.00	82.73	7.77
1019	EL-A011928	MAMMOTH RED fodder beet	17.33	90.81	6.29
993	EL-A16-00011	Wintergold fodder beet	16.67	90.01	6.17
Burpee		Detroit Dark Red table beet	4.67	87.59	5.84
	mean		16.00	94.01	14.72
	F value		11.63 ***	11.21 ***	11.19 ***
	LSD 0.05		6.02	2.72	2.56

Agronomic observation of a wide range of previous East Lansing releases and candidate releases (Table 4) was done in support of efforts to understand genetic diversity as related to performance which may be deduced by whole genome sequencing. Genome sequencing of most of these entries is in progress, with assistance of the Beet Sugar Development Foundation members. Also included in these genome comparisons are representatives of beet crop types (fodder, table, and chard). Seed was not treated, and disease was not controlled throughout the season, nor were stands thinned. Stand was generally excellent on the comparatively sandy soils where the trial was conducted. The trial was planted as an observation block where each entry was planted as a single row in seven series, and the middle three series were harvested for weights and sugars. Results conformed to expectations with the lowest sugars and yield among the table beet materials, low sugar but higher yield among fodder beet accessions, higher sugar but low yield in chards, and higher sugar and yield among sugar beets (Table 4). Legacy sugar beet materials (generally indicated by a lower EL- or SR-prefaced name in Table 4) were generally lower in sucrose.

Two other RI populations were examined for sugars, the HSB6 population which is derived from a cross between C869 (moderate sugar) and L19 (high sugar) and the AYA6 population which was derived from a cross between C869 and wild beet (low sugar). A great deal of variability was observed among the RI lines, and since each one of these lines is genetically fixed, differences relate to their genetic performance in a common environment. Values measured are in line with expectations, with mean sucrose values of both RI lines showing a wide range.

Table 6: Summary statistics for RI lines constructed to deduce the genetics of sucrose content in beets.

Population	N Rows	No. of beets	sd.dev.	range
AYA6	178	12.13	6.09	33.00
C869 CMS	10	15.60	3.47	10.00
HSB6	221	15.12	5.08	25.00
L19/2-ib	5	12.40	3.58	8.00
		Weight (lbs)	sd.dev.	range
AYA6	178	nd	nd	nd
C869 CMS	10	18.00	6.83	18.00
HSB6	221	14.78	6.30	28.00
L19/2-ib	5	6.00	2.83	6.00
		Purity (NIR)	sd.dev.	range
AYA6	178	92.39	3.19	24.91
C869 CMS	10	95.25	1.32	3.45
HSB6	221	93.98	1.27	5.96
L19/2-ib	5	95.33	1.06	2.46
		Sucrose (NIR)	sd.dev.	range
AYA6	178	17.21	2.33	15.15
C869 CMS	10	16.12	0.99	3.06
HSB6	221	18.25	1.71	8.39
L19/2-ib	5	21.33	1.16	2.53

Finally, 30 Plant Introductions (PIs) from the USDA-ARS National Plant Germplasm System (NPGS) *Beta* Collection [includes garden beet, sugarbeet, leaf beet, fodder beet (*Beta vulgaris* L.), and wild beet (*Beta* spp.)] along with three entries resulting from crossing of previous years (2011-2014) PIs selected from Cercospora leaf spot tests (Hanson, et al. PDMR 8:FC170) with East Lansing germplasm were evaluated for resistance to *Cercospora beticola* in an artificially produced epiphytotic environment (based generally on Ruppel, E.G. and J.O. Gaskill. 1971. J. Am. Soc. Sugar Beet Technol. 16:384). A randomized complete-block design with 1-row and 3-replications was used to evaluate germplasm at the Michigan State University Saginaw Valley Research and Extension Center (SVREC) near Frankenmuth, MI. Internal controls included a susceptible check, F1042 (PI 674103), and a resistant check, EL50/2 (PI 664912). The nursery was spray-inoculated with a liquid spore suspension (approximately 1×10^3 spores/ml as determined with a hemacytometer) of *C. beticola*. Inoculum was produced from a mixture of leaves collected from the 2016 inoculated leaf spot nursery at SVREC and naturally infected beets grown at SVREC and on the Michigan State University campus farms in East Lansing, MI. Visual evaluations of the plot 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. Bolting beets were removed throughout the season.

Only one accession (Entry 928, Table 5) was not significantly different from the resistant control at any rating date. Entry 928 is a broad-based germplasm derived from inter-pollinating East Lansing elite germplasm from the past 10 years of breeding with PI's selected from the 2015 USDA-ARS National Plant Germplasm System (NPGS) *Beta* Collection Cercospora nursery trial. Other breeding populations derived from previous PI nurseries (e.g. Entries 930, 953, 929, 927, and 926) were all significantly better than the susceptible check. Entries p2 (a *Beta vulgaris* spp. *maritima* wild accession collected from Ireland) and p29 (a previous USDA-ARS release from Beltsville, MD) showed low levels of Cercospora, but were significantly different from the resistant check.

We extend our gratitude to Paul Horny and Dennis Fleischmann for their help with nursery and farm operations.

We also thank Michigan Sugar for their generous assistance in thinning and agronomic evaluations.

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Table 5: Plant Introduction (PI) Cercospora Leaf Spot nursery results and materials derived from previous nurseries crossed with traditional East Lansing germplasm.

Entry	Name	EL / PI number	Cerc 8/2/17	Cerc 8/10/17	Cerc 8/18/17	Cerc 8/25/17	Cerc 9/1/17
963	EL50/2 (Resistant check)	EL-A021482	1.0	1.2	1.4	2.2	2.4
928	elites (EL50;storage;rhizoc;suc;nema) x 2015 wilds	EL-A15-01095	1.0	1.7	2.3	3.3	3.7
930	PI,Kimberly,FC selections 2015	EL-A16-00032	1.3	2.0	3.0	3.7	4.0
953	2014 Cercospora (Grp 1)	EL-A1402162	1.3	1.7	2.0	3.3	4.0
p2	IDBBNR 5877	PI518383	1.3	2.0	3.0	4.0	4.0
p29	SP70641-0	PI590666	1.3	1.3	3.0	3.7	4.0
929	wild Cerc PI selections 2009-2014	EL-A16-00009	1.7	2.0	3.0	3.7	4.3
p4	WB 870	PI540616	1.3	2.0	3.3	4.0	4.3
p30	C36	PI590682	1.0	2.0	3.3	4.0	4.3
927	2014 Cerc PI's (Grp 5)	EL-A1402160	1.8	2.5	3.5	4.3	4.5
p1	IDBBNR 5811	PI518317	2.0	2.0	3.7	4.0	4.7
p3	WB 869	PI540615	2.0	2.7	4.0	4.3	4.7
p9	SLC 131	Ames2659	1.3	2.3	3.0	4.3	4.7
p12	WIR 2293	Ames19159	1.7	2.7	3.7	4.3	4.7
926	2011 Cerc PI nursery sel'ns	EL-A12-00029	2.0	2.7	4.0	4.0	5.0
p5	WB 871	PI540617	2.3	3.0	4.0	4.7	5.0
p7	IDBBNR 9683	PI546516	1.7	2.7	4.3	5.0	5.0
p14	RS-1B	NSL80221	1.3	3.0	3.7	4.7	5.0
p17	A77-17	NSL93285	1.3	3.0	4.3	5.0	5.0
p21	370/71	PI372277	1.3	3.3	4.0	4.7	5.0
p27	Wild beet	PI504179	2.0	3.0	3.7	4.7	5.0
p28	DAMA	PI531253	2.0	3.0	4.0	5.0	5.0
p6	IDBBNR 5637	PI546407	2.3	3.0	4.0	5.3	5.3
p11	IDBBNR 4836	Ames4377	2.0	3.3	4.0	5.0	5.3
p15	72/4-41-2-14	NSL86579	1.7	3.3	4.3	5.3	5.3
p19	NS-C6 (41X20)	NSL188580	2.0	2.7	3.7	4.3	5.3
p26	Wild beet	PI504177	1.7	2.3	3.7	5.0	5.3
p10	SLC 133	Ames2662	2.0	3.0	4.3	5.3	5.7
p13	GIANT YELLOW ECKENDORF	NSL31344	2.3	3.7	4.0	5.3	5.7
p16	A76-39	NSL93280	2.0	3.3	4.3	5.3	5.7
p20	BUSZCZYNSHI P-POLY	PI296539	2.3	3.3	4.3	5.3	5.7
p23	VNIS F-510	PI386205	2.3	3.3	4.7	5.3	5.7
p18	44	NSL142007	1.7	3.7	4.7	5.7	6.0
p25	Ramonskaja odnosemennaja 32	PI476323	1.7	3.0	4.0	5.3	6.0
p8	SLC 129	Ames2657	2.0	3.3	4.7	5.3	6.3
p22	MEZHOTNENSK 080	PI381638	1.7	3.7	5.0	6.0	6.3
p24	IDBBNR 5523	PI470092	1.3	3.7	4.3	5.7	6.3
955	F1042 (Susceptible check)	EL-A16-0001	1.5	3.8	4.8	5.8	6.5
	Mean		1.68	2.7	3.73	4.60	5.0
	F value		1.68*	3.45***	2.78***	3.59***	4.20***
	LSD 0.05		0.88	1.11	1.41	1.32	1.28
	CV		35.4	33.4	29.2	23.9	22.5

Official Variety Trial

SVREC, Richville - 2017

Trial Quality: Good
Plant/Harvest: Apr 17/Nov 1
Planted: Thick and thinned to ~200 beets/ 100 ft

Soil Type: Sandy Clay Loam
% OM: 2.9 **pH:** 8.1 **CEC:** 14.2
Nutrient Levels: Adequate
Added N: 160lbs

Cerc Control: Very Good 9 applications**
Rhizoc Control: Good
Rainfall: 21.73 inches

	$/	RWSA		RWST			T/A		% Suc		% CJP	
Variety	Acre	Act.	% Ck	Act.	% Ck	Rank	Act.	Rank	Act.	Rank	Act.	Rank
C-G675	**$1,668**	**12767**	**112**	**314**	**103**	**5**	**40.6**	**1**	**20.4**	**7**	**96.6**	**9**
B-1703	**$1,641**	**12554**	**110**	**318**	**104**	**2**	**39.5**	**7**	**20.5**	**4**	**96.8**	**1**
SX-RR1264	**$1,625**	**12434**	**109**	311	102	12	**40.0**	**4**	20.2	16	**96.6**	**8**
SX-RR1243	**$1,595**	**12203**	**107**	304	100	28	**40.1**	**3**	19.8	27	96.4	27
SX-RR1276	**$1,594**	**12197**	**107**	310	102	13	**39.3**	**10**	20.2	15	**96.6**	**10**
B-1606	**$1,583**	**12117**	**106**	300	98	35	**40.4**	**2**	19.5	39	**96.7**	**2**
B-1713	**$1,579**	**12082**	**106**	306	100	23	**39.6**	**6**	19.9	26	**96.5**	**17**
SX-RR1275N	**$1,568**	**11998**	**105**	308	101	19	**39.0**	**13**	20.0	24	**96.7**	**6**
C-G752	**$1,564**	**11970**	**105**	304	100	27	**39.4**	**9**	19.8	30	**96.7**	**4**
HIL-9732NT	**$1,561**	**11948**	**104**	311	102	11	**38.4**	**14**	20.2	11	**96.6**	**15**
HIL-9865	**$1,545**	**11821**	**103**	**320**	**105**	**1**	37.0	26	**20.8**	**1**	**96.5**	**16**
SX-RR1212	**$1,541**	**11795**	**103**	301	99	32	**39.1**	**12**	19.6	34	**96.6**	**13**
SX-RR1279	**$1,539**	**11778**	**103**	310	102	15	**37.9**	**18**	20.2	14	**96.5**	**20**
C-G333NT	$1,536	11758	103	300	98	36	**39.2**	**11**	19.6	35	96.4	32
B-18RR4N	$1,536	11753	103	309	101	16	**38.0**	**17**	20.1	17	**96.6**	**11**
C-RR059	$1,535	11745	103	311	102	10	**37.8**	**20**	20.2	10	**96.5**	**19**
C-G739	$1,532	11722	102	308	101	17	**38.1**	**16**	20.2	13	96.1	40
B-1690	$1,527	11686	102	**316**	**104**	**4**	37.0	25	**20.6**	**3**	**96.5**	**22**
B-149N	$1,518	11614	101	295	97	41	**39.4**	**8**	19.3	41	96.3	33
B-1399	$1,517	11607	101	292	96	42	**39.8**	**5**	19.0	42	**96.7**	**7**
SX-RR1245N	$1,512	11567	101	301	99	33	**38.4**	**15**	19.7	33	96.5	26
SX-RR1278N	$1,510	11555	101	**312**	**102**	**9**	37.0	24	**20.3**	**9**	96.5	24
B-12RR2N	$1,502	11494	100	303	99	30	**37.9**	**19**	19.7	31	**96.7**	**3**
C-G724	$1,492	11419	100	**313**	**103**	**7**	36.5	28	20.5	5	96.3	36
SX-RR1277	$1,488	11387	99	307	101	20	37.1	23	20.0	19	96.5	25
C-G515	$1,486	11370	99	**312**	**102**	**8**	36.5	27	**20.3**	**8**	96.4	31
MA-513NT	$1,479	11318	99	305	100	25	37.1	22	20.0	20	96.1	41
SX-RR1251	$1,472	11265	98	300	98	37	**37.6**	**21**	19.6	37	96.5	23
C-G351NT	$1,452	11111	97	**317**	**104**	**3**	35.0	34	**20.6**	**2**	**96.5**	**18**
C-G758	$1,445	11061	97	308	101	18	35.9	30	20.0	22	**96.7**	**5**
B-1772	$1,404	10746	94	306	100	22	35.1	32	20.0	18	96.3	38
HIL-9908	$1,391	10645	93	**314**	**103**	**6**	33.9	37	**20.4**	**6**	**96.6**	**12**
MA-709	$1,383	10586	92	306	100	24	34.6	35	20.0	25	96.4	28
B-133N	$1,376	10528	92	297	97	39	35.4	31	19.5	40	96.2	39
HM-173RR	$1,370	10487	92	299	98	38	35.0	33	19.6	36	96.3	35
HM-28RR	$1,365	10448	91	289	95	43	36.1	29	19.0	43	96.4	29
HM-NT9607	$1,344	10289	90	302	99	31	34.1	36	19.8	29	96.3	37
HIL-9879NT	$1,330	10174	89	307	101	21	33.1	38	20.0	23	**96.6**	**14**
MA-708NT	$1,315	10060	88	305	100	26	32.9	39	20.0	21	96.1	42
MA-707NT	$1,283	9815	86	303	99	29	32.4	41	19.8	28	96.4	30
HIL-9909NT	$1,272	9737	85	301	99	34	32.4	40	19.7	32	96.3	34
HM-9616RR	$1,271	9727	85	310	102	14	31.4	43	20.2	12	**96.5**	**21**
HIL-9910NT	$1,219	9329	82	295	97	40	31.6	42	19.6	38	95.8	43
Average	$1,475.9	11295		306.1			36.89		19.96		96.46	
LSD 5%	106.8	817.3		7.3			2.6		0.4		0.3	
CV %	7.4	7.4		2.4			7.1		2.2		0.3	

Official Variety Trial
Michigan Sugar Company
SVREC, Richville - 2017

Trial Quality: Good
Plant/Harv: Apr 17/ Nov 1
Plots: 2 rows X 38 ft., 8 reps
Row Spacing: 22 inches
Seeding Rate: 2 inches, thinned to 200 beets/100 ft.

Soil Type: Sandy Clay Loam
% OM: 2.9 **pH:** 8.1 **CEC:** 14.2
Nutrients: Abv Opt: P, Opt: K
High: Mn Low: B
Added N: 160 lbs.
Prev Crop: Wheat

Cerc Control: Very Good
9 applications**
Rhizoc Control: Good
Quadris IF T-Band, 6-8 lf
Rainfall: 21.73 inches

Variety	$/A	RWSA	RWST		Yield		Sugar		CJP		CLS	
			Lb/T	Rank	T/A	Rank	%	Rank	%	Rank	0-9	Rank
C-G675	**$1,668**	**12767**	**314**	**4**	**40.6**	**1**	**20.4**	**4**	**96.6**	**5**	**1.63**	**6**
SX-RR1264	**$1,625**	**12434**	311	8	**40.0**	**4**	20.2	9	**96.6**	**4**	1.75	10
SX-RR1243	**$1,595**	**12203**	304	13	**40.1**	**3**	19.8	13	**96.4**	**17**	**1.50**	**4**
B-1606	**$1,583**	**12117**	300	18	**40.4**	**2**	19.5	21	**96.7**	**1**	1.75	11
HIL-9732NT	**$1,561**	**11948**	311	7	**38.4**	**9**	20.2	7	**96.6**	**9**	2.50	25
HIL-9865	$1,545	11821	**320**	**1**	37.0	17	**20.8**	**1**	**96.5**	**10**	**1.50**	**5**
SX-RR1212	$1,541	11795	301	16	**39.1**	**8**	19.6	17	**96.6**	**7**	1.88	14
C-G333NT	$1,536	11758	300	19	**39.2**	**7**	19.6	18	**96.4**	**20**	2.13	17
B-18RR4N	$1,536	11753	309	10	**38.0**	**11**	20.1	10	**96.6**	**6**	2.13	18
C-RR059	$1,535	11745	311	6	**37.8**	**13**	20.2	6	**96.5**	**12**	2.13	19
B-1690	$1,527	11686	**316**	**3**	37.0	16	**20.6**	**3**	**96.5**	**14**	**1.63**	**7**
B-149N	$1,518	11614	295	23	**39.4**	**6**	19.3	23	96.3	21	2.38	24
B-1399	$1,517	11607	292	24	**39.8**	**5**	19.0	24	**96.7**	**3**	**1.38**	**2**
SX-RR1245N	$1,512	11567	301	17	**38.4**	**10**	19.7	16	**96.5**	**16**	**1.63**	**8**
B-12RR2N	$1,502	11494	303	14	**37.9**	**12**	19.7	15	**96.7**	**2**	2.13	20
C-G515	$1,486	11370	**312**	**5**	36.5	18	**20.3**	**5**	**96.4**	**19**	2.13	21
MA-513NT	$1,479	11318	305	12	37.1	15	20.0	11	96.1	25	2.13	22
SX-RR1251	$1,472	11265	300	20	**37.6**	**14**	19.6	20	**96.5**	**15**	1.75	12
C-G351NT	$1,452	11111	**317**	**2**	35.0	22	**20.6**	**2**	**96.5**	**11**	**1.63**	**9**
B-133N	$1,376	10528	297	22	35.4	20	19.5	22	96.2	24	2.13	23
HM-173RR	$1,370	10487	299	21	35.0	21	19.6	19	96.3	22	1.75	13
HM-28RR	$1,365	10448	289	25	36.1	19	19.0	25	**96.4**	**18**	1.88	15
HM-NT9607	$1,344	10289	302	15	34.1	23	19.8	14	96.3	23	1.88	16
HIL-9879NT	$1,330	10174	307	11	33.1	24	20.0	12	**96.6**	**8**	**1.25**	**1**
HM-9616RR	$1,271	9727	310	9	31.4	25	20.2	8	**96.5**	**13**	**1.38**	**3**
Average	$1,489.9	11401.0	305.1		37.38		19.90		96.48		1.84	
LSD 5%	104.4	798.6	7.7		2.6		0.4		0.3		0.5	
CV %	7.1	7.1	2.6		7.0		2.3		0.3		18.0	

**** See Cercospora Fungicide Application Page**

***CLS:** Cercospora rating taken from this trial not the Cercospora Nurseries. Rating taken one week prior to harvest.

$/A: Gross dollars per acre assuming a $40 payment and trial average RWST.

Bold: Results are not statistically different from top-ranking variety in each column.

Comments: This was the first trial planted in 2017 on April 17th and it was harvested on November 1st. The emergence in this trial was excellent and it was thinned to 200 beets/100'. Yield and sugar content were very good and what would be expected of a full season field. Cercospora and Rhizoctonia control in this trial was good.

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Cercospora Leafspot Nursery

Blumfield East and SVREC - 2017

Variety	Avg CLS 0-9	% Check	% Leaf Damage	Blum CLS 0-9	SVRF CLS 0-9
HIL-9908	3.5	70.7	5.8	3.4	3.3
B-1703	3.7	75.0	7.5	3.5	3.5
B-1399	3.8	76.5	8.3	3.8	3.3
HM-9616RR	3.9	78.8	9.2	3.7	3.5
MA-709	3.9	79.4	9.2	3.7	3.7
HIL-9879NT	4.0	80.2	10.0	3.7	3.6
HIL-9910NT	4.0	80.8	10.0	3.8	3.8
C-G675	4.2	85.0	13.0	4.1	3.7
HM-173RR	4.2	85.6	13.0	3.8	4.1
HM-28RR	4.3	87.1	14.0	3.9	4.0
C-G758	4.4	88.3	15.5	4.4	3.9
Resistant Check	4.5	89.9	17.0	4.8	3.6
B-1690	4.5	91.6	17.0	4.2	4.1
C-G724	4.5	91.9	17.0	4.2	4.2
B-1772	4.6	93.5	18.5	4.3	4.1
HIL-9909NT	4.6	93.6	18.5	4.5	4.1
SX-RR1276	4.7	94.1	20.0	4.6	4.1
B-12RR2N	4.7	94.7	20.0	4.4	4.3
HIL-9865	4.7	94.7	20.0	4.4	4.2
C-G351NT	4.7	95.1	20.0	4.2	4.3
MA-708NT	4.7	95.1	20.0	4.4	4.3
HM-NT9607RR	4.8	96.1	22.0	4.5	4.1
C-G752	4.8	97.4	22.0	4.6	4.2
SX-RR1251	4.8	97.8	22.0	4.8	4.2
B-1606	4.9	98.5	23.5	4.5	4.5
C-G515	4.9	98.9	23.5	4.4	4.5
C-059RR	4.9	99.4	23.5	4.5	4.4
SX-RR1243	5.0	100.0	25.0	4.9	4.2
SX-RR1264	5.0	100.3	25.0	4.4	4.6
SX-RR1275N	5.0	100.8	25.0	4.6	4.4
SX-RR1278N	5.0	101.2	25.0	4.8	4.3
B-133N	5.0	101.9	25.0	4.8	4.5
B-18RR4N	5.1	103.5	27.0	**5.1**	4.4
C-G739	5.2	104.4	30.0	4.8	4.6
B-149N	5.3	106.8	32.0	4.9	**4.7**
SX-1245N	5.3	106.9	32.0	**5.4**	4.3
SX-RR1279	5.3	107.4	32.0	**5.2**	4.5
C-G333NT	5.3	107.5	32.0	4.9	**4.9**
Susceptible Check	5.4	109.6	34.0	**5.4**	4.6
SX-RR1277	5.4	109.6	34.0	**5.5**	4.5
HIL-9732NT	5.5	110.4	37.0	**5.2**	**4.8**
B-1713	5.5	111.2	37.0	**5.2**	**4.8**
SX-RR1212	5.5	111.5	37.0	**5.4**	4.5
MA-707NT	5.5	112.0	37.0	**5.1**	**4.8**
MA-513NT	5.8	117.1	45.0	**5.8**	**4.8**
Average	4.8	96.3		4.5	4.2
LSD 5%	0.6	11.2		0.6	0.2
CV %	5.8	5.8		10.9	4.7

Harvest aid effects on two classes of dry beans

Christy Sprague, Gary Powell and Brian Stiles, Michigan State University

Location:	Richville (SVREC)	**Tillage:**	Conventional
Planting Date:	June 8, 2017	**Row width:**	30-inch
Replicated:	4 times	**Soil Type:**	Clay loam, 2.7% OM, pH 7.0
Varieties:	'Zenith' black beans	**Populations:**	109,000 seeds/A
	'Merlin' navy beans		109,000 seeds/A

Table 1. Preharvest treatments on bean desiccation (%) 3, 7, 14 days after treatment (DAT) and yield.

	Zenith				Merlin			
Treatments	**3 DAT**	**7 DAT**	**14 DAT**	**Yield[a]**	**3 DAT**	**7 DAT**	**14 DAT**	**Yield**
Sharpen (1 fl oz) + MSO + AMS	64 ab[b]	96 a	98 ab	15.3 c	55 ab	96 a	98 ab	12.6 c
Gramoxone (2 pt) + NIS	65 a	87 c	95 b	17.1 a-c	55 ab	83 cd	91 c	16.1 ab
Valor (1.5 oz) + MSO	56 cd	92 bc	98 ab	18.9 ab	55 ab	88 bc	95 a-c	17.9 a
Roundup (22 fl oz) + AMS	49 ef	78 d	98 a	20.0 a	45 d	75 e	93 bc	17.5 ab
Aim (2 fl oz) + MSO	53 de	75 d	87 c	17.7 a-c	50 c	78 de	91 c	15.2 a-c
Sharpen (2 fl oz) + MSO + AMS	58 b-d	97a	99 a	17.8 a-c	54 ab	98 a	100 a	17.2 ab
Sharpen (1 fl oz) + Roundup + MSO + AMS	59 a-d	98 a	100 a	17.1 a-c	53 bc	98 a	100 a	15.9 a-c
Sharpen (1 fl oz) + Gramox.+ MSO + AMS	48 a-c	94 ab	98 ab	15.9 bc	56 a	94 ab	95 a-c	14.2 bc
Untreated	47 f	56 e	86 c	17.7 a-c	45 d	56 f	83 d	16.9 ab

[a] Yield is in cwt/A obtained by direct harvest and adjusted to 18% moisture
[b] Means within a column with different letters are significantly different from each other

Summary: This study was conducted to evaluate the effects of preharvest treatments on desiccation and yield of two dry bean classes with differing speeds of dry down, 'Zenith' black bean (uniform dry down) and 'Merlin' navy bean (green stem). Preharvest applications were made when 65 and 70% of the pods were yellow for 'Zenith' and 'Merlin' beans, respectively. This is the third year that we have conducted similar trials. Over the three years there are some general trends. Sharpen applied at 1 fl oz/A is similar 2 fl oz/A rate, regardless of variety. The speed of effectiveness on desiccation is dependent on the year, but over 24 observations for the three years, Sharpen or Sharpen tank-mixtures provide the most consistent bean desiccation 7 DAT, followed by Valor and Gramoxone. It takes 14 days for maximum desiccation with Roundup, and Aim alone is the least effective of the treatments. The biggest concern is with yield, when quick acting herbicides are applied prior to 80% of the pods being yellow, we do see reductions in yield. This label recommendation must always be followed. In addition, Roundup should only be used to desiccate weeds and dry beans must be in the hard dough stage (30% seed moisture or less), due to chances of glyphosate residues found in the marketed crop. Overall, many of the treatments provided good bean desiccation. This research was supported by the Michigan Dry Bean Commission through the Michigan Department of Agriculture Specialty Crops grant.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Harvest aid effects on common lambsquarters and dry bean desiccation

Christy Sprague, Gary Powell and Brian Stiles, Michigan State University

Location: Richville (SVREC)	**Tillage:** Conventional
Planting Date: June 8, 2017	**Row width:** 30-inch
Replicated: 4 times	**Soil Type:** Clay loam, 2.7% OM, pH 7.0
Varieties: 'Merlin' navy beans	**Date Treated:** August 25, 2017

Table 1. Effect of preharvest treatments on common lambsquarters and dry bean desiccation and yield.

	C. lambsquarters		'Merlin' navy bean		
Treatments	**7 DAT**	**14 DAT**	**3 DAT**	**7 DAT**	**Yield[a]**
Sharpen (1 fl oz) + MSO + AMS	23 d-g[b]	37 d	65 d-f	96 ab	17.5 a-c
Sharpen (2 fl oz) + MSO + AMS	30 c-g	50 cd	73 a	97 a	17.4 a-c
Gramoxone (2 pt) + NIS	30 c-g	37 d	68 a-d	88 d-f	18.6 a-c
Valor (1.5 oz) + MSO	0 g	0 f	60 e	82 g	20.0 a
Roundup (22 fl oz) + AMS	13 e-g	58 c	61 de	85 e-g	19.1 ab
Aim (2 fl oz) + MSO	12 fg	20 e	66 cd	84 fg	17.9 a-c
Sharpen (1 oz) +Roundup+ MSO +AMS	45 b-e	88 a	67 bc	98 a	16.6 bc
Sharpen (1 oz) +Gramox.+ MSO + AMS	86 a	93 a	73 a	98 a	15.3 c
Valor (1.5 oz) +Roundup+ MSO +AMS	56 b-e	92 a	66 cd	95 a-c	16.1 bc
Valor (1.5 oz) +Gramox.+ MSO + AMS	56 a-c	75 b	71 ab	91 b-d	18.6 ab
Aim (2 fl oz) +Roundup+ MSO +AMS	47 b-d	93 a	68 a-e	95 a-c	18.3 a-c
Aim (2 fl oz) +Gramox.+ MSO + AMS	70 ab	81 ab	70 a-c	91 c-e	17.0 a-c
Untreated	0 g	0 f	46 f	66 h	17.7 a-c

[a] Yield is in cwt/A obtained by direct harvest and adjusted to 18% moisture

[b] 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 treatments on weed and bean desiccation. This is the third year we have looked at common lambsquarters desiccation and have evaluated Powell amaranth desiccation previously. In the past, Gramoxone, Roundup (glyphosate) or combinations with these herbicides have provided the greatest desiccation of common lambsquarters (88% or greater) and Powell amaranth (90% or greater). However, this year combinations of Gramoxone + Sharpen or Roundup combinations were needed for effective common lambsquarters control 14 DAT. The reduced common lambsquarters desiccation from Gramoxone alone and Roundup alone was unexpected. Sharpen alone and all combinations with Gramoxone or Roundup provided greater than 90% bean desiccation 7 DAT. By 14 DAT, all treatment desiccated dry bean greater 90%. While we have several years data comparing preharvest treatments, our recommendation if a grower decides to use Sharpen is to use 1 fl oz/A rate, this also reduces the rotation restriction for following crops, such as sugarbeet. In many cases there were no detriments to applying tank-mixtures of the preharvest herbicides. However, Gramoxone or Roundup were in many cases needed to help with weed desiccation. Please refer to the 2018 MSU Weed Control Guide (E-434) for recommendations for the different preharvest herbicide treatments available in dry bean. This research was supported by the Michigan Dry Bean Commission through the Michigan Department of Agriculture Specialty Crops grant.

Sensitivity of Two Classes of Dry Edible Beans to Plant Growth Regulator Herbicides

Scott Bales and Christy Sprague, Michigan State University

Location:	Richville (SVREC)	**Tillage:**	Conventional
Planting Date:	June 8, 2017	**Row width:**	30-inch
Replicated:	4 times	**Soil Type:**	Clay loam, 2.7% OM, pH 7.0
Varieties:	'Zenith' black beans	**Populations:**	109,000 seeds/A
	'Merlin' navy beans		109,000 seeds/A

Table 1. Sub-lethal doses of plant growth regulator herbicides effects on dry bean injury 21 days after treatment (DAT), maturity and yield.

						Yield[d]		
		Injury[b]		Delayed maturity[c]		Zenith		Merlin
Herbicide	**Rate[a]**	**V2**	**V8**	**V2**	**V8**	**V2**	**V8**	**V2 & V8**
Dicamba	0.1	2 f[e]	8 e	0 a	3 b	21.0 a-d[c]	21.6 b	17.8 c[d]
	1.0	13 d	26 c	10 b	25 c	20.2 cd	22.8 ab	20.5 b
	10	36 b	45 a	29 b	45 c	25.3 a	15.7 c	20.0 b
2,4-D Choline	0.1	0 f	0 f	0 A	2 A	21.5 b-d	22.2 ab	20.9 b
	1.0	1 f	1 f	2 B	5 B	23.5 a-c	22.4 ab	20.4 b
	10	2 f	6 e	7 C	33 C	24.6 ab	23.4 ab	23.7 a
Untreated	-	-	-	-	-	23.1 a-d	22.9 ab	19.4 bc

[a] Rate is a % of 0.5 lb ae/A of dicamba and 1.0 lb ae/A of 2,4-D.
[b] Injury and maturity are combined over dry bean class.
[c] Days past the untreated to 50% maturity. The larger numbers are greater delays in maturity.
[d] Yield is in cwt/A obtained by direct harvest and adjusted to 18% moisture combined over application timing when possible
[e] Means within each outlined area with different letters are significantly different from each other.

Summary: With the recent commercialization of soybean resistant to dicamba (Xtend soybean) and upcoming release of soybean resistant to 2,4-D (Enlist soybean) a study was conducted to investigate the effects of off-target exposure of dicamba and 2,4-D on two classes of dry edible beans. The objective of this research was to gain a better understanding of how dry edible bean respond to sub-lethal doses of these PGR herbicides. 'Zenith' black bean and 'Merlin' navy bean were exposed to the PGR herbicides at the V2 and preflower (V8) stages. Dry bean varieties responded similarly to exposure of dicamba and 2,4-D. Exposure to dicamba always caused more injury and caused greater delays in dry bean maturity. Even with delays in maturity dry bean yield was only lower compared with the untreated when Zenith black beans were exposed to the 10% rate of dicamba. However, the delays in harvest may greatly effect yield of other treatments in the future. We will be looking at the effects of this injury on seed quality and will be repeating this research in the future.

Tank-contamination effects from dicamba on sugarbeet

Trial ID: SB01-17 Study Dir.: Probst, Sprague
Conducted: SVREC Investigator: Christy Sprague

Planting Date: Apr-18-2017
Variety: ACH 6515
Population: 4.25 " spacing
Soil Type: SCL sandy clay loam
Plot Size: 10 X 40 FT
Row Spacing: 30 IN
No. of Reps: 4
% OM: 2.4
pH: 7.7
Study Design: Randomized Complete Block (RCB)

Tillage/Previous Crops: Fall moldboard; spring field cultivated twice
Fertilizer: 100 lb N/A as Urea (217 lb/A)

Crop and Weed Description

Weed	Code	Common Name	Scientific Name
1			

Crop	Code	Common Name
1	BETVU	

Application Description

	A	B	C
Application Timing:	2-Leaf	6-Leaf	Canopy
Date Treated:	May-16-2017	Jun-2-2017	Jul-5-2017
Time Treated:	9:00 AM	9:45 AM	11:15 AM
% Cloud Cover:	60	20	0
Air Temp., Unit:	70 F	74 F	82 F
% Relative Humidity:	62	36	45
Wind Speed/Unit/Dir:	3.5 mph SW	2 mph SW	0.5 mph S
Soil Temp, Unit:	63 F	65 F	78 F
Leaf Moist/Dew Presence (Y/N):	1	4	4
Soil Moist:	1	4	5

Crop Stage at Each Application

	A	B	C
Crop 1 Name:	BETVU	BETVU	BETVU
Height:	0.5 "	4- " (6)	12-16 " (13)
Stage:	2L	6L	14L

Weed Stage at Each Application

	A	B	C
Weed 1 Name:			
Height:			
Stage:			

Application Equipment

Appl	Sprayer Type	Ground Speed	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	Spray Volume	Carrier	Operation Pressure
A	BACKPK	3.8 MPH	AIXR	11003	20 "	20 "	100 "	19 GPA	WATER	30 PSI
B	BACKPK	3.8 MPH	AIXR	11003	20 "	20 "	100 "	19 GPA	WATER	30 PSI
C	BACKPK	3.8 MPH	AIXR	11003	24 "	20 "	100 "	19 GPA	WATER	30 PSI

Comments:

Tank-contamination effects from dicamba on sugarbeet
Trial ID: SB01-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Probst, Sprague

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	BETVU injury 7 DAT *	BETVU injury 14 DAT *	BETVU injury 21 DAT *	BETVU Sep-18-2017 injury percent 75 DA-C *	BETVU Sep-19-2017 stand count 100' row 76 DA-C *	BETVU Sep-20-2017 % sugar 77 DA-C *
	Pest Code											
	Crop Code						BETVU	BETVU	BETVU	BETVU	BETVU	BETVU
	Rating Date									Sep-18-2017	Sep-19-2017	Sep-20-2017
	Rating Type						injury	injury	injury	injury	stand count	% sugar
	Rating Unit						percent	percent	percent	percent	100' row	
	Trt-Eval Interval						7 DAT	14 DAT	21 DAT	75 DA-C	76 DA-C	77 DA-C
	Number of Decimals						0	0	0	0	0	1
1	Roundup PowerMax	4.5	SL	32	fl oz/a	A	1	0	0	0	262	19.4
1	AMS		WG	17	lb/100 gal	A						
2	Clarity (1/800X rate)	4	L	0.04	fl oz/a	A	1	4	0	0	262	19.5
2	Roundup PowerMax	4.5	L	32	fl oz/a	A						
2	AMS		WG	17	lb/100 gal	A						
3	Clarity (1/400X rate)	4	L	0.08	fl oz/a	A	1	8	4	0	255	19.3
3	Roundup PowerMax	4.5	L	32	fl oz/a	A						
3	AMS		WG	17	lb/100 gal	A						
4	Clarity (1/200X rate)	4	L	0.16	fl oz/a	A	2	16	12	0	259	19.2
4	Roundup PowerMax	4.5	L	32	fl oz/a	A						
4	AMS		WG	17	lb/100 gal	A						
5	Clarity (1/100X rate)	4	L	0.32	fl oz/a	A	4	24	17	3	255	19.4
5	Roundup PowerMax	4.5	L	32	fl oz/a	A						
5	AMS		WG	17	lb/100 gal	A						
6	Clarity (1/50X rate)	4	L	0.64	fl oz/a	A	5	34	29	6	258	19.0
6	Roundup PowerMax	4.5	L	32	fl oz/a	A						
6	AMS		WG	17	lb/100 gal	A						
7	Roundup PowerMax	4.5	SL	32	fl oz/a	B	1	0	0	0	259	19.5
7	AMS		WG	17	lb/100 gal	B						
8	Clarity (1/800X rate)	4	L	0.04	fl oz/a	B	1	3	2	0	266	18.6
8	Roundup PowerMax	4.5	L	32	fl oz/a	B						
8	AMS		WG	17	lb/100 gal	B						
9	Clarity (1/400X rate)	4	L	0.08	fl oz/a	B	3	6	5	3	253	19.1
9	Roundup PowerMax	4.5	L	32	fl oz/a	B						
9	AMS		WG	17	lb/100 gal	B						
10	Clarity (1/200X rate)	4	L	0.16	fl oz/a	B	4	16	11	4	257	18.8
10	Roundup PowerMax	4.5	L	32	fl oz/a	B						
10	AMS		WG	17	lb/100 gal	B						
11	Clarity (1/100X rate)	4	L	0.32	fl oz/a	B	5	28	28	9	273	19.1
11	Roundup PowerMax	4.5	L	32	fl oz/a	B						
11	AMS		WG	17	lb/100 gal	B						
12	Clarity (1/50X rate)	4	L	0.64	fl oz/a	B	6	40	44	16	267	18.7
12	Roundup PowerMax	4.5	L	32	fl oz/a	B						
12	AMS		WG	17	lb/100 gal	B						
13	Roundup PowerMax	4.5	SL	32	fl oz/a	C	1	0	0	0	266	19.1
13	AMS		WG	17	lb/100 gal	C						

* Adjusted means

Tank-contamination effects from dicamba on sugarbeet
Trial ID: SB01-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Probst, Sprague

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	*	*	*	*	*	*
Pest Code												
Crop Code							BETVU	BETVU	BETVU	BETVU	BETVU	BETVU
Rating Date										Sep-18-2017	Sep-19-2017	Sep-20-2017
Rating Type							injury	injury	injury	injury	stand count	% sugar
Rating Unit							percent	percent	percent	percent	100' row	
Trt-Eval Interval							7 DAT	14 DAT	21 DAT	75 DA-C	76 DA-C	77 DA-C
Number of Decimals							0	0	0	0	0	1
14	Clarity (1/800X rate)	4	L	0.04	fl oz/a	C	2	5	4	1	276	19.2
14	Roundup PowerMax	4.5	L	32	fl oz/a	C						
14	AMS		WG	17	lb/100 gal	C						
15	Clarity (1/400X rate)	4	L	0.08	fl oz/a	C	3	6	9	4	258	19.2
15	Roundup PowerMax	4.5	L	32	fl oz/a	C						
15	AMS		WG	17	lb/100 gal	C						
16	Clarity (1/200X rate)	4	L	0.16	fl oz/a	C	4	15	14	6	270	19.0
16	Roundup PowerMax	4.5	L	32	fl oz/a	C						
16	AMS		WG	17	lb/100 gal	C						
17	Clarity (1/100X rate)	4	L	0.32	fl oz/a	C	5	24	26	13	264	19.3
17	Roundup PowerMax	4.5	L	32	fl oz/a	C						
17	AMS		WG	17	lb/100 gal	C						
18	Clarity (1/50X rate)	4	L	0.64	fl oz/a	C	6	39	42	21	256	19.0
18	Roundup PowerMax	4.5	L	32	fl oz/a	C						
18	AMS		WG	17	lb/100 gal	C						
LSD P=.05							0.5	3.5	3.7	3.8	23.0	0.80
Standard Deviation							0.4	2.4	2.6	2.7	16.2	0.56
CV							12.62	16.5	19.07	58.07	6.19	2.93

* Adjusted means

Tank-contamination effects from dicamba on sugarbeet
Trial ID: SB01-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Probst, Sprague

Pest Code								
Crop Code							BETVU	BETVU
Rating Date							Sep-20-2017	Sep-20-2017
Rating Type							yield	RWSA
Rating Unit							ton/acre	# / acre
Trt-Eval Interval							77 DA-C	77 DA-C
Number of Decimals							1	0
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	*	*
1	Roundup PowerMax	4.5	SL	32	fl oz/a	A	27.6	8760
1	AMS		WG	17	lb/100 gal	A		
2	Clarity (1/800X rate)	4	L	0.04	fl oz/a	A	29.8	8219
2	Roundup PowerMax	4.5	L	32	fl oz/a	A		
2	AMS		WG	17	lb/100 gal	A		
3	Clarity (1/400X rate)	4	L	0.08	fl oz/a	A	25.6	7062
3	Roundup PowerMax	4.5	L	32	fl oz/a	A		
3	AMS		WG	17	lb/100 gal	A		
4	Clarity (1/200X rate)	4	L	0.16	fl oz/a	A	28.3	8523
4	Roundup PowerMax	4.5	L	32	fl oz/a	A		
4	AMS		WG	17	lb/100 gal	A		
5	Clarity (1/100X rate)	4	L	0.32	fl oz/a	A	25.5	7620
5	Roundup PowerMax	4.5	L	32	fl oz/a	A		
5	AMS		WG	17	lb/100 gal	A		
6	Clarity (1/50X rate)	4	L	0.64	fl oz/a	A	23.5	7484
6	Roundup PowerMax	4.5	L	32	fl oz/a	A		
6	AMS		WG	17	lb/100 gal	A		
7	Roundup PowerMax	4.5	SL	32	fl oz/a	B	26.8	7917
7	AMS		WG	17	lb/100 gal	B		
8	Clarity (1/800X rate)	4	L	0.04	fl oz/a	B	28.7	7989
8	Roundup PowerMax	4.5	L	32	fl oz/a	B		
8	AMS		WG	17	lb/100 gal	B		
9	Clarity (1/400X rate)	4	L	0.08	fl oz/a	B	29.0	8386
9	Roundup PowerMax	4.5	L	32	fl oz/a	B		
9	AMS		WG	17	lb/100 gal	B		
10	Clarity (1/200X rate)	4	L	0.16	fl oz/a	B	26.4	7473
10	Roundup PowerMax	4.5	L	32	fl oz/a	B		
10	AMS		WG	17	lb/100 gal	B		
11	Clarity (1/100X rate)	4	L	0.32	fl oz/a	B	27.0	7739
11	Roundup PowerMax	4.5	L	32	fl oz/a	B		
11	AMS		WG	17	lb/100 gal	B		
12	Clarity (1/50X rate)	4	L	0.64	fl oz/a	B	23.1	6484
12	Roundup PowerMax	4.5	L	32	fl oz/a	B		
12	AMS		WG	17	lb/100 gal	B		
13	Roundup PowerMax	4.5	SL	32	fl oz/a	C	28.7	7138
13	AMS		WG	17	lb/100 gal	C		

* Adjusted means

Tank-contamination effects from dicamba on sugarbeet
Trial ID: SB01-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Probst, Sprague

Pest Code								
Crop Code							BETVU	BETVU
Rating Date							Sep-20-2017	Sep-20-2017
Rating Type							yield	RWSA
Rating Unit							ton/acre	# / acre
Trt-Eval Interval							77 DA-C	77 DA-C
Number of Decimals							1	0
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	*	*
14	Clarity (1/800X rate)	4	L	0.04	fl oz/a	C	28.0	7965
14	Roundup PowerMax	4.5	L	32	fl oz/a	C		
14	AMS		WG	17	lb/100 gal	C		
15	Clarity (1/400X rate)	4	L	0.08	fl oz/a	C	26.9	7643
15	Roundup PowerMax	4.5	L	32	fl oz/a	C		
15	AMS		WG	17	lb/100 gal	C		
16	Clarity (1/200X rate)	4	L	0.16	fl oz/a	C	29.1	7777
16	Roundup PowerMax	4.5	L	32	fl oz/a	C		
16	AMS		WG	17	lb/100 gal	C		
17	Clarity (1/100X rate)	4	L	0.32	fl oz/a	C	26.3	7540
17	Roundup PowerMax	4.5	L	32	fl oz/a	C		
17	AMS		WG	17	lb/100 gal	C		
18	Clarity (1/50X rate)	4	L	0.64	fl oz/a	C	25.8	8456
18	Roundup PowerMax	4.5	L	32	fl oz/a	C		
18	AMS		WG	17	lb/100 gal	C		
LSD P=.05							5.77	1728.8
Standard Deviation							4.07	1217.3
CV							15.07	15.64

* Adjusted means

Tank-contamination effects from Enlist Duo on sugarbeet

Trial ID: SB02-17 modified
Conducted: SVREC
Study Dir.: Probst, Sprague
Investigator: Christy Sprague

Planting Date: Apr-18-2017
Variety: ACH 6515
Population: 4.25 " spacing
Soil Type: SCL sandy clay loam
Plot Size: 10 X 40 FT
Row Spacing: 30 IN
No. of Reps: 4
% OM: 2.4
pH: 7.7
Study Design: Randomized Complete Block (RCB)

Tillage/Previous Crops: Fall moldboard plow; spring soil finish twice
Fertilizer: 100 lb N/A as Urea (217 lb/A)

Crop and Weed Description

Weed	Code	Common Name	Scientific Name
1			

Crop	Code	Common Name
1	BETVU	

Application Description

	A	B	C
Application Timing:	2-Leaf	6-Leaf	Canopy
Date Treated:	May-16-2017	Jun-2-2017	Jul-5-2017
Time Treated:	11:30 AM	10:15 AM	10:30 PM
% Cloud Cover:	60	20	0
Air Temp., Unit:	70 F	75 F	79 F
% Relative Humidity:	62	36	45
Wind Speed/Unit/Dir:	2 mph S	2 mph SW	0.5 mph S
Soil Temp, Unit:	63 F	75 F	76 F
Leaf Moist/Dew Presence (Y/N):	1	4	5
Soil Moist:	1	4	4

Crop Stage at Each Application

	A	B	C
Crop 1 Name:	BETVU	BETVU	BETVU
Height:	0.5 "	4 "	12-14 " (13)
Stage:	2L	6L	12-16L

Weed Stage at Each Application

	A	B	C
Weed 1 Name:			
Height:			
Stage:			

Application Equipment

Appl	Sprayer Type	Ground Speed	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	Spray Volume	Carrier	Operation Pressure
A	BACKPK	3.8 MPH	AIXR	11003	20 "	20 "	100 "	19 GPA	WATER	30 PSI
B	BACKPK	3.8 MPH	AIXR	11003	20 "	20 "	100 "	19 GPA	WATER	30 PSI
C	BACKPK	3.8 MPH	AIXR	11003	24 "	20 "	100 "	19 GPA	WATER	30 PSI

Comments:

Tank-contamination effects from Enlist Duo on sugarbeet
Trial ID: SB02-17 modified Location: SVREC
Investigator: Christy Sprague
Study Director: Probst, Sprague

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	BETVU May-22-2017 injury percent 7 DAT *	BETVU May-30-2017 injury percent 14 DAT *	BETVU Jun-5-2017 injury percent 21 DAT *	BETVU Sep-18-2017 injury percent 75 DA-C *	BETVU Sep-19-2017 stand count 100' row 76 DA-C *
	Pest Code										
	Crop Code						BETVU	BETVU	BETVU	BETVU	BETVU
	Rating Date						May-22-2017	May-30-2017	Jun-5-2017	Sep-18-2017	Sep-19-2017
	Rating Type						injury	injury	injury	injury	stand count
	Rating Unit						percent	percent	percent	percent	100' row
	Trt-Eval Interval						7 DAT	14 DAT	21 DAT	75 DA-C	76 DA-C
	Number of Decimals						0	0	0	0	0
1	Roundup PowerMax	4.5	L	32	fl oz/a	A	0	0	0	0	241
1	AMS		WG	17	lb/100 gal	A					
2	Enlist Duo (1/800X rate)	3.33	SL	0.09375	fl oz/a	A	0	5	0	0	256
2	Roundup PowerMax	4.5	L	32	fl oz/a	A					
2	AMS		WG	17	lb/100 gal	A					
3	Enlist Duo (1/400X rate)	3.33	SL	0.1875	fl oz/a	A	0	12	2	0	239
3	Roundup PowerMax	4.5	L	32	fl oz/a	A					
3	AMS		WG	17	lb/100 gal	A					
4	Enlist Duo (1/200X rate)	3.33	SL	0.375	fl oz/a	A	2	18	9	0	245
4	Roundup PowerMax	4.5	L	32	fl oz/a	A					
4	AMS		WG	17	lb/100 gal	A					
5	Enlist Duo (1/100X rate)	3.33	SL	0.75	fl oz/a	A	8	26	15	4	238
5	Roundup PowerMax	4.5	L	32	fl oz/a	A					
5	AMS		WG	17	lb/100 gal	A					
6	Enlist Duo (1/500Xrate)	3.33	SL	1.5	fl oz/a	A	10	34	28	14	243
6	Roundup PowerMax	4.5	L	32	fl oz/a	A					
6	AMS		WG	17	lb/100 gal	A					
7	Roundup PowerMax	4.5	L	32	fl oz/a	B	0	0	0	0	242
7	AMS		WG	17	lb/100 gal	B					
8	Enlist Duo (1/800X rate)	3.33	SL	0.09375	fl oz/a	B	10	5	5	0	241
8	Roundup PowerMax	4.5	L	32	fl oz/a	B					
8	AMS		WG	17	lb/100 gal	B					
9	Enlist Duo (1/400X rate)	3.33	SL	0.1875	fl oz/a	B	9	12	10	0	244
9	Roundup PowerMax	4.5	L	32	fl oz/a	B					
9	AMS		WG	17	lb/100 gal	B					
10	Enlist Duo (1/200X rate)	3.33	SL	0.375	fl oz/a	B	17	12	13	1	242
10	Roundup PowerMax	4.5	L	32	fl oz/a	B					
10	AMS		WG	17	lb/100 gal	B					
11	Enlist Duo (1/100Xrate)	3.33	SL	0.75	fl oz/a	B	30	22	20	14	257
11	Roundup PowerMax	4.5	L	32	fl oz/a	B					
11	AMS		WG	17	lb/100 gal	B					
12	Enlist Duo (1/50Xrate)	3.33	SL	1.5	fl oz/a	B	41	35	43	18	188
12	Roundup PowerMax	4.5	L	32	fl oz/a	B					
12	AMS		WG	17	lb/100 gal	B					

* Adjusted means
Excluded replicate 1 in column 6

Tank-contamination effects from Enlist Duo on sugarbeet
Trial ID: SB02-17 modified Location: SVREC
Investigator: Christy Sprague
Study Director: Probst, Sprague

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	*	*	*	*	*
Pest Code											
Crop Code							BETVU	BETVU	BETVU	BETVU	BETVU
Rating Date							May-22-2017	May-30-2017	Jun-5-2017	Sep-18-2017	Sep-19-2017
Rating Type							injury	injury	injury	injury	stand count
Rating Unit							percent	percent	percent	percent	100' row
Trt-Eval Interval							7 DAT	14 DAT	21 DAT	75 DA-C	76 DA-C
Number of Decimals							0	0	0	0	0
13	Roundup PowerMax	4.5	L	32	fl oz/a	C	0	0	0	0	235
13	AMS		WG	17	lb/100 gal	C					
14	Enlist Duo (1/800X rate)	3.33	SL	0.09375	fl oz/a	C	3	5	5	0	241
14	Roundup PowerMax	4.5	L	32	fl oz/a	C					
14	AMS		WG	17	lb/100 gal	C					
15	Enlist Duo (1/400X rate)	3.33	SL	0.1875	fl oz/a	C	7	12	10	2	255
15	Roundup PowerMax	4.5	L	32	fl oz/a	C					
15	AMS		WG	17	lb/100 gal	C					
16	Enlist Duo (1/200X rate)	3.33	SL	0.375	fl oz/a	C	19	25	17	6	254
16	Roundup PowerMax	4.5	L	32	fl oz/a	C					
16	AMS		WG	17	lb/100 gal	C					
17	Enlist Duo (1/100Xrate)	3.33	SL	0.75	fl oz/a	C	27	27	24	10	258
17	Roundup PowerMax	4.5	L	32	fl oz/a	C					
17	AMS		WG	17	lb/100 gal	C					
18	Enlist Duo (1/50Xrate)	3.33	SL	1.5	fl oz/a	C	42	46	42	15	218
18	Roundup PowerMax	4.5	L	32	fl oz/a	C					
18	AMS		WG	17	lb/100 gal	C					
LSD P=.05							7.1	4.2	4.1	5.0	26.3
Standard Deviation							5.0	3.0	2.9	3.5	18.5
CV							40.35	18.17	21.46	75.53	7.58

* Adjusted means
Excluded replicate 1 in column 6

Tank-contamination effects from Enlist Duo on sugarbeet
Trial ID: SB02-17 modified Location: SVREC
Investigator: Christy Sprague
Study Director: Probst, Sprague

Pest Code								
Crop Code						BETVU	BETVU	BETVU
Rating Date						Sep-20-2017	Sep-20-2017	Sep-20-2017
Rating Type						% sugar	yield	RWSA
Rating Unit							ton/acre	# / acre
Trt-Eval Interval						77 DA-C	77 DA-C	77 DA-C
Number of Decimals						1	1	0
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	*	*	*
1	Roundup PowerMax	4.5	L	32	fl oz/a	A	19.4	24.1	6907
1	AMS		WG	17	lb/100 gal	A			
2	Enlist Duo (1/800X rate)	3.33	SL	0.09375	fl oz/a	A	19.3	26.2	7637
2	Roundup PowerMax	4.5	L	32	fl oz/a	A			
2	AMS		WG	17	lb/100 gal	A			
3	Enlist Duo (1/400X rate)	3.33	SL	0.1875	fl oz/a	A	19.6	23.1	6646
3	Roundup PowerMax	4.5	L	32	fl oz/a	A			
3	AMS		WG	17	lb/100 gal	A			
4	Enlist Duo (1/200X rate)	3.33	SL	0.375	fl oz/a	A	19.0	25.7	7583
4	Roundup PowerMax	4.5	L	32	fl oz/a	A			
4	AMS		WG	17	lb/100 gal	A			
5	Enlist Duo (1/100X rate)	3.33	SL	0.75	fl oz/a	A	19.5	21.0	6260
5	Roundup PowerMax	4.5	L	32	fl oz/a	A			
5	AMS		WG	17	lb/100 gal	A			
6	Enlist Duo (1/500Xrate)	3.33	SL	1.5	fl oz/a	A	19.3	21.4	6066
6	Roundup PowerMax	4.5	L	32	fl oz/a	A			
6	AMS		WG	17	lb/100 gal	A			
7	Roundup PowerMax	4.5	L	32	fl oz/a	B	19.0	22.9	6555
7	AMS		WG	17	lb/100 gal	B			
8	Enlist Duo (1/800X rate)	3.33	SL	0.09375	fl oz/a	B	18.6	24.1	6726
8	Roundup PowerMax	4.5	L	32	fl oz/a	B			
8	AMS		WG	17	lb/100 gal	B			
9	Enlist Duo (1/400X rate)	3.33	SL	0.1875	fl oz/a	B	19.9	27.6	8308
9	Roundup PowerMax	4.5	L	32	fl oz/a	B			
9	AMS		WG	17	lb/100 gal	B			
10	Enlist Duo (1/200X rate)	3.33	SL	0.375	fl oz/a	B	19.2	26.7	8001
10	Roundup PowerMax	4.5	L	32	fl oz/a	B			
10	AMS		WG	17	lb/100 gal	B			
11	Enlist Duo (1/100Xrate)	3.33	SL	0.75	fl oz/a	B	19.4	23.4	6906
11	Roundup PowerMax	4.5	L	32	fl oz/a	B			
11	AMS		WG	17	lb/100 gal	B			
12	Enlist Duo (1/50Xrate)	3.33	SL	1.5	fl oz/a	B	19.2	19.5	5545
12	Roundup PowerMax	4.5	L	32	fl oz/a	B			
12	AMS		WG	17	lb/100 gal	B			

* Adjusted means
Excluded replicate 1 in column 6

Tank-contamination effects from Enlist Duo on sugarbeet
Trial ID: SB02-17 modified Location: SVREC
Investigator: Christy Sprague
Study Director: Probst, Sprague

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	*	*	*
	Pest Code								
	Crop Code						BETVU	BETVU	BETVU
	Rating Date						Sep-20-2017	Sep-20-2017	Sep-20-2017
	Rating Type						% sugar	yield	RWSA
	Rating Unit							ton/acre	# / acre
	Trt-Eval Interval						77 DA-C	77 DA-C	77 DA-C
	Number of Decimals						1	1	0
13	Roundup PowerMax	4.5	L	32	fl oz/a	C	18.9	22.0	6461
13	AMS		WG	17	lb/100 gal	C			
14	Enlist Duo (1/800X rate)	3.33	SL	0.09375	fl oz/a	C	19.4	21.7	6044
14	Roundup PowerMax	4.5	L	32	fl oz/a	C			
14	AMS		WG	17	lb/100 gal	C			
15	Enlist Duo (1/400X rate)	3.33	SL	0.1875	fl oz/a	C	19.6	20.0	5881
15	Roundup PowerMax	4.5	L	32	fl oz/a	C			
15	AMS		WG	17	lb/100 gal	C			
16	Enlist Duo (1/200X rate)	3.33	SL	0.375	fl oz/a	C	19.3	24.7	7073
16	Roundup PowerMax	4.5	L	32	fl oz/a	C			
16	AMS		WG	17	lb/100 gal	C			
17	Enlist Duo (1/100Xrate)	3.33	SL	0.75	fl oz/a	C	19.5	22.0	6448
17	Roundup PowerMax	4.5	L	32	fl oz/a	C			
17	AMS		WG	17	lb/100 gal	C			
18	Enlist Duo (1/50Xrate)	3.33	SL	1.5	fl oz/a	C	19.3	16.8	5312
18	Roundup PowerMax	4.5	L	32	fl oz/a	C			
18	AMS		WG	17	lb/100 gal	C			
	LSD P=.05						0.88	5.45	1708.2
	Standard Deviation						0.53	3.84	1203.3
	CV						2.76	16.75	18.0

* Adjusted means
Excluded replicate 1 in column 6

Evaluation of various POST ethofumesate rates in sugarbeet

Trial ID: SB03-17 Study Dir.: Sprague, Powell, Stiles
Conducted: SVREC Investigator: Christy Sprague

Planting Date: Apr-18-2017
Variety: ACH G515RR
Population: 4.12 " spacing
Soil Type: SCL sandy clay loam
Plot Size: 10 X 30 FT
Row Spacing: 30 IN
No. of Reps: 3
% OM: 2.4
pH: 7.7
Study Design: Randomized Complete Block (RCB)

Tillage/Previous Crops: Convential tillage
Fertilizer:

Crop and Weed Description

Weed	Code	Common Name	Scientific Name
1	CHEAL	lambsquarters, common	Chenopodium album
Crop	**Code**	**Common Name**	
1	BETVU	Sugarbeet	

Application Description

	A	B
Application Timing:	E.POST	POST
Date Treated:	May-24-2017	Jun-8-2017
Time Treated:	2:45 PM	10:30 AM
% Cloud Cover:	90	0
Air Temp., Unit:	63 F	69 F
% Relative Humidity:	67	51
Wind Speed/Unit/Dir:	11 mph N	2 mph S
Soil Temp, Unit:	59 F	67 F
Leaf Moist/Dew Presence (Y/N):	5	5
Soil Moist:	3	5

Crop Stage at Each Application

	A	B
Crop 1 Name:	BETVU	BETVU
Height:	1-2 " (1.5)	4-6 " (5)
Stage:	4L	6L

Weed Stage at Each Application

	A	B
Weed 1 Name:	CHEAL	CHEAL
Height:	2-4 " (3)	2-6 " (4)
Stage:	Many	Many

Weed Density

	1
Date:	May-24-2017
Weed Name:	CHEAL
Density:	3 FT2

Application Equipment

Appl	Sprayer Type	Ground Speed	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	Spray Volume	Carrier	Operation Pressure
A	Cub	3.8 MPH	AIXR	11003	22 "	20 "	100 "	19 GPA	WATER	30 PSI
B	Cub	3.8 MPH	AIXR	11003	26 "	20 "	100 "	19 GPA	WATER	30 PSI

Comments:

Evaluation of various POST ethofumesate rates in sugarbeet
Trial ID: SB03-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Sprague, Powell, Stiles

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	Pest Code		CHEAL		CHEAL	
							Crop Code	BETVU		BETVU		BETVU
							Rating Date	May-30-2017	May-30-2017	Jun-8-2017	Jun-8-2017	Jun-21-2017
							Rating Type	injury	control	injury	control	injury
							Rating Unit	percent	percent	percent	percent	percent
							Trt-Eval Interval	6 DA-A	6 DA-A	15 DA-A	15 DA-A	13 DA-B
							Number of Decimals	0	0	0	0	0
								*	*	*	*	*
1	Roundup PowerMax	4	SL	32	fl oz/a	A		0	83	0	96	0
1	AMS		WG	17	lb/100 gal	A						
1	Roundup PowerMax	4	SL	32	fl oz/a	B						
1	AMS		WG	17	lb/100 gal	B						
2	Ethofumesate	4	L	6	fl oz/a	A		8	23	4	3	0
2	Destiny HC		L	1.5	pt/a	A						
2	Ethofumesate	4	L	6	fl oz/a	B						
2	Destiny HC		L	1.5	pt/a	B						
3	Ethofumesate	4	L	12	fl oz/a	A		7	18	6	13	0
3	Destiny HC		L	1.5	pt/a	A						
3	Ethofumesate	4	L	12	fl oz/a	B						
3	Destiny HC		L	1.5	pt/a	B						
4	Ethofumesate	4	L	18	fl oz/a	A		4	15	2	28	0
4	Destiny HC		L	1.5	pt/a	A						
4	Ethofumesate	4	L	18	fl oz/a	B						
4	Destiny HC		L	1.5	pt/a	B						
5	Ethofumesate	4	L	24	fl oz/a	A		5	22	4	25	0
5	Destiny HC		L	1.5	pt/a	A						
5	Ethofumesate	4	L	24	fl oz/a	B						
5	Destiny HC		L	1.5	pt/a	B						
6	Ethofumesate	4	L	32	fl oz/a	A		5	15	4	25	0
6	Destiny HC		L	1.5	pt/a	A						
6	Ethofumesate	4	L	32	fl oz/a	B						
6	Destiny HC		L	1.5	pt/a	B						
7	Untreated							0	0	0	0	0
8	Ethofumesate	4	L	6	fl oz/a	A		3	97	2	99	0
8	Roundup PowerMax	4	SL	32	fl oz/a	A						
8	Destiny HC		L	1.5	pt/a	A						
8	AMS		WG	17	lb/100 gal	A						
8	Ethofumesate	4	L	6	fl oz/a	B						
8	Roundup PowerMax	4	SL	32	fl oz/a	B						
8	Destiny HC		L	1.5	pt/a	B						
8	AMS		WG	17	lb/100 gal	B						

* Adjusted means
Could not calculate LSD (% mean diff) for columns 5,7 because error mean square = 0.

Evaluation of various POST ethofumesate rates in sugarbeet
Trial ID: SB03-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Sprague, Powell, Stiles

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code						
Pest Code								CHEAL		CHEAL		
Crop Code							BETVU		BETVU		BETVU	
Rating Date							May-30-2017	May-30-2017	Jun-8-2017	Jun-8-2017	Jun-21-2017	
Rating Type							injury	control	injury	control	injury	
Rating Unit							percent	percent	percent	percent	percent	
Trt-Eval Interval							6 DA-A	6 DA-A	15 DA-A	15 DA-A	13 DA-B	
Number of Decimals							0	0	0	0	0	
9	Ethofumesate	4	L	12	fl oz/a	A	6	97	4	98	0	
9	Roundup PowerMax	4	SL	32	fl oz/a	A						
9	Destiny HC		L	1.5	pt/a	A						
9	AMS		WG	17	lb/100 gal	A						
9	Ethofumesate	4	L	12	fl oz/a	B						
9	Roundup PowerMax	4	SL	32	fl oz/a	B						
9	Destiny HC		L	1.5	pt/a	B						
9	AMS		WG	17	lb/100 gal	B						
10	Ethofumesate	4	L	18	fl oz/a	A	5	95	3	95	0	
10	Roundup PowerMax	4	SL	32	fl oz/a	A						
10	Destiny HC		L	1.5	pt/a	A						
10	AMS		WG	17	lb/100 gal	A						
10	Ethofumesate	4	L	18	fl oz/a	B						
10	Roundup PowerMax	4	SL	32	fl oz/a	B						
10	Destiny HC		L	1.5	pt/a	B						
10	AMS		WG	17	lb/100 gal	B						
11	Ethofumesate	4	L	24	fl oz/a	A	5	95	3	97	0	
11	Roundup PowerMax	4	SL	32	fl oz/a	A						
11	Destiny HC		L	1.5	pt/a	A						
11	AMS		WG	17	lb/100 gal	A						
11	Ethofumesate	4	L	24	fl oz/a	B						
11	Roundup PowerMax	4	SL	32	fl oz/a	B						
11	Destiny HC		L	1.5	pt/a	B						
11	AMS		WG	17	lb/100 gal	B						
12	Ethofumesate	4	L	32	fl oz/a	A	4	95	8	95	0	
12	Roundup PowerMax	4	SL	32	fl oz/a	A						
12	Destiny HC		L	1.5	pt/a	A						
12	AMS		WG	17	lb/100 gal	A						
12	Ethofumesate	4	L	32	fl oz/a	B						
12	Roundup PowerMax	4	SL	32	fl oz/a	B						
12	Destiny HC		L	1.5	pt/a	B						
12	AMS		WG	17	lb/100 gal	B						
LSD P=.05							3.8	5.5	5.6	10.5	.	
Standard Deviation							2.2	3.2	3.3	6.2	0.0	
CV							50.1	5.55	100.88	11.03	0.0	

* Adjusted means
Could not calculate LSD (% mean diff) for columns 5,7 because error mean square = 0.

Michigan State University

Evaluation of various POST ethofumesate rates in sugarbeet
Trial ID: SB03-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Sprague, Powell, Stiles

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code						
Pest Code							CHEAL		CHEAL			
Crop Code								BETVU		BETVU	BETVU	BETVU
Rating Date							Jun-21-2017	Jul-6-2017	Jul-6-2017	Sep-19-2017	Sep-20-2017	Sep-20-2017
Rating Type							control	injury	control	beets 100'	% sugar	yield
Rating Unit							percent	percent	percent	row		ton/acre
Trt-Eval Interval							13 DA-B	28 DA-B	28 DA-B	118 DA-A	104 DA-B	119 DA-A
Number of Decimals							0	0	0	0	1	1
1	Roundup PowerMax	4	SL	32	fl oz/a	A	99	0	99	259	19.0	22.6
1	AMS		WG	17	lb/100 gal	A						
1	Roundup PowerMax	4	SL	32	fl oz/a	B						
1	AMS		WG	17	lb/100 gal	B						
2	Ethofumesate	4	L	6	fl oz/a	A	20	0	18	156	18.7	13.6
2	Destiny HC		L	1.5	pt/a	A						
2	Ethofumesate	4	L	6	fl oz/a	B						
2	Destiny HC		L	1.5	pt/a	B						
3	Ethofumesate	4	L	12	fl oz/a	A	37	0	25	102	17.3	8.9
3	Destiny HC		L	1.5	pt/a	A						
3	Ethofumesate	4	L	12	fl oz/a	B						
3	Destiny HC		L	1.5	pt/a	B						
4	Ethofumesate	4	L	18	fl oz/a	A	42	0	33	173	19.4	15.1
4	Destiny HC		L	1.5	pt/a	A						
4	Ethofumesate	4	L	18	fl oz/a	B						
4	Destiny HC		L	1.5	pt/a	B						
5	Ethofumesate	4	L	24	fl oz/a	A	50	0	40	190	18.7	16.6
5	Destiny HC		L	1.5	pt/a	A						
5	Ethofumesate	4	L	24	fl oz/a	B						
5	Destiny HC		L	1.5	pt/a	B						
6	Ethofumesate	4	L	32	fl oz/a	A	57	0	47	196	19.6	17.1
6	Destiny HC		L	1.5	pt/a	A						
6	Ethofumesate	4	L	32	fl oz/a	B						
6	Destiny HC		L	1.5	pt/a	B						
7	Untreated						0	0	0	144	18.4	12.6
8	Ethofumesate	4	L	6	fl oz/a	A	100	0	100	300	18.6	26.1
8	Roundup PowerMax	4	SL	32	fl oz/a	A						
8	Destiny HC		L	1.5	pt/a	A						
8	AMS		WG	17	lb/100 gal	A						
8	Ethofumesate	4	L	6	fl oz/a	B						
8	Roundup PowerMax	4	SL	32	fl oz/a	B						
8	Destiny HC		L	1.5	pt/a	B						
8	AMS		WG	17	lb/100 gal	B						

* Adjusted means
Could not calculate LSD (% mean diff) for columns 5,7 because error mean square = 0.

Evaluation of various POST ethofumesate rates in sugarbeet
Trial ID: SB03-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Sprague, Powell, Stiles

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	CHEAL Jun-21-2017 control percent 13 DA-B *	BETVU Jul-6-2017 injury percent 28 DA-B *	CHEAL Jul-6-2017 control percent 28 DA-B *	BETVU Sep-19-2017 beets 100' row 118 DA-A *	BETVU Sep-20-2017 % sugar 104 DA-B *	BETVU Sep-20-2017 yield ton/acre 119 DA-A *
	Pest Code						CHEAL		CHEAL			
	Crop Code							BETVU		BETVU	BETVU	BETVU
	Rating Date						Jun-21-2017	Jul-6-2017	Jul-6-2017	Sep-19-2017	Sep-20-2017	Sep-20-2017
	Rating Type						control	injury	control	beets 100'	% sugar	yield
	Rating Unit						percent	percent	percent	row		ton/acre
	Trt-Eval Interval						13 DA-B	28 DA-B	28 DA-B	118 DA-A	104 DA-B	119 DA-A
	Number of Decimals						0	0	0	0	1	1
9	Ethofumesate	4	L	12	fl oz/a	A	100	0	100	279	18.4	24.4
9	Roundup PowerMax	4	SL	32	fl oz/a	A						
9	Destiny HC		L	1.5	pt/a	A						
9	AMS		WG	17	lb/100 gal	A						
9	Ethofumesate	4	L	12	fl oz/a	B						
9	Roundup PowerMax	4	SL	32	fl oz/a	B						
9	Destiny HC		L	1.5	pt/a	B						
9	AMS		WG	17	lb/100 gal	B						
10	Ethofumesate	4	L	18	fl oz/a	A	100	0	100	275	19.0	24.0
10	Roundup PowerMax	4	SL	32	fl oz/a	A						
10	Destiny HC		L	1.5	pt/a	A						
10	AMS		WG	17	lb/100 gal	A						
10	Ethofumesate	4	L	18	fl oz/a	B						
10	Roundup PowerMax	4	SL	32	fl oz/a	B						
10	Destiny HC		L	1.5	pt/a	B						
10	AMS		WG	17	lb/100 gal	B						
11	Ethofumesate	4	L	24	fl oz/a	A	99	0	100	290	18.9	25.3
11	Roundup PowerMax	4	SL	32	fl oz/a	A						
11	Destiny HC		L	1.5	pt/a	A						
11	AMS		WG	17	lb/100 gal	A						
11	Ethofumesate	4	L	24	fl oz/a	B						
11	Roundup PowerMax	4	SL	32	fl oz/a	B						
11	Destiny HC		L	1.5	pt/a	B						
11	AMS		WG	17	lb/100 gal	B						
12	Ethofumesate	4	L	32	fl oz/a	A	99	0	100	313	19.0	27.3
12	Roundup PowerMax	4	SL	32	fl oz/a	A						
12	Destiny HC		L	1.5	pt/a	A						
12	AMS		WG	17	lb/100 gal	A						
12	Ethofumesate	4	L	32	fl oz/a	B						
12	Roundup PowerMax	4	SL	32	fl oz/a	B						
12	Destiny HC		L	1.5	pt/a	B						
12	AMS		WG	17	lb/100 gal	B						
	LSD P=.05						6.9	.	9.4	73.9	1.38	6.45
	Standard Deviation						4.1	0.0	5.6	43.4	0.81	3.79
	CV						6.11	0.0	8.75	19.09	4.32	19.09

* Adjusted means
Could not calculate LSD (% mean diff) for columns 5,7 because error mean square = 0.

Evaluation of various POST ethofumesate rates in sugarbeet
Trial ID: SB03-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Sprague, Powell, Stiles

Pest Code									
Crop Code							BETVU	BETVU	
Rating Date							Sep-20-2017	Sep-20-2017	
Rating Type							RWST	RWSA	
Rating Unit							#/ton	#/acre	
Trt-Eval Interval							104 DA-B	104 DA-B	
Number of Decimals							0	0	
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	*	*	
1	Roundup PowerMax	4	SL	32	fl oz/a	A	290	6581	
1	AMS		WG	17	lb/100 gal	A			
1	Roundup PowerMax	4	SL	32	fl oz/a	B			
1	AMS		WG	17	lb/100 gal	B			
2	Ethofumesate	4	L	6	fl oz/a	A	284	3852	
2	Destiny HC		L	1.5	pt/a	A			
2	Ethofumesate	4	L	6	fl oz/a	B			
2	Destiny HC		L	1.5	pt/a	B			
3	Ethofumesate	4	L	12	fl oz/a	A	261	2463	
3	Destiny HC		L	1.5	pt/a	A			
3	Ethofumesate	4	L	12	fl oz/a	B			
3	Destiny HC		L	1.5	pt/a	B			
4	Ethofumesate	4	L	18	fl oz/a	A	297	4494	
4	Destiny HC		L	1.5	pt/a	A			
4	Ethofumesate	4	L	18	fl oz/a	B			
4	Destiny HC		L	1.5	pt/a	B			
5	Ethofumesate	4	L	24	fl oz/a	A	283	4705	
5	Destiny HC		L	1.5	pt/a	A			
5	Ethofumesate	4	L	24	fl oz/a	B			
5	Destiny HC		L	1.5	pt/a	B			
6	Ethofumesate	4	L	32	fl oz/a	A	299	5106	
6	Destiny HC		L	1.5	pt/a	A			
6	Ethofumesate	4	L	32	fl oz/a	B			
6	Destiny HC		L	1.5	pt/a	B			
7	Untreated						280	3558	
8	Ethofumesate	4	L	6	fl oz/a	A	281	7334	
8	Roundup PowerMax	4	SL	32	fl oz/a	A			
8	Destiny HC		L	1.5	pt/a	A			
8	AMS		WG	17	lb/100 gal	A			
8	Ethofumesate	4	L	6	fl oz/a	B			
8	Roundup PowerMax	4	SL	32	fl oz/a	B			
8	Destiny HC		L	1.5	pt/a	B			
8	AMS		WG	17	lb/100 gal	B			

* Adjusted means
Could not calculate LSD (% mean diff) for columns 5,7 because error mean square = 0.

Evaluation of various POST ethofumesate rates in sugarbeet
Trial ID: SB03-17 Location: SVREC
Investigator: Christy Sprague
Study Director: Sprague, Powell, Stiles

Pest Code													
Crop Code											BETVU	BETVU	
Rating Date											Sep-20-2017	Sep-20-2017	
Rating Type											RWST	RWSA	
Rating Unit											#/ton	#/acre	
Trt-Eval Interval											104 DA-B	104 DA-B	
Number of Decimals											0	0	

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Code	*	*
9	Ethofumesate	4	L	12	fl oz/a	A	278	6799
9	Roundup PowerMax	4	SL	32	fl oz/a	A		
9	Destiny HC		L	1.5	pt/a	A		
9	AMS		WG	17	lb/100 gal	A		
9	Ethofumesate	4	L	12	fl oz/a	B		
9	Roundup PowerMax	4	SL	32	fl oz/a	B		
9	Destiny HC		L	1.5	pt/a	B		
9	AMS		WG	17	lb/100 gal	B		
10	Ethofumesate	4	L	18	fl oz/a	A	288	6907
10	Roundup PowerMax	4	SL	32	fl oz/a	A		
10	Destiny HC		L	1.5	pt/a	A		
10	AMS		WG	17	lb/100 gal	A		
10	Ethofumesate	4	L	18	fl oz/a	B		
10	Roundup PowerMax	4	SL	32	fl oz/a	B		
10	Destiny HC		L	1.5	pt/a	B		
10	AMS		WG	17	lb/100 gal	B		
11	Ethofumesate	4	L	24	fl oz/a	A	287	7279
11	Roundup PowerMax	4	SL	32	fl oz/a	A		
11	Destiny HC		L	1.5	pt/a	A		
11	AMS		WG	17	lb/100 gal	A		
11	Ethofumesate	4	L	24	fl oz/a	B		
11	Roundup PowerMax	4	SL	32	fl oz/a	B		
11	Destiny HC		L	1.5	pt/a	B		
11	AMS		WG	17	lb/100 gal	B		
12	Ethofumesate	4	L	32	fl oz/a	A	287	7797
12	Roundup PowerMax	4	SL	32	fl oz/a	A		
12	Destiny HC		L	1.5	pt/a	A		
12	AMS		WG	17	lb/100 gal	A		
12	Ethofumesate	4	L	32	fl oz/a	B		
12	Roundup PowerMax	4	SL	32	fl oz/a	B		
12	Destiny HC		L	1.5	pt/a	B		
12	AMS		WG	17	lb/100 gal	B		
LSD P=.05							23.8	1959.9
Standard Deviation							13.9	1150.7
CV							4.89	20.22

* Adjusted means
Could not calculate LSD (% mean diff) for columns 5,7 because error mean square = 0.

2017 DRY BEAN YIELD TRIALS

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Plant, Soil and Microbial Sciences

The dry bean breeding program initiated its ninth season on the 450 acre Saginaw Valley Research & Extension Center (SVREC) research farm near Frankenmuth MI in 2017. The MSU dry bean breeding and genetics program conducted 20 yield trials in 2017 in ten market classes and participated in the growing and evaluation of the Cooperative Dry Bean, Midwest Regional Performance, National Drought and the National Sclerotinia Nurseries in Michigan and winter nursery in Puerto Rico. The nurseries were planted in June 2017 into favorable soil moisture conditions, which continued through June. In July and August, trials received only 2.37" of rain during that 60-day period which hastened maturity and reduced overall yields. A major effort to expand evaluation of black beans with improved canning quality was made in 2017. A total of 3260 bean plots were trialed in 2017, 2590 plots at SVREC and 670 plots at the Montcalm Research Farm (MRF). In addition, selection for tolerance to drought stress during the extended dry period was possible in all nurseries based on performance under these conditions. Heavy rains (~5") following planting at MRF resulted in plot loss and damage due to flooding but the surviving plots recovered and although maturity was delayed, overall yields were well above average. The same heavy rainfall patterns in the northern production area resulted in severe outbreak of anthracnose and resulting yield losses in growers' fields. A new race of anthracnose was detected in Alcona County that overcame the resistance gene in Zenith. All current black, navy and small red bean varieties are susceptible to the new race, whereas most kidney bean varieties are resistant. The emergence of a new race of anthracnose has caused a refocus on the disease and breeding for resistance. However, the predominant race in Michigan is still race 73 and it is essential that all new varieties are resistant to this predominant race. The majority of black, navy and otebo breeding lines are resistant to race 73, but resistance in small red and pinto classes lags behind. One observation of the trials at SVREC was the shortening (dwarfing) of plant stature in the majority of trials. The heavy earlier rains following planting appears to have contributed to this dwarfing effect as it was also observed in production fields that received excessive rain following planting. Some varieties like Samurai otebo bean that normally stand 55 cm tall were rated at 48 cm in 2017. This dwarfing effect contributed to direct harvest losses in some lines.

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. 7101: Standard Navy Bean Yield Trial

This 30-entry trial included standard commercial navy bean varieties, and advanced lines from the MSU breeding program, which carry the N-prefix. Yields ranged from 13.7 to 29.1 cwt/acre with a mean of 21.6 cwt/acre. Variability in this trial was moderate (CV=10.2%) and the LSD needed for significance was 2.6 cwt/acre. Four lines significantly out-yielded the test mean and included top yielding line N14229 from 2015 and 2016 trials. The top yielding entry had the highest agronomic rating (6.0) as it showed excellent dry down unlike many of the standard varieties that exhibited severe leaf retention. Yield potential in this cross was supported by sib N14230 which ranked 2nd in the trial. Merlin was the top variety in the trial and was among the top four entries. Two cultivars, Vigilant, and AAC Shock grouped above the test mean. Similar to past years, Medalist was among the lowest yielding varieties with Alpena and two lines from Puerto Rico. The low performance of Medalist results from severe leaf retention and failure to dry down. The inability of many varieties to mature uniformly was the result of the early drought stress resulting in the inability of the plants to set sufficient pod load (sink) to mature out normally. Canning tests will be conducted on all new MSU breeding lines before being considered for release.

Expt. 7102: Standard Black Bean Yield Trial

This 48-entry trial included the standard commercial black bean varieties and advanced breeding lines. Yields ranged from 13.1 to 26.1 cwt/acre with a test mean of 21.6 cwt/acre. Variability was moderate in this test, (CV=10.1%) and the LSD was 2.6 cwt/acre. Six entries significantly outyielded the test mean and they included B16504, which ranked first in 2016. Black Bear was the top commercial variety at 22.2 cwt/acre and significantly outyielded Zenith, Zorro and Eclipse. The disappointing low yield of Zenith and Zorro was due to a seed emergence problem resulting from seed treatment that resulted in low stands. Zenith (26.2 cwt/acre) continues to outperform Zorro (23.0 cwt/acre) by 3.2 cwt/acre or 12% over 7 research trials in 2017. Entry PR1147-3 from Puerto Rico was the lowest yielding entry in the test. Canning tests will be conducted on new breeding lines to ensure only those with canning quality similar to Zenith are advanced.

Expt. 7103: Black Bean RIL Population 5 Yield Trial

This 156-entry trial included recombinant inbred lines (RILs) developed by crossing Zenith with an advanced black bean breeding line, B12724, and inbreeding the progeny over several generations. This experiment was designed to determine the combining ability of two black beans that are known to possess excellent color retention when canned. Yields ranged from 16.6 to 31.7 cwt/acre, and the test mean of 26.3 cwt/acre was the same as Zenith, the top commercial variety in this test. Variability was low (CV=8.3%), resulting in a LSD of 3 cwt/acre. The B12724 parent yielded 24.1 cwt/acre, while the commercial checks Zorro and Eclipse yielded 23.4 and 22.9 cwt/acre, respectively. The entire RIL population was canned last year, and most lines maintained a dark black color after canning, some being darker than Zenith. Lines will be selected for this year's canning tests based on yield, agronomic, and previous canning data.

Expt. 7104: Black Bean RIL Population 76 Yield Trial

This 156-entry trial included RILs developed by crossing an advanced black bean breeding line, B14311, with Zenith and inbreeding the progeny over several generations. The breeding line B14311 produces high yields, but turns an undesirable light brown color when canned. This experiment was designed to create a mapping population to identify which regions of the genome affect color retention of canned black beans. Yields ranged from 11.8 to 33.7 cwt/acre, with a test mean of 27.3 cwt/acre. Variability was low (CV=7.2%), resulting in a LSD of 3.2 cwt/acre. The parents of the population yielded 29.7 and 26.6 cwt/acre for B14311 and Zenith, respectively. Commercial checks Zorro and Eclipse yielded 25.2 and 24.5 cwt/acre, respectively. The entire RIL population was canned last year, and individual lines segregated dramatically for post-processing color retention. The entire RIL population will be canned again in 2018. The data will be used to find quantitative trait loci (QTL) and genetic markers that have the potential for use in marker-assisted selection for canning quality traits.

Expt. 7105: Black Bean RIL Population 86 Yield Trial

This 156-entry trial included RILs developed by crossing two black bean advanced breeding lines, B14311 and B12724, and inbreeding the progeny over several generations. Line B14311 is high-yielding, but turns an undesirable light brown color when canned, while line B12724 is high-yielding and has canning quality comparable to Zenith. This experiment is designed to create a different mapping population than the one described above to identify which regions of the genome affect color retention of canned black beans in a different genetic background. Yields ranged from 20.4 to 36.0 cwt/acre with a test mean of 29.6 cwt/acre. Variability was very low (CV=6.2%), and resulted in a LSD of 3 cwt/acre. The parents of the population yielded 29.9 and 32.9 cwt/acre for B14311 and B12724, respectively. Commercial checks Zenith, Zorro, and Eclipse yielded 31.4, 27.8, and 26.5 cwt/acre, respectively, while the black bean breeding line B16504 topped the trial at 36.0 cwt/acre (over 10 cwt/acre more than in Expt. 7102). The entire RIL population was canned last year, and individual lines segregated dramatically for post-processing color retention and the entire RIL population will be canned again in 2018. The data will be used to find quantitative trait loci (QTL) and genetic markers that have the potential for use in marker-assisted selection for canning quality traits. Both line B12724 and Zenith both have excellent color retention, so using them as parents in separate populations may determine if they possess different QTL affecting this trait.

Expt. 7106: Black Bean RIL Population 11 Yield Trial

This 108-entry trial included RILs developed by crossing an advanced black bean breeding line, B14302, with Zenith and inbreeding the progeny over several generations. Like the previously mentioned line B14311, B14302 is a high-yielder but a poor-canner. Additionally, B14302 may carry a gene that confers resistance to the new race of anthracnose discovered in Alcona County. Due to time and space limitations, this population cannot be used for a genetic mapping study, but can be used to identify recombinants with good yield, canning quality, and potentially anthracnose resistance. Yields ranged from 21.8 to 38.5 cwt/acre, with a test mean of 30.2 cwt/acre. Variability was very low (CV=6.2%), and resulted in a LSD of 3.1 cwt/acre. The parents of the population had nearly identical yields, at 27.5 and 27.8 cwt/acre for B14302 and Zenith, respectively.

Commercial checks Zorro and Eclipse yielded 25.7 and 22.2 cwt/acre, respectively. Selections have been made in this population for good agronomic characteristics without knowledge of canning performance. However, these RILs have undergone hyperspectral and Vis/NIR imaging data on dry seed in an attempt to create a model that predicts canning quality based on dry seed alone. This imaging data can be used along with yield and anthracnose resistance to guide selection of which lines to include in canning tests.

Expt. 7107: Black Bean RIL Populations 31 and 45 Yield Trial

This 72-entry trial included two RIL populations derived by crossing black beans with poor color retention after canning (B14302 & B14303) with black beans with good color retention (B12724 & Zenith). Due to time and space limitations, these populations cannot be used for genetic mapping, but can be used to identify recombinants with good yield, canning quality, and potentially anthracnose resistance from B14302-derived lines. Yields ranged from 16.8 to 33.0 cwt/acre, with a test mean of 24.5 cwt/acre. Variability was moderate (CV=10.3%), and resulted in a LSD of 4.2 cwt/acre. Zenith performed well, yielding 30.4 cwt/acre. These populations have been selected for agronomic traits more rigorously than Population 11 in Expt. 7106. The highest-yielding lines will be selected for canning quality prior to advancing to 2018 trials.

Expt. 7108: Standard Great Northern Yield Trial

This 42-entry trial included MSU great northern breeding lines (G-prefix) and standard commercial check varieties. The test ranged in yield from 12.0 to 26.0 cwt/acre with a mean yield of 20.7 cwt/acre. Variability was moderate (CV= 11.6%) resulting in a LSD value of 2.3 cwt/acre needed for significance. Eight entries significantly outperformed the test mean and included the new Samurai otebo variety. Samurai is an upright type suitable for direct harvest and is comparable in yield to current upright black and navy bean varieties. The test tended to group by maturity where early season lines (<90d maturity) were generally lower yielding. Powderhorn check variety was among the lowest yielding entries, matured earlier (88d) due to drought. Many of the new G17-lines will need to be retested to determine the adaptation under more normal growing conditions.

Expt. 7109: Standard Pinto Bean Yield Trial

This 36-entry trial included MSU pinto lines (P-prefix) and standard commercial check varieties. The test ranged in yield from 9.6 to 21.6 cwt/acre with a mean yield of 15.4 cwt/acre. Variability was high (CV= 15.5%) resulting in a LSD value of 2.8 cwt/acre needed for significance. Nine entries significantly outperformed the test mean and included La Paz and Eldorado. Included in the top group was PT9-5-6 from USDA-WA program and a new slow dark pinto (SDP) from MSU. Included in the test was a number of SDP lines due to the renewed emphasis on slow dark trait. Many of these lines/bulks underperformed including three new slow-dark varieties, Radiant, Palomino and Vibrant. The emphasis on incorporating this trait into pinto beans appears to be bringing along negative traits that are negatively impacting yield due to genetic linkage drag. Overall, the yield potential is this trial was very low.

Expt. 7110: Standard Small Red and Pink 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 13.5 to 27.9 cwt/acre with a mean yield of 20.8 cwt/acre. Variability was moderate (CV=11.3%) resulting in a LSD value of 2.8 cwt/acre for significance. The top nine lines included three sib-lines (R17603, R17604, R17605) plus three small red varieties Viper, Cayenne and Gypsy Rose that significantly outperformed the test mean, while Merlot, Desert Song, and Rosetta pink ranked below the mean yield. Seed size of Viper (35g) is significantly smaller than that of Merlot (43g) and Cayenne (39g). Two small red line OAC Rosito from Canada and SR10-2-1 from USDA-WA significantly under performed. Overall more progress was observed among the small red R- lines than the pink S-lines. Progress in small red breeding program has been limited by a lack of useful variability and inability to combine performance with upright architecture and suitable canning quality in new lines. All lines will be evaluated for canning quality and BCMV reaction prior to advancing to 2018 trials.

Expt. 7111: Preliminary Otebo Yield Trial

This 48-entry trial included MSU otebo breeding lines (G-prefix) and standard commercial check varieties. The test ranged in yield from 9.7 to 28.3 cwt/acre with a mean yield of 18.9 cwt/acre. Variability was high (CV= 14.1%) resulting in a LSD value of 3.6 cwt/acre needed for significance. Nine entries significantly outperformed the test mean and included the new Samurai otebo variety. Samurai is an upright type suitable for direct harvest and is comparable in yield to current upright black and navy bean varieties. Most of the G17-entries are derived from crosses with Samurai to introduce anthracnose resistance. The majority of entries carry resistance to race 73 and resistance to the new race discovered in 2017. Since this bean type is processed as bean paste in Japan the top yielding entries including Samurai are being tested for pasting properties and levels of resistance starch to ensure that they meet the quality standards of that industry.

Expt. 7112: 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 36-entry trial ranged in yield from 7.6 to 26.4 cwt/acre with a mean of 18.0 cwt/acre. Variability was moderate (CV=11.5%) resulting in a LSD value (2.8 cwt/acre) for significance. As a result, 13 lines were significantly higher in yield than the test mean including varieties Cayenne, Staybright, and La Paz. In the top group were pinto and great northern lines from MSU, USDA-WA (PT-prefix), Colorado, and NDSU. Staybright is a slow dark pinto that showed good agronomic adaptation. Performance of other slow darkening pintos COSD-7 from CSU and Palomino from NDSU was below average. Twin Falls was the best overall pinto from Idaho as the other two varieties Nez Perce and Blackfoot significantly under performed. This cooperative trial continues to be valuable as it allows an evaluation of potential new lines prior to release in other states. Canning quality will also be evaluated for all entries.

Expt. 7113: National Dry Bean Drought Nursery

This 40-entry trial was conducted at the SVREC to evaluate a series of breeding lines identified through shuttle breeding between University Nebraska and USDA-TARS station in Puerto Rico as possessing improved levels of drought stress. The trial was replicated by colleagues at various locations across the US. Yields ranged from 8.1 to 24.5 cwt/acre with a mean of 16.6 cwt/acre. Variability was moderate (CV=10.9%) and the LSD needed for significance was 2.5cwt/acre. Eleven lines significantly out-yielded the test mean, including varieties Cayenne, Zenith, Croissant, Longs Peak, and Merlot, while Blackfoot was the lower yielding entry as in test 7112. Since drought was a factor in 2017, it was gratifying to see that new MSU varieties were in the top group. This suggests that continued selection for high performance under local precipitation patterns has resulted in materials that exhibit improved performance under stressful conditions.

Expt. 7214: Standard Kidney Bean Yield Trial

This 64-entry trial was conducted on new ground on the Montcalm Research Farm (MRF) to compare the performance of standard and new light red kidney (LRK), dark red kidney (DRK), white kidney (WK), varieties from MSU and CDBN under supplemental irrigation (10x total 5.4”). A prominent feature of this trial was lack of root rot disease pressure as noted in past years and lack of deer feeding due to erection of a deer fence. Yields ranged from 29.0 to 43.2 cwt/acre with a mean of 35.6 cwt/acre. Variability was low (CV=9.4%) resulting in a LSD value of 3.9 cwt/acre needed for significance. Eleven entries significantly out-yielded the test mean, including the varieties Chaparral, Beluga, and a new WK line ND122386 from NDSU. Varieties Clouseau, Dynasty, Talon, Red Rover and Rosie were above the test mean, while Red Hawk, Montcalm, Red Cedar, Snowdon and CELRK fell below the mean. Both Snowdon and Red Cedar has seed quality problems, which resulted in poor emergence and low stands, which contributed to the lower yields. These results provide a comparison of all current red and white kidney bean varieties.

Expt. 7215: Preliminary Kidney Bean Yield Trial

This 48-entry trial was conducted to compare the performance of new kidney bean lines from MSU grown under supplemental irrigation (10x total 5.4”). A prominent feature of this trial was lack of root rot disease pressure as noted in past years and lack of deer feeding due to erection of a deer fence. Yields ranged from 28.8 to 49.9 cwt/acre with a mean of 38.9 cwt/acre. Variability was moderate (CV=10.9%) in this 3-rep experiment resulting in a LSD value of 5.8 cwt/acre needed for significance. Only four lines significantly outyielded the test mean and these are all new K17-lines. The group included two WK sibs and two half-sibs one WK and one DRK. Clouseau yielded above the test mean while Red Hawk, Red Cedar and Snowdon varieties dropped below the test mean. There was no difference in yield between Red Hawk and Red Cedar, other than Red Cedar showed good levels of CBB resistance. Since canning quality is vital in kidney beans, only those lines equivalent in canning quality to check varieties will be advanced in 2018.

Expt. 7216: Standard Yellow Bean Yield Trial

This 28-entry trial was conducted on new ground at MRF to compare the performance of new yellow bean lines from MSU under supplemental irrigation (10x total 5.4"). This is the first yellow bean trial conducted with MSU lines (Y-prefix) and new varieties from programs in the US and Canada. Yields were exceptional despite the fact that portions of the trial were lost due to flooding following planting. Yields ranged from 29.2 to 54.2 cwt/acre with a mean of 38.2 cwt/acre. Variability was moderate (CV=9.2%) resulting in a LSD value of 4.1 cwt/acre needed for significance. Seven lines significantly outyielded the test mean and these included the new Patron variety, its sib (DBY-28-1), a private variety SVS-0863, three lines from the MSU program and AAC Y012 from Canada. This is the first yellow bean test with new MSU lines that all carry I-gene resistance to BCMV. The AAC lines are susceptible to BCMV. These results are initial efforts to breed adapted yellow beans and retain the strong yellow seed color of the Mexican Peruano, Azufrado, Mayacoba seed types. The virus resistance in all new lines will be verified and the lines will be canned before being advanced in 2018.

Expt. 7217: National White Mold Yield Trial

This 35-entry trial was conducted 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, USDA-WA, and Guelph. 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 17times for a total of 7.8" to maintain adequate levels of moisture for favorable disease development at the critical flowering period. The trial was planted on old bean land previously infected with white mold. The trial was badly damaged by flooding following planting so harvest was restricted to surviving plots, which had variable levels of white mold infection due to differences in plant vigor. The test ranged in yield from 2.6 to 40.8 cwt/acre with a mean yield of 22.2 cwt/acre. Variability was high (CV=14.6%), thus a high LSD value (4.4 cwt/acre) was needed for significance. Twelve lines significantly out-yielded the test mean and included Zenith and a large number of new B16-black bean and P16-pinto lines. Kidney beans were among the lowest yielding entries similar to previous years, but root rots may have been a contributing factor. This trial will continue to be part of the breeding effort to improve tolerance to white mold in future varieties in 2018.

Expt. 7218: White Mold x Fertility Trial

A small trial was conducted to see the interaction between N-fertility levels on the incidence of white mold in two contrasting bean cultivars, Zenith black and Viper small red. Both varieties have similar growth habits and maturities but differ in reaction to white mold. Zenith shows greater level of resistance to white mold. The trial was conducted adjacent to test 7217 and received the same irrigation amounts (17x, 7.8"). Three N-treatments, 20 lbs/a, 40 lb/a and 80 lbs/a were applied to each variety across 4 replicates. White mold developed and appeared to more severely infect the Viper variety, incidence of 40% versus 11% for Zenith (Table 1). However, Viper outperformed Zenith at all N treatments. This was due in part to a seed quality issue with Zenith.

Viper germinated at 97%, while Zenith germinated at 64%. The trial was damaged earlier by flooding which contributed to the high CV. The yield increase due to an additional 40 lb N over the 20 lb N base was 9% similar across varieties, but significantly lower than the 27% observed in 2016. Interestingly there was no gain by applying 80 lb N compared with the 40 lb N recommended rate. In fact, a small but non-significant decrease was observed. Based on the data, the increased rate of N does not appear to contribute to higher white mold ratings; in fact, the highest white mold rating was observed at the recommended 40 lb rate. The work needs to be repeated in 2018.

Expt. 7219: Iowa State Yield Trial

This small 4-entry trial was a collaboration with Iowa State University who were evaluating four contrasting bean types at a number of locations across the US to determine the effects of location on mineral element content of the seed. The four varieties were the yellow bean MY 06326, Taurus great northern, Eclipse black and Montcalm DRK. Yields were exceptional and MY 06326 now holds the record yield of 58.6 cwt/acre at the MRF. Yields ranged from 37.3 to 58.6 cwt/acre with a mean of 47.9 cwt/acre. Variability was well controlled (CV=4.2%) resulting in a LSD value of 3.3 cwt/acre needed for significance. Only the yellow bean significantly outyielded the test mean. MY 06326 is a private variety licensed by the Kelley Bean Company and bred by Provita, but it is susceptible to BCMV. The surprising high yield of the yellow bean would suggest that this market class could be grown successfully in the Montcalm area. This is also supported by the high yields recorded in the yellow bean test 7216.

Expt. 7220: Yellow Bean Root Rot Yield Trial

This small 6-entry trial was conducted on land at MRF that had exhibited serious root rot problems in prior years. The purpose was to compare few elite yellow bean lines under root rot conditions as past observations showed them to be more resistant than kidney beans. Yields were reduced substantially compared to test 7216 on new land. Yields ranged from 22.5 to 36.2 cwt/acre with a mean of 28.4 cwt/acre. Variability was surprisingly low (CV=4.7%) resulting in a LSD value of 2.9 cwt/acre needed for significance. Two lines significantly outyielded the test mean and these were the same high yielding lines in test 7216. The new Patron variety dropped 30 cwt between tests and the overall test mean was 10 cwt less that test 7216. These results continue to underscore the importance of overall soil health for successful bean production and the yield losses that soil borne pathogens can cause.

Early Generation Breeding Material grown in Michigan in 2017

F3 through F5 lines
Navy and Black - 153 lines
Pinto - 30 lines
GN - 27 lines
Pinks and Reds – 22 lines
Kidneys (DR, LR, White) - 59 lines

F2 populations
Navy and Black -149 populations
Pinto - 83 populations
GN & Tebo - 34 populations
Pinks and Reds - 28 populations
Kidneys (DR, LR, White) - 98 populations
Yellow – 67 populations

F1 populations: 371 different crosses among ten contrasting seed types.

Table 1. Expt. 7218: White Mold x Fertility Trial

Variety	Yield & Seed Size							
	Yield cwt/acre				100 seed weight (g)			
N rate	20 lb	80 lb	80 lb	Mean	20 lb	40 lb	80 lb	Mean
Zenith	25.1	27.9	27.7	26.5	24.1	24.3	24.8	25.1
Viper	29.6	32.1	31.7	31.0	30.6	30.8	30.8	31.0
Mean	27.2	29.6	29.5	28.7	27.7	28.2	28.1	28.0
LSD .05			4.4	3.6			0.96	0.79
CV%				17.2				3.8

Variety	White Mold Ratings							
	Disease Incidence %				Disease Index DIX			
N rate	20 lb	40 lb	80 lb	Mean	20 lb	40 lb	80 lb	Mean
Zenith	9.0	19.0	5.8	11.3	7.1	14.1	1.4	7.5
Viper	35.0	45.7	40.0	40.2	24.7	39.1	26.4	30.1
Mean	22.0	32.4	22.9	25.7	15.9	26.6	14.9	18.8
LSD .05			22.2	12.9			17.9	10.4

2017 DRY BEAN YIELD TRIALS

EXPERIMENT	TITLE	PLANTING DATE	LOCATION		ENTRIES	DESIGN	REPS	HARVEST METHOD
7101	STANDARD NAVY BEAN YIELD TRIAL	06/01/17	SVR&EC	FRANKENMUTH	30	REC. LATTICE	4	DIRECT HARVESTED
7102	STANDARD BLACK BEAN YIELD TRIAL	06/01/17	SVR&EC	FRANKENMUTH	48	ALPHA LATTICE	4	DIRECT HARVESTED
7103	PRELIMINARY BLACK BEAN YIELD TRIAL-1	06/01/17	SVR&EC	FRANKENMUTH	156	ALPHA LATTICE	3	DIRECT HARVESTED
7104	PRELIMINARY BLACK BEAN YIELD TRIAL-2	06/02/17	SVR&EC	FRANKENMUTH	156	ALPHA LATTICE	2	DIRECT HARVESTED
7105	PRELIMINARY BLACK BEAN YIELD TRIAL-3	06/02/17	SVR&EC	FRANKENMUTH	156	ALPHA LATTICE	2	DIRECT HARVESTED
7106	PRELIMINARY BLACK BEAN YIELD TRIAL-4	06/02/17	SVR&EC	FRANKENMUTH	108	ALPHA LATTICE	2	DIRECT HARVESTED
7107	PRELIMINARY BLACK BEAN YIELD TRIAL-5	06/02/17	SVR&EC	FRANKENMUTH	72	REC. LATTICE	2	DIRECT HARVESTED
7108	STANDARD GREAT NORTHERN YIELD TRIAL	06/02/17	SVR&EC	FRANKENMUTH	42	REC. LATTICE	4	DIRECT HARVESTED
7109	STANDARD PINTO BEAN YIELD TRIAL	06/05/17	SVR&EC	FRANKENMUTH	36	SQ. LATTICE	4	DIRECT HARVESTED
7110	STANDARD PINK & SMALL RED YIELD TRIAL	06/05/17	SVR&EC	FRANKENMUTH	36	SQ. LATTICE	4	DIRECT HARVESTED
7111	PRELIMINARY TEBO BEAN YIELD TRIAL	06/05/17	SVR&EC	FRANKENMUTH	48	ALPHA LATTICE	3	DIRECT HARVESTED
7112	MIDWEST & CO-OP. REGIONAL TRIAL	06/05/17	SVR&EC	FRANKENMUTH	36	SQ. LATTICE	3	DIRECT HARVESTED
7113	NATIONAL DRY BEAN DROUGHT TRIAL	06/05/17	SVR&EC	FRANKENMUTH	40	ALPHA LATTICE	3	DIRECT HARVESTED
7214	STANDARD KIDNEY BEAN YIELD TRIAL	06/13/17	ENTRICAN	MONTCALM	64	SQ. LATTICE	4	ROD PULLED
7215	PRELIMINARY KIDNEY BEAN YIELD TRIAL	06/13/17	ENTRICAN	MONTCALM	48	ALPHA LATTICE	3	ROD PULLED
7216	STANDARD YELLOW BEAN YIELD TRIAL	06/13/17	ENTRICAN	MONTCALM	28	ALPHA LATTICE	4	ROD PULLED
7217	NATIONAL WHITE MOLD YIELD TRIAL	06/14/17	ENTRICAN	MONTCALM	35	ALPHA LATTICE	3	DIRECT HARVESTED
7218	WHITE MOLD X NITROGEN RATE TRIAL	06/14/17	ENTRICAN	MONTCALM	2X3	FACTORIAL	4	ROD PULLED
7219	SEED NUTRIENT CONTENT TRIAL-IA STATE	06/14/17	ENTRICAN	MONTCALM	4	RCBD	4	ROD PULLED
7220	YELLOW BEAN ROOT ROT YIELD TRIAL	06/14/17	ENTRICAN	MONTCALM	6	RCBD	4	ROD PULLED

SVR&EC: SAGINAW VALLEY RESEARCH & EXTENSION CENTER

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

FRANKENMUTH: FERTILIZER BROADCAST: 400 POUNDS OF 15-5-13 + S, ZN, MN, CU PRIOR TO PLANTING.
HERBICIDES APPLIED: 1.0 PT DUAL + 1.5 QT. EPTAM APPLIED PPI. 1.0 PT BASAGRAN, 8 OZ. REFLEX, 4 OZ. RAPTOR ON JUNE 30.
PESTICIDES APPLIED: 9.6 OZ. ASANA ON JUNE 30.

ENTRICAN: FERTILIZER BROADCAST: 200 POUNDS OF 19-10-19 PRIOR TO PLANTING. 50 POUNDS 46-0-0 SIDE DRESSED ON JULY 24.
HERBICIDES APPLIED: 2 PT. SONALAN/1.25 QT EPTAM/2PT. DUAL PPI. 4 OZ. RAPTOR/14 OZ. REFLEX/1 PT BASAGRAN ON JULY 11.
PESTICIDES APPLIED: 9.6 OZ. ASANA ON JULY 11. 4 OZ. MUSTANG MAX ON AUGUST 14.
IRRIGATION APPLIED: 5.4 INCHES – 10 APPLICATIONS ON 7214,7215,7216,7219; 7.8 INCHES 17 APPLICATIONS ON 7217,7218, 7220.

EXPERIMENT 7101 STANDARD NAVY YIELD TRIAL									PLANTED: 6/1/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
N14229	N11275/N11256	1	29.1	19.2	44.0	90.0	1.0	49.8	6.0	2.0	1.0
N14230	N11275/N11256	5	24.6	19.0	46.0	91.0	1.0	49.3	5.3	2.5	1.0
I11264	COOP 03019, **MERLIN**	15	24.4	19.9	44.0	93.0	1.3	49.3	4.8	2.5	1.0
N17506	N14230/N12447	21	24.2	20.6	45.0	90.0	1.0	47.5	5.3	2.0	1.0
N17504	N14206/N14229	19	24.1	20.0	45.0	90.0	1.0	46.3	4.8	1.5	1.0
N14218	N11256/N11298	9	24.0	19.6	46.0	91.0	1.0	48.3	5.3	1.5	1.0
N17508	Alpena/N14229	23	24.0	20.2	46.0	90.0	1.0	49.0	4.8	3.0	2.0
N15337	N12466/N11258	8	23.9	20.9	45.0	92.0	1.0	50.0	5.5	2.5	1.0
N15313	N11258/N11277	4	23.8	19.7	43.0	89.0	1.0	48.0	4.8	4.0	2.0
N17505	N14230/N12447	20	23.7	22.0	47.0	91.0	1.0	48.3	5.8	1.5	1.0
N14201	N11249/N11256	2	23.3	19.8	46.0	90.0	1.0	47.8	5.3	2.0	1.0
I10101	COOP 02084, **VIGILANT**	13	23.2	22.1	44.0	91.0	1.0	47.8	4.0	2.0	1.0
N17503	N14206/N14223	18	23.2	18.9	45.0	91.0	1.0	47.8	4.8	1.5	1.0
I17518	ACUG 14-1, **AAC SHOCK**	27	22.9	22.4	43.0	89.0	1.0	48.0	4.0	3.0	1.0
N17509	N12466/N14206	24	22.6	20.2	46.0	90.0	1.0	45.3	4.3	2.5	1.0
N15306	N11230/N11298	11	22.4	19.7	43.0	91.0	1.0	49.0	5.5	1.5	1.0
N14205	N11256/N11258	10	22.2	19.9	44.0	89.0	1.0	46.5	4.5	2.0	1.0
N15341	N12468/N12466	12	21.6	20.3	45.0	91.0	1.0	47.8	5.0	1.0	1.0
N17510	N13124/N14230	25	21.4	19.0	44.0	90.0	1.0	47.3	4.5	2.0	1.0
I08902	HYLAND T9905	28	20.6	23.0	44.0	94.0	1.3	48.8	4.3	1.5	1.0
N17501	N13124/N14206	16	20.3	18.8	45.0	92.0	1.0	48.5	5.0	2.0	1.0
N16405	N12466/N11264	7	20.0	21.0	45.0	88.0	1.0	47.8	5.8	1.0	1.0
N17502	N14206/N14223	17	20.0	18.8	44.0	89.0	1.0	45.0	4.0	2.0	1.0
N15331	N12438/N12468	3	19.7	20.8	45.0	92.0	1.0	48.3	5.3	1.5	2.0
N17507	N14235/N14243	22	19.4	18.4	44.0	90.0	1.0	47.0	4.5	2.0	1.0
N16401	N09175/Alpena	6	17.9	21.7	44.0	88.0	1.0	43.5	4.0	1.0	2.0
I08958	Mayflower/Avanti, **MEDALIST**	26	17.2	21.3	43.0	94.0	1.8	49.5	4.3	2.5	1.0
N11283	MEDALIST/N08003, **ALPENA**	14	15.7	19.1	43.0	91.0	1.0	46.0	4.0	2.5	1.0
I17527	PR1217-16, **BELLA**	30	14.5	26.6	43.0	90.0	1.0	43.0	3.3	2.5	1.0
I17526	PR0801-81A	29	13.7	24.1	43.0	92.0	1.0	46.5	3.0	2.5	2.0
MEAN(30)			21.6	20.6	44.5	90.5	1.0	47.5	4.7	2.1	1.1
LSD(.05)			2.6	0.7	1.0	1.8	0.3	2.3	0.9	1.2	0.9
CV%			10.2	2.7	1.3	1.2	15.4	2.9	12.0	34.7	31.3

EXPERIMENT 7102 STANDARD BLACK YIELD TRIAL								PLANTED: 6/1/17			
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
B17119	B14306/B13218	44	26.1	20.5	48.0	89.0	1.0	46.8	4.3	2.5	4.0
B16504	Zenith//Alpena*/B09197	1	25.7	21.6	47.0	92.0	1.0	48.5	5.3	1.0	2.0
B15430	Zenith/B12721	25	25.5	24.3	47.0	89.0	1.0	48.5	4.8	2.0	3.0
B15447	B11363/Zenith	19	24.5	23.1	47.0	92.0	1.0	47.0	4.3	2.5	4.0
B15411	B09175/B11363	21	24.2	22.0	47.0	90.0	1.0	45.0	4.5	3.0	2.0
B16501	Zenith/B10215	4	24.2	22.6	47.0	90.0	1.0	46.0	4.0	1.5	2.0
B17109	B14303/B13218	34	23.9	24.0	47.0	91.0	1.0	48.3	5.8	1.0	3.0
B17103	B11371/B13204	28	23.7	21.9	47.0	89.0	1.0	47.3	4.8	1.0	4.0
B17118	B14306/B13218	43	23.7	20.0	46.0	90.0	1.0	46.5	4.8	1.0	4.0
B17115	B14306/B14311	40	23.6	20.4	48.0	89.0	1.0	46.8	4.3	1.5	5.0
B15434	Zenith/B12721	18	23.6	22.6	48.0	92.0	1.0	48.0	5.3	1.0	1.0
B15443	B11363/B09175	15	23.5	25.5	46.0	91.0	1.0	47.5	4.3	1.5	3.0
B17108	B14303/B13204	33	23.3	20.6	47.0	91.0	1.0	48.0	5.3	1.0	3.0
B15417	B10208/B09175	5	23.0	23.3	47.0	92.0	1.0	48.8	5.0	1.0	2.0
B15453	B11371/B11363	16	22.8	22.6	49.0	91.0	1.0	46.8	4.3	1.0	2.0
B17104	B11371/B14305	29	22.8	22.4	48.0	91.0	1.0	47.0	4.5	2.0	3.0
B15451	B11371/B11363	11	22.7	22.6	48.0	92.0	1.0	48.0	5.0	1.5	1.0
B17107	B14303/B13204	32	22.4	20.9	47.0	92.0	1.0	47.3	5.3	1.0	3.0
B15427	Zenith/B11343	12	22.3	24.3	47.0	89.0	1.0	46.3	4.8	3.0	2.0
B16503	Zenith/B12720	17	22.3	24.9	49.0	90.0	1.0	47.5	4.3	2.0	4.0
B16505	B11363//Alpena*/B09197	10	22.2	21.3	47.0	90.0	1.0	44.5	4.0	1.5	3.0
I17501	BL12576, **BLACK BEAR**	45	22.2	21.4	47.0	93.0	1.0	49.8	5.0	1.0	1.0
B17112	B14304/B10244	37	22.0	20.4	48.0	89.0	1.0	47.5	4.3	3.0	3.0
B15464	B12709/B12721	13	21.9	24.2	47.0	90.0	1.0	47.5	5.0	1.0	3.0
B17106	B14302/B13218	31	21.9	19.5	46.0	88.0	1.0	47.3	5.0	1.0	3.0
B17117	B14306/B14305	42	21.8	20.4	49.0	89.0	1.0	45.8	4.3	2.5	4.0
B16511	B13204//Alpena*/B09197	7	21.7	22.5	46.0	91.0	1.0	47.0	4.3	3.0	3.0
B17101	Zorro/B14302	26	21.5	19.1	48.0	89.0	1.0	45.0	3.3	2.5	3.0
B17116	B14306/B14311	41	21.5	20.4	49.0	89.0	1.0	47.8	4.8	1.5	4.0
B17114	B14304/B14302	39	21.2	23.2	48.0	93.0	1.0	47.8	5.3	2.5	1.0
B17111	B14303/B14301	36	21.1	19.2	47.0	88.0	1.0	45.3	4.5	1.0	2.0
B15414	B09175/B11611	8	20.9	27.1	46.0	94.0	1.0	48.5	5.3	1.0	2.0
B16507	B12720/Zenith	3	20.9	25.5	48.0	92.0	1.0	48.3	5.0	1.5	3.0
B17113	B14304/B14302	38	20.8	23.3	49.0	93.0	1.0	48.8	5.5	1.5	1.0
B16506	B11363//Alpena*/B09197	2	20.5	23.0	47.0	91.0	1.0	46.0	4.0	2.5	2.0

EXPERIMENT 7102 STANDARD BLACK YIELD TRIAL								PLANTED: 6/1/17			
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**	**CBB (1-5)**	**BRONZE SCORE**
B17105	B14302/B13218	30	20.3	21.5	47.0	91.0	1.0	46.8	4.8	1.5	3.0
I17517	ACUG 15-B4	46	20.0	21.9	47.0	90.0	1.0	47.8	4.0	2.0	1.0
B17110	B14303/B14301	35	20.0	21.7	47.0	90.0	1.0	45.8	4.3	1.5	2.0
B16502	Zenith/B12710	22	20.0	23.6	46.0	92.0	1.0	47.8	4.3	2.5	3.0
B15442	B11363/B09175	6	19.9	25.9	48.0	93.0	1.0	47.8	4.5	1.5	2.0
I17529	PR1483-105	48	19.2	22.1	47.0	89.0	1.0	47.3	4.0	1.0	3.0
I03390	ND9902621-2, **ECLIPSE**	23	19.1	21.7	47.0	89.0	1.0	47.3	4.0	3.0	2.0
B16510	B12720/B11363	20	18.7	21.3	47.0	90.0	1.0	46.8	4.3	3.5	1.0
B16508	B12720/Zenith	14	18.5	27.6	47.0	92.0	1.0	47.3	4.3	1.0	2.0
B10244	B04644/ZORRO, **ZENITH**	9	18.4	24.3	48.0	93.0	1.0	48.3	4.8	2.5	4.0
B04554	B00103*/X00822, **ZORRO**	24	16.5	22.7	48.0	92.0	1.0	46.3	4.0	2.0	2.0
B17102	Zorro/B14302	27	15.9	18.0	48.0	89.0	1.0	43.8	4.0	1.5	3.0
I17528	PR1147-3	47	13.1	23.6	47.0	91.0	1.0	46.8	3.8	1.0	2.0
MEAN(48)			21.6	22.4	47.1	90.5	1.0	47.1	4.5	1.7	2.3
LSD(.05)			2.6	0.7	1.3	1.1	-	1.4	0.7	1.0	1.0
CV%			10.1	2.8	1.6	1.0	-	2.4	12.5	35.6	25.7

EXPERIMENT 7103 PRELIMINARY BLACK YIELD TRIAL (POP.05)									PLANTED: 6/1/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
B17220	Zenith/B12724	20	31.7	23.2	45.0	93.0	1.0	49.0	5.5	2.5	2.0
B17202	Zenith/B12724	2	31.5	20.7	47.0	92.0	1.0	49.5	5.0	2.5	1.0
B17218	Zenith/B12724	18	31.4	22.4	45.0	93.0	1.0	49.0	4.5	3.5	2.0
B17328	Zenith/B12724	128	31.3	23.0	48.0	92.0	1.0	46.5	5.0	1.5	1.0
B17269	Zenith/B12724	69	31.2	23.8	46.0	93.0	1.0	47.5	4.5	2.5	2.0
B17315	Zenith/B12724	115	31.1	21.3	47.0	92.0	1.0	48.0	4.0	2.5	1.0
B17293	Zenith/B12724	93	30.1	22.4	-	92.0	1.0	48.0	5.0	2.5	3.0
B17255	Zenith/B12724	55	30.1	22.3	47.0	92.0	1.0	47.0	4.0	1.0	1.0
B17224	Zenith/B12724	24	30.1	21.9	47.0	93.0	1.0	48.5	4.5	2.0	2.0
B17271	Zenith/B12724	71	30.0	23.8	47.0	92.0	1.0	46.5	4.5	1.5	2.0
B15430	Zenith/B12721	155	29.9	24.8	44.0	90.0	1.0	47.0	5.0	2.0	3.0
B17290	Zenith/B12724	90	29.7	22.7	46.0	92.0	1.0	48.0	4.5	1.5	2.0
B17323	Zenith/B12724	123	29.5	23.2	46.0	94.0	1.0	48.5	5.0	2.5	1.0
B17228	Zenith/B12724	28	29.3	22.6	45.0	93.0	1.0	47.5	5.0	1.0	3.0
B17260	Zenith/B12724	60	29.2	21.8	47.0	92.0	1.0	49.0	6.0	2.5	2.0
B17305	Zenith/B12724	105	29.1	24.2	47.0	92.0	1.0	48.0	5.0	2.5	3.0
B17306	Zenith/B12724	106	29.0	22.3	47.0	93.0	1.0	48.0	5.5	1.0	2.0
B17340	Zenith/B12724	140	28.9	23.7	-	93.0	1.0	48.5	5.0	2.0	2.0
B17259	Zenith/B12724	59	28.9	22.1	48.0	92.0	1.0	48.0	5.0	1.5	2.0
B17346	Zenith/B12724	146	28.9	20.8	47.0	90.0	1.0	46.5	4.5	2.5	3.0
B17286	Zenith/B12724	86	28.8	22.1	46.0	92.0	1.0	47.0	5.0	2.5	2.0
B17262	Zenith/B12724	62	28.7	23.0	48.0	94.0	1.0	50.0	6.0	3.5	2.0
B17214	Zenith/B12724	14	28.7	24.0	45.0	92.0	1.0	48.0	5.0	2.0	2.0
B17342	Zenith/B12724	142	28.6	24.2	45.0	95.0	1.0	51.0	5.5	1.5	1.0
B17330	Zenith/B12724	130	28.5	22.8	47.0	93.0	1.0	48.5	5.0	1.5	2.0
B17280	Zenith/B12724	80	28.5	21.3	46.0	91.0	1.0	46.5	4.0	1.5	2.0
B17268	Zenith/B12724	68	28.5	21.5	46.0	92.0	1.0	47.0	4.5	4.0	3.0
B17298	Zenith/B12724	98	28.5	23.2	-	91.0	1.0	45.5	4.5	3.0	3.0
B17265	Zenith/B12724	65	28.4	22.7	45.0	93.0	1.0	48.0	5.0	2.0	2.0
B17317	Zenith/B12724	117	28.4	23.3	46.0	92.0	1.0	47.0	5.0	2.5	4.0
B17325	Zenith/B12724	125	28.3	21.1	46.0	94.0	1.0	47.5	5.0	2.0	2.0
B17207	Zenith/B12724	7	28.2	21.0	46.0	93.0	1.0	46.5	5.0	3.0	1.0
B17287	Zenith/B12724	87	28.1	21.6	46.0	93.0	1.0	46.5	4.0	4.0	3.0
B17274	Zenith/B12724	74	28.1	20.7	46.0	90.0	1.0	45.0	4.5	1.5	3.0
B17225	Zenith/B12724	25	28.1	20.0	46.0	92.0	1.0	46.5	4.5	2.0	2.0
B17237	Zenith/B12724	37	28.0	21.6	45.0	94.0	1.0	49.0	5.0	2.0	1.0
B17223	Zenith/B12724	23	28.0	22.9	45.0	94.0	1.0	47.0	4.0	2.5	2.0
B17206	Zenith/B12724	6	28.0	22.1	47.0	94.0	1.0	49.5	4.5	3.0	3.0
B17324	Zenith/B12724	124	28.0	22.6	47.0	92.0	1.0	48.0	4.0	3.5	2.0
B17241	Zenith/B12724	41	28.0	23.3	46.0	92.0	1.0	47.0	4.5	2.5	3.0

EXPERIMENT 7103 PRELIMINARY BLACK YIELD TRIAL (POP.05)									PLANTED: 6/1/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
B17213	Zenith/B12724	13	28.0	21.5	-	92.0	1.0	49.0	5.5	3.0	1.0
B17263	Zenith/B12724	63	27.8	23.0	46.0	92.0	1.0	48.5	5.5	4.0	2.0
B14302	B09197/B11334	150	27.8	19.8	46.0	92.0	1.0	48.0	5.0	1.5	2.0
B17270	Zenith/B12724	70	27.7	22.3	-	95.0	1.0	48.0	5.0	2.0	1.0
B16507	B12720/Zenith	154	27.7	26.2	44.0	92.0	1.0	47.5	4.5	2.0	1.0
B17266	Zenith/B12724	66	27.6	21.1	47.0	92.0	1.0	46.0	5.0	1.0	2.0
B17329	Zenith/B12724	129	27.6	24.0	48.0	93.0	1.0	49.0	4.5	3.0	3.0
B17299	Zenith/B12724	99	27.6	22.7	46.0	94.0	1.0	48.5	4.0	2.5	2.0
B17221	Zenith/B12724	21	27.6	23.0	45.0	92.0	1.0	47.5	5.5	3.5	2.0
B17339	Zenith/B12724	139	27.5	21.7	46.0	92.0	1.0	47.0	4.5	1.5	2.0
B17208	Zenith/B12724	8	27.5	22.3	46.0	92.0	1.0	48.0	5.5	1.0	2.0
B17295	Zenith/B12724	95	27.4	20.2	46.0	93.0	1.0	48.0	5.0	2.0	3.0
B17227	Zenith/B12724	27	27.4	23.0	47.0	94.0	1.0	48.0	4.5	3.0	2.0
B17211	Zenith/B12724	11	27.4	23.0	46.0	92.0	1.0	48.0	5.0	2.5	3.0
B17261	Zenith/B12724	61	27.3	23.2	46.0	92.0	1.0	47.0	5.0	3.5	3.0
B17233	Zenith/B12724	33	27.3	23.4	47.0	92.0	1.0	47.5	5.0	4.0	1.0
B17294	Zenith/B12724	94	27.3	22.8	47.0	91.0	1.0	47.0	4.0	3.0	3.0
B17201	Zenith/B12724	1	27.2	20.7	46.0	91.0	1.0	45.0	4.0	3.0	4.0
B17308	Zenith/B12724	108	27.2	21.2	46.0	91.0	1.0	45.0	4.0	2.5	3.0
B17209	Zenith/B12724	9	27.1	23.6	44.0	94.0	1.0	48.0	4.5	3.0	2.0
B17212	Zenith/B12724	12	27.1	22.2	46.0	91.0	1.0	47.5	4.5	1.0	1.0
B17292	Zenith/B12724	92	27.1	21.9	-	93.0	1.0	49.0	5.5	1.0	1.0
B17307	Zenith/B12724	107	27.1	22.1	47.0	91.0	1.0	46.5	4.0	3.5	3.0
B17344	Zenith/B12724	144	27.0	23.0	46.0	92.0	1.0	47.0	4.5	1.0	1.0
B17235	Zenith/B12724	35	27.0	21.0	46.0	93.0	1.0	48.0	5.0	2.0	3.0
B17338	Zenith/B12724	138	26.9	19.9	48.0	95.0	1.0	48.0	4.5	3.5	1.0
B17251	Zenith/B12724	51	26.9	22.3	46.0	92.0	1.0	46.0	4.5	1.5	3.0
B17313	Zenith/B12724	113	26.8	22.2	46.0	92.0	1.0	48.5	5.0	3.0	4.0
B17291	Zenith/B12724	91	26.8	22.6	45.0	93.0	1.0	47.5	5.0	3.0	4.0
B17222	Zenith/B12724	22	26.8	23.7	46.0	93.0	1.0	47.5	4.5	2.0	2.0
B17231	Zenith/B12724	31	26.8	22.9	46.0	93.0	1.0	47.5	4.5	2.5	2.0
B17314	Zenith/B12724	114	26.7	21.1	46.0	94.0	1.0	48.0	4.5	3.5	3.0
B17281	Zenith/B12724	81	26.7	21.3	46.0	90.0	1.0	46.0	4.5	3.0	2.0
B17321	Zenith/B12724	121	26.6	23.2	45.0	91.0	1.0	47.5	5.0	1.0	3.0
B17320	Zenith/B12724	120	26.6	21.8	46.0	92.0	1.0	47.0	4.5	2.5	2.0
B17272	Zenith/B12724	72	26.6	22.9	47.0	93.0	1.0	47.0	5.0	3.5	2.0
B17311	Zenith/B12724	111	26.4	22.3	45.0	95.0	1.0	49.0	4.5	4.0	2.0
B17264	Zenith/B12724	64	26.4	22.1	46.0	90.0	1.0	47.0	4.5	3.5	3.0
B17331	Zenith/B12724	131	26.4	22.5	44.0	93.0	1.0	48.0	5.0	2.5	3.0
B17300	Zenith/B12724	100	26.4	21.7	47.0	92.0	1.0	48.5	5.5	3.0	3.0

EXPERIMENT 7103 PRELIMINARY BLACK YIELD TRIAL (POP.05)									PLANTED: 6/1/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
B17232	Zenith/B12724	32	26.4	22.0	47.0	91.0	1.0	45.5	4.5	2.0	5.0
B17254	Zenith/B12724	54	26.3	20.8	45.0	92.0	1.0	48.5	4.5	2.0	4.0
B17257	Zenith/B12724	57	26.3	22.9	46.0	91.0	1.0	48.5	5.5	2.5	3.0
B17216	Zenith/B12724	16	26.3	23.1	48.0	91.0	1.0	46.5	5.0	1.5	2.0
B17215	Zenith/B12724	15	26.3	22.2	45.0	95.0	1.0	48.0	4.5	3.5	2.0
B17245	Zenith/B12724	45	26.3	22.4	47.0	91.0	1.0	46.5	4.0	3.5	3.0
B10244	B04644/ZORRO, **ZENITH**	147	26.3	22.4	46.0	94.0	1.0	47.0	4.5	2.5	2.0
B17204	Zenith/B12724	4	26.2	22.1	46.0	91.0	1.0	47.5	4.5	1.0	1.0
B17256	Zenith/B12724	56	26.1	22.1	48.0	92.0	1.0	48.5	5.0	1.5	1.0
B17335	Zenith/B12724	135	25.9	20.7	48.0	95.0	1.0	47.5	4.5	1.5	2.0
B17242	Zenith/B12724	42	25.9	21.9	46.0	92.0	1.0	47.0	4.0	2.5	2.0
B17234	Zenith/B12724	34	25.9	22.9	45.0	92.0	1.0	46.0	4.5	1.5	2.0
B17283	Zenith/B12724	83	25.8	21.7	47.0	93.0	1.0	47.5	5.0	2.0	4.0
B17310	Zenith/B12724	110	25.7	22.1	46.0	91.0	1.0	47.0	4.0	4.5	3.0
B17279	Zenith/B12724	79	25.7	22.7	47.0	92.0	1.0	47.0	5.0	3.5	5.0
B17322	Zenith/B12724	122	25.7	20.0	47.0	92.0	1.0	47.0	4.5	2.0	2.0
B17247	Zenith/B12724	47	25.7	22.2	46.0	96.0	1.0	49.0	4.5	2.0	1.0
B17250	Zenith/B12724	50	25.6	21.7	44.0	92.0	1.0	48.0	5.0	2.0	4.0
B17284	Zenith/B12724	84	25.5	20.0	47.0	92.0	1.0	46.5	4.5	2.5	2.0
B17248	Zenith/B12724	48	25.5	22.7	47.0	93.0	1.0	48.0	4.5	1.5	2.0
B17301	Zenith/B12724	101	25.5	21.3	46.0	90.0	1.0	45.5	4.0	3.5	3.0
B16506	B11363//Alpena*/B09197	153	25.5	23.5	46.0	92.0	1.0	46.0	4.0	2.0	1.0
B17303	Zenith/B12724	103	25.5	23.0	47.0	92.0	1.0	47.5	4.5	1.5	1.0
B17341	Zenith/B12724	141	25.5	22.5	46.0	91.0	1.0	46.0	4.5	1.0	4.0
B17343	Zenith/B12724	143	25.4	19.6	46.0	94.0	1.0	46.5	4.5	1.5	3.0
B17333	Zenith/B12724	133	25.4	21.8	45.0	91.0	1.0	46.0	4.5	2.5	4.0
B17326	Zenith/B12724	126	25.3	22.1	46.0	91.0	1.0	47.0	5.0	1.0	3.0
B17278	Zenith/B12724	78	25.3	21.9	48.0	92.0	1.0	47.0	4.5	3.0	3.0
B17276	Zenith/B12724	76	25.3	20.9	48.0	93.0	1.0	48.0	5.0	2.0	2.0
B17277	Zenith/B12724	77	25.2	21.8	45.0	91.0	1.0	46.5	4.0	1.0	1.0
B17240	Zenith/B12724	40	25.2	20.0	46.0	90.0	1.0	45.5	4.0	1.0	3.0
B17297	Zenith/B12724	97	25.2	21.8	46.0	90.0	1.0	44.5	4.0	2.5	5.0
B17273	Zenith/B12724	73	25.1	23.6	45.0	92.0	1.0	46.0	4.0	1.5	1.0
B17252	Zenith/B12724	52	25.1	21.9	48.0	94.0	1.0	46.0	4.5	3.0	2.0
B17226	Zenith/B12724	26	25.1	21.5	46.0	91.0	1.0	47.0	4.5	2.0	2.0
B17229	Zenith/B12724	29	25.0	21.1	46.0	93.0	1.0	48.0	4.5	1.5	3.0
B17239	Zenith/B12724	39	25.0	21.7	44.0	91.0	1.0	46.0	4.0	3.5	1.0
B17253	Zenith/B12724	53	24.9	23.4	46.0	94.0	1.0	48.5	5.0	2.5	2.0
B17285	Zenith/B12724	85	24.9	21.6	46.0	91.0	1.0	46.0	4.0	1.0	2.0
B17282	Zenith/B12724	82	24.9	22.4	48.0	91.0	1.0	46.5	4.5	2.5	5.0

EXPERIMENT 7103 PRELIMINARY BLACK YIELD TRIAL (POP.05)									PLANTED: 6/1/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
B17302	Zenith/B12724	102	24.8	22.6	46.0	94.0	1.0	49.5	5.0	3.5	2.0
B17244	Zenith/B12724	44	24.8	23.2	46.0	92.0	1.0	47.0	4.5	2.5	2.0
B17334	Zenith/B12724	134	24.7	21.5	48.0	95.0	1.0	48.0	4.5	3.0	2.0
B17258	Zenith/B12724	58	24.7	23.0	47.0	92.0	1.0	49.0	4.5	3.0	3.0
B17288	Zenith/B12724	88	24.7	21.7	47.0	94.0	1.0	46.5	4.5	2.0	3.0
B17345	Zenith/B12724	145	24.6	21.2	46.0	94.0	1.0	48.5	5.0	2.0	1.0
B17316	Zenith/B12724	116	24.6	22.2	47.0	92.0	1.0	46.0	4.0	1.5	1.0
B17246	Zenith/B12724	46	24.4	23.0	47.0	96.0	1.0	50.0	4.0	2.0	2.0
B17203	Zenith/B12724	3	24.4	21.3	47.0	91.0	1.0	46.5	4.0	2.0	4.0
B17238	Zenith/B12724	38	24.3	22.4	46.0	93.0	1.0	44.5	4.0	3.5	2.0
B17336	Zenith/B12724	136	24.3	21.7	47.0	91.0	1.0	44.5	4.0	3.0	4.0
B17217	Zenith/B12724	17	24.3	22.1	48.0	95.0	1.0	48.5	4.0	3.5	2.0
B17219	Zenith/B12724	19	24.2	24.3	46.0	95.0	1.0	48.5	4.0	3.0	1.0
B14303	B09197/B11334	151	24.2	20.4	45.0	93.0	1.0	47.5	5.0	2.0	2.0
B12724	B09184/B09135	148	24.1	22.3	45.0	93.0	1.0	46.5	4.5	1.5	2.0
B17249	Zenith/B12724	49	24.1	21.9	46.0	92.0	1.0	46.0	4.0	1.0	4.0
B14311	B11338/B10241	149	24.1	21.2	46.0	92.0	1.0	45.5	4.5	2.0	2.0
B17309	Zenith/B12724	109	23.9	21.3	46.0	92.0	1.0	46.5	4.0	3.5	2.0
B17296	Zenith/B12724	96	23.8	21.4	47.0	92.0	1.0	46.5	4.5	2.0	3.0
B17304	Zenith/B12724	104	23.6	21.9	48.0	92.0	1.0	46.5	4.5	2.5	3.0
B04554	B00103*/X00822, **ZORRO**	89	23.4	22.6	47.0	92.0	1.0	47.5	4.5	3.0	2.0
B17210	Zenith/B12724	10	23.4	21.7	45.0	90.0	1.0	45.5	4.0	1.5	2.0
B17318	Zenith/B12724	118	23.2	22.2	46.0	91.0	1.0	44.5	4.0	2.0	1.0
B17275	Zenith/B12724	75	23.0	23.4	47.0	91.0	1.0	47.5	4.5	2.5	2.0
I03390	ND9902621-2, **ECLIPSE**	152	22.9	23.2	47.0	90.0	1.0	45.0	4.0	2.0	2.0
B17327	Zenith/B12724	127	22.8	21.2	46.0	92.0	1.0	45.5	4.5	2.5	2.0
B17267	Zenith/B12724	67	22.4	23.4	46.0	93.0	1.0	46.0	4.5	1.5	2.0
B17205	Zenith/B12724	5	22.1	20.9	46.0	92.0	1.0	45.0	4.0	4.0	3.0
B17236	Zenith/B12724	36	21.9	21.5	47.0	91.0	1.0	47.0	4.0	3.5	3.0
B17332	Zenith/B12724	132	21.9	20.3	46.0	90.0	1.0	45.5	4.0	1.0	3.0
B17312	Zenith/B12724	112	21.9	21.6	46.0	91.0	1.0	45.0	4.5	1.5	3.0
B17230	Zenith/B12724	30	21.5	22.3	45.0	90.0	1.0	45.0	4.5	2.0	3.0
B17319	Zenith/B12724	119	20.8	22.4	46.0	90.0	1.0	46.0	4.0	3.0	5.0
B17243	Zenith/B12724	43	19.1	22.2	47.0	93.0	1.0	47.1	4.0	2.0	2.0
I16708	**XRAV-40-4**	156	19.1	20.9	46.0	90.0	1.0	44.5	4.0	3.5	2.0
B17337	Zenith/B12724	137	16.6	20.9	46.0	90.0	1.0	43.0	4.0	3.0	3.0
MEAN(156)			26.3	22.2	46.1	92.0	1.0	47.2	4.6	2.3	2.2
LSD(.05)			3.0	1.1	1.1	1.8	-	2.1	1.0	1.4	1.0
CV%			8.3	3.7	1.4	1.2	-	2.7	13.1	35.3	29.0

EXPERIMENT 7104 PRELIMINARY BLACK YIELD TRIAL (POP.76)									PLANTED: 6/2/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
B17416	B14311/Zenith	16	33.7	24.1	46.0	94.0	1.0	48.0	4.5	2.5	2.0
B17511	B14311/Zenith	111	32.8	24.4	47.0	91.0	1.0	47.0	5.0	3.0	3.0
B17453	B14311/Zenith	53	32.5	20.9	46.0	93.0	1.0	46.5	4.5	1.0	2.0
B17431	B14311/Zenith	31	32.5	20.3	45.0	92.0	1.0	45.5	4.5	2.0	2.0
B17478	B14311/Zenith	78	32.4	24.0	48.0	93.0	1.0	49.0	5.0	2.0	2.0
B17426	B14311/Zenith	26	32.3	21.3	47.0	94.0	1.0	47.5	5.5	2.0	3.0
B17536	B14311/Zenith	136	32.0	21.7	48.0	94.0	1.0	46.5	5.0	2.0	2.0
B17487	B14311/Zenith	87	31.9	23.9	48.0	93.0	1.0	45.0	4.0	2.0	2.0
B17410	B14311/Zenith	10	31.8	23.9	46.0	93.0	1.0	47.5	5.5	1.5	3.0
B17421	B14311/Zenith	21	31.5	20.7	47.0	92.0	1.0	47.5	6.0	1.5	1.0
B17467	B14311/Zenith	67	31.5	21.1	46.0	93.0	1.0	46.0	4.5	2.0	4.0
B17429	B14311/Zenith	29	31.4	25.6	48.0	94.0	1.0	47.5	5.0	2.5	2.0
B17472	B14311/Zenith	72	31.4	22.5	47.0	95.0	1.0	46.0	4.5	1.5	1.0
B17438	B14311/Zenith	38	31.1	20.8	47.0	93.0	1.0	47.5	5.0	2.0	3.0
B17460	B14311/Zenith	60	31.1	23.2	49.0	94.0	1.0	46.5	4.0	2.5	2.0
B17509	B14311/Zenith	109	30.7	23.0	48.0	94.0	1.0	47.0	5.0	2.5	2.0
B17528	B14311/Zenith	128	30.6	22.2	47.0	94.0	1.0	45.5	4.0	1.5	3.0
B17510	B14311/Zenith	110	30.5	22.0	48.0	93.0	1.0	45.5	4.0	3.0	2.0
B17494	B14311/Zenith	94	30.4	21.6	46.0	93.0	1.0	47.5	5.5	3.0	4.0
B17449	B14311/Zenith	49	30.2	20.6	47.0	93.0	1.0	47.0	4.5	1.5	1.0
B17481	B14311/Zenith	81	30.2	22.3	49.0	95.0	1.0	47.0	4.5	2.0	2.0
B17522	B14311/Zenith	122	30.2	20.1	47.0	92.0	1.0	47.5	4.5	2.0	2.0
B17417	B14311/Zenith	17	30.2	21.8	46.0	94.0	1.0	43.0	4.5	2.5	3.0
B17455	B14311/Zenith	55	30.2	21.5	47.0	94.0	1.0	46.5	4.5	2.5	3.0
B17402	B14311/Zenith	2	30.1	21.0	48.0	94.0	1.0	46.0	5.0	2.0	2.0
B17540	B14311/Zenith	140	29.9	22.2	47.0	93.0	1.0	46.0	4.5	3.0	2.0
B17501	B14311/Zenith	101	29.8	21.9	46.0	94.0	1.0	44.5	4.5	3.0	1.0
B17512	B14311/Zenith	112	29.7	20.9	47.0	94.0	1.0	47.0	5.0	1.5	2.0
B17541	B14311/Zenith	141	29.7	20.0	48.0	92.0	1.0	44.5	4.0	2.0	3.0
B14311	B11338/B10241	148	29.7	20.7	46.0	93.0	1.0	46.5	4.5	1.0	2.0
B17413	B14311/Zenith	13	29.6	22.5	47.0	94.0	1.0	48.5	5.5	2.0	2.0
B17401	B14311/Zenith	1	29.6	22.9	47.0	93.0	1.0	47.0	4.5	3.5	3.0
B12724	B09184/B09135	150	29.6	22.2	47.0	92.0	1.0	46.0	4.5	1.5	1.0
B17520	B14311/Zenith	120	29.6	22.4	46.0	93.0	1.0	47.0	5.0	1.5	2.0
B17477	B14311/Zenith	77	29.6	21.2	46.0	94.0	1.0	46.5	4.5	1.5	2.0
B17515	B14311/Zenith	115	29.5	23.3	45.0	94.0	1.0	47.0	4.5	1.5	3.0
B17486	B14311/Zenith	86	29.5	20.2	46.0	92.0	1.0	47.0	4.5	3.0	2.0
B17424	B14311/Zenith	24	29.5	24.7	47.0	93.0	1.0	47.0	4.5	1.5	1.0
B17459	B14311/Zenith	59	29.4	23.6	47.0	94.0	1.0	47.5	5.0	1.0	2.0
B17479	B14311/Zenith	79	29.4	23.9	46.0	96.0	1.0	47.0	4.5	2.5	1.0

EXPERIMENT 7104 PRELIMINARY BLACK YIELD TRIAL (POP.76)									PLANTED: 6/2/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
B17415	B14311/Zenith	15	29.2	21.9	48.0	93.0	1.0	46.5	4.5	2.0	3.0
B17491	B14311/Zenith	91	29.2	23.7	48.0	95.0	1.0	46.0	4.0	2.0	2.0
B17523	B14311/Zenith	123	29.2	21.8	46.0	94.0	1.0	46.0	4.5	2.5	2.0
B17450	B14311/Zenith	50	29.2	23.5	47.0	94.0	1.0	47.5	5.0	1.5	3.0
B17418	B14311/Zenith	18	29.2	20.2	45.0	92.0	1.0	43.5	4.0	2.5	2.0
B17440	B14311/Zenith	40	29.2	24.3	45.0	94.0	1.0	47.0	5.0	2.0	2.0
B17422	B14311/Zenith	22	29.2	22.1	47.0	94.0	1.0	47.0	5.0	3.5	2.0
B17419	B14311/Zenith	19	29.2	24.2	48.0	97.0	1.0	49.0	5.5	2.0	1.0
B17546	B14311/Zenith	146	29.1	20.6	48.0	92.0	1.0	45.5	4.0	1.5	1.0
B17448	B14311/Zenith	48	29.1	20.8	47.0	93.0	1.0	45.5	4.5	1.5	2.0
B17531	B14311/Zenith	131	29.1	21.1	46.0	92.0	1.0	45.0	4.0	2.0	3.0
B17456	B14311/Zenith	56	29.0	20.1	45.0	93.0	1.0	46.5	4.5	2.0	3.0
B17458	B14311/Zenith	58	29.0	23.8	46.0	92.0	1.0	45.0	4.0	2.0	3.0
B17471	B14311/Zenith	71	28.9	22.4	47.0	93.0	1.0	45.0	4.5	2.0	2.0
B17500	B14311/Zenith	100	28.9	23.1	46.0	94.0	1.0	47.0	4.0	2.5	2.0
B17451	B14311/Zenith	51	28.9	21.3	46.0	94.0	1.0	47.5	5.5	1.0	2.0
B17452	B14311/Zenith	52	28.8	22.5	46.0	92.0	1.0	46.5	5.0	1.5	3.0
B17508	B14311/Zenith	108	28.6	23.0	47.0	92.0	1.0	46.5	4.5	2.0	3.0
B17405	B14311/Zenith	5	28.5	24.1	49.0	94.0	1.0	46.0	4.0	2.0	1.0
B17428	B14311/Zenith	28	28.4	20.7	46.0	92.0	1.0	46.0	4.5	3.0	3.0
B17524	B14311/Zenith	124	28.3	20.4	47.0	93.0	1.0	46.0	4.0	2.5	1.0
B17488	B14311/Zenith	88	28.3	21.6	48.0	92.0	1.0	44.5	4.0	2.0	3.0
B17409	B14311/Zenith	9	28.2	20.8	46.0	93.0	1.0	47.5	4.5	3.0	4.0
B17502	B14311/Zenith	102	28.2	24.5	48.0	95.0	1.0	47.5	4.5	3.0	2.0
B17995	Zenith/B09197	153	28.2	22.6	45.0	93.0	1.0	44.5	4.5	1.5	3.0
B17493	B14311/Zenith	93	28.2	22.9	48.0	94.0	1.0	46.0	5.0	2.0	3.0
B17537	B14311/Zenith	137	28.2	24.0	49.0	95.0	1.0	48.0	5.0	1.5	2.0
B17465	B14311/Zenith	65	28.1	21.7	47.0	94.0	1.0	47.0	4.5	1.5	3.0
B17461	B14311/Zenith	61	27.9	22.7	48.0	94.0	1.0	46.5	5.0	3.0	2.0
B17506	B14311/Zenith	106	27.9	19.9	46.0	92.0	1.0	44.5	4.0	3.0	3.0
B17474	B14311/Zenith	74	27.9	23.5	49.0	94.0	1.0	45.5	4.0	2.5	1.0
B17466	B14311/Zenith	66	27.8	24.8	47.0	94.0	1.0	47.5	5.0	2.0	2.0
B17513	B14311/Zenith	113	27.8	23.6	48.0	95.0	1.0	47.5	5.0	2.0	3.0
B17530	B14311/Zenith	130	27.6	20.6	46.0	93.0	1.0	47.0	4.5	2.5	3.0
B17535	B14311/Zenith	135	27.5	24.4	46.0	93.0	1.0	46.5	4.5	1.5	5.0
B17443	B14311/Zenith	43	27.4	21.8	46.0	93.0	1.0	46.5	4.5	3.0	4.0
B17414	B14311/Zenith	14	27.4	21.7	48.0	92.0	1.0	46.0	4.0	3.0	2.0
B17442	B14311/Zenith	42	27.4	19.1	47.0	92.0	1.0	45.0	4.5	3.0	2.0
B17447	B14311/Zenith	47	27.2	21.7	46.0	91.0	1.0	44.5	4.0	2.5	2.0
B17525	B14311/Zenith	125	27.2	19.9	47.0	92.0	1.0	43.0	4.0	1.5	2.0

EXPERIMENT 7104 PRELIMINARY BLACK YIELD TRIAL (POP.76)										PLANTED: 6/2/17	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
B17480	B14311/Zenith	80	27.2	22.3	46.0	92.0	1.0	45.5	4.0	2.0	3.0
B17441	B14311/Zenith	41	27.1	23.2	46.0	94.0	1.0	45.0	4.5	2.0	4.0
B17517	B14311/Zenith	117	27.0	21.0	46.0	92.0	1.0	46.0	4.5	1.5	2.0
B17529	B14311/Zenith	129	27.0	22.0	45.0	91.0	1.0	45.5	4.0	2.0	4.0
B17504	B14311/Zenith	104	27.0	20.4	46.0	92.0	1.0	44.5	4.5	2.0	3.0
B17463	B14311/Zenith	63	27.0	22.1	47.0	93.0	1.0	47.5	5.0	3.0	2.0
B17412	B14311/Zenith	12	26.9	22.7	47.0	94.0	1.0	45.0	4.0	2.5	4.0
B17454	B14311/Zenith	54	26.9	19.8	47.0	93.0	1.0	46.0	4.5	4.0	2.0
B14302	B09197/B11334	46	26.9	20.2	49.0	94.0	1.0	46.5	4.5	3.5	2.0
B17538	B14311/Zenith	138	26.9	21.4	46.0	92.0	1.0	46.5	4.5	2.5	1.0
B17496	B14311/Zenith	96	26.8	19.9	47.0	92.0	1.0	44.5	4.0	1.5	2.0
B17469	B14311/Zenith	69	26.7	22.5	46.0	94.0	1.0	46.5	4.0	2.0	2.0
B17473	B14311/Zenith	73	26.6	22.4	47.0	95.0	1.0	47.5	4.5	1.5	2.0
B10244	B04644/ZORRO, **ZENITH**	147	26.6	25.1	47.0	95.0	1.0	46.5	4.5	3.0	2.0
B17489	B14311/Zenith	89	26.5	22.9	46.0	93.0	1.0	45.0	4.0	1.0	2.0
B17499	B14311/Zenith	99	26.5	21.3	46.0	91.0	1.0	44.5	4.0	1.0	2.0
B17433	B14311/Zenith	33	26.4	19.9	46.0	93.0	1.0	44.5	4.0	1.5	2.0
B17420	B14311/Zenith	20	26.4	21.7	45.0	92.0	1.0	46.0	4.5	1.0	3.0
B17519	B14311/Zenith	119	26.4	24.1	48.0	95.0	1.0	49.0	5.0	1.5	3.0
B17527	B14311/Zenith	127	26.4	23.1	47.0	94.0	1.0	46.0	4.0	2.5	2.0
B17505	B14311/Zenith	105	26.4	20.7	47.0	95.0	1.0	46.5	4.5	1.0	1.0
B17437	B14311/Zenith	37	26.4	22.2	45.0	93.0	1.0	45.0	4.0	1.5	3.0
B17406	B14311/Zenith	6	26.3	20.8	46.0	93.0	1.0	45.0	4.5	1.5	2.0
B17434	B14311/Zenith	34	26.2	22.2	48.0	93.0	1.0	46.0	4.5	2.5	2.0
B17425	B14311/Zenith	25	26.2	23.2	47.0	95.0	1.0	48.0	4.5	2.0	2.0
B17507	B14311/Zenith	107	26.2	22.9	46.0	94.0	1.0	47.5	5.0	3.5	3.0
B17468	B14311/Zenith	68	26.2	24.8	48.0	95.0	1.0	48.5	5.5	1.5	2.0
B17457	B14311/Zenith	57	26.1	22.2	46.0	93.0	1.0	44.5	4.0	3.0	2.0
B17470	B14311/Zenith	70	26.1	21.1	47.0	94.0	1.0	47.5	5.0	1.5	2.0
B17484	B14311/Zenith	84	26.1	23.5	47.0	94.0	1.0	45.5	4.0	1.0	2.0
B17435	B14311/Zenith	35	26.1	20.8	46.0	94.0	1.0	45.5	4.5	2.0	3.0
B17503	B14311/Zenith	103	26.1	21.5	46.0	92.0	1.0	45.5	4.5	2.5	1.0
B17521	B14311/Zenith	121	26.0	22.7	46.0	94.0	1.0	46.0	4.0	3.0	4.0
B17436	B14311/Zenith	36	26.0	21.0	47.0	93.0	1.0	47.0	4.5	1.0	2.0
B17411	B14311/Zenith	11	25.9	18.3	47.0	93.0	1.0	46.5	5.0	3.0	4.0
B17427	B14311/Zenith	27	25.9	19.7	46.0	93.0	1.0	46.5	4.0	4.5	5.0
B17544	B14311/Zenith	144	25.7	23.4	47.0	92.0	1.0	44.0	3.5	2.5	2.0
B17407	B14311/Zenith	7	25.6	22.6	45.0	92.0	1.0	46.0	4.5	1.5	1.0
B17534	B14311/Zenith	134	25.6	22.6	46.0	93.0	1.0	45.5	4.0	2.5	2.0
B17476	B14311/Zenith	76	25.4	21.5	48.0	93.0	1.0	44.5	4.0	2.0	2.0

EXPERIMENT 7104 PRELIMINARY BLACK YIELD TRIAL (POP.76)									PLANTED: 6/2/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE SCORE
B17404	B14311/Zenith	4	25.3	22.7	47.0	94.0	1.0	46.5	4.0	1.0	2.0
B17518	B14311/Zenith	118	25.3	19.0	47.0	92.0	1.0	44.5	3.5	4.0	1.0
B17485	B14311/Zenith	85	25.2	22.9	47.0	94.0	1.0	45.5	4.5	1.5	2.0
B04554	B00103*/X00822, **ZORRO**	149	25.2	23.3	46.0	95.0	1.0	45.0	4.0	2.5	2.0
B17492	B14311/Zenith	92	25.2	19.0	48.0	91.0	1.0	44.0	3.5	2.0	3.0
B17403	B14311/Zenith	3	25.1	22.3	47.0	93.0	1.0	47.0	4.5	3.0	3.0
B17462	B14311/Zenith	62	25.1	24.1	47.0	93.0	1.0	46.5	4.5	2.0	1.0
B17516	B14311/Zenith	116	25.1	19.4	46.0	92.0	1.0	44.0	3.5	1.0	2.0
B17408	B14311/Zenith	8	25.0	24.0	47.0	93.0	1.0	44.5	3.0	3.5	1.0
B17445	B14311/Zenith	45	24.9	20.6	45.0	91.0	1.0	43.5	4.0	2.0	4.0
B17526	B14311/Zenith	126	24.9	24.2	46.0	92.0	1.0	44.5	4.0	3.0	3.0
B17998	Zenith/B09197	156	24.9	21.6	47.0	93.0	1.0	45.0	4.0	1.0	2.0
B17495	B14311/Zenith	95	24.9	22.5	46.0	93.0	1.0	47.5	5.0	1.5	2.0
B17432	B14311/Zenith	32	24.8	20.9	47.0	92.0	1.0	47.0	4.5	1.5	2.0
B17539	B14311/Zenith	139	24.7	19.8	47.0	92.0	1.0	44.0	3.5	2.0	2.0
B17514	B14311/Zenith	114	24.6	21.5	46.0	91.0	1.0	43.0	4.0	1.5	4.0
B17439	B14311/Zenith	39	24.6	21.4	46.0	93.0	1.0	44.0	4.0	1.0	4.0
I03390	ND9902621-2, **ECLIPSE**	151	24.5	23.4	47.0	93.0	1.0	44.5	4.0	2.5	2.0
B17490	B14311/Zenith	90	24.5	21.0	46.0	93.0	1.0	44.0	4.0	3.0	1.0
B17543	B14311/Zenith	143	24.3	22.9	48.0	94.0	1.0	46.0	4.0	2.5	3.0
B17482	B14311/Zenith	82	24.2	20.1	46.0	93.0	1.0	46.0	4.5	3.5	4.0
B17997	Zenith/B09197	155	24.2	21.0	49.0	91.0	1.0	44.0	3.5	2.0	2.0
B17483	B14311/Zenith	83	24.0	20.0	46.0	93.0	1.0	45.5	4.0	2.5	2.0
B17542	B14311/Zenith	142	23.9	21.3	46.0	94.0	1.0	47.0	4.5	1.5	4.0
B17423	B14311/Zenith	23	23.8	18.2	45.0	91.0	1.0	43.0	3.5	3.0	4.0
B17430	B14311/Zenith	30	23.4	22.2	48.0	95.0	1.0	47.0	4.0	1.5	2.0
B17464	B14311/Zenith	64	23.3	19.2	46.0	92.0	1.0	46.5	4.5	3.5	2.0
B17498	B14311/Zenith	98	23.0	21.1	47.0	95.0	1.0	47.5	4.5	2.0	1.0
B17475	B14311/Zenith	75	21.7	19.8	48.0	92.0	1.0	45.0	3.5	2.5	3.0
B17996	Zenith/B09197	154	21.5	19.6	46.0	92.0	1.0	43.0	3.5	2.0	3.0
B17533	B14311/Zenith	133	21.3	20.4	47.0	92.0	1.0	43.0	3.5	1.5	1.0
B16506	B11363//Alpena*/B09197	152	20.9	23.0	46.0	92.0	1.0	44.0	4.0	3.0	1.0
B17497	B14311/Zenith	97	20.4	22.9	46.0	92.0	1.0	44.5	3.5	2.0	2.0
B17444	B14311/Zenith	44	20.1	20.2	47.0	92.0	1.0	43.5	3.5	3.0	1.0
B17532	B14311/Zenith	132	12.4	23.7	48.0	98.0	1.0	47.5	4.0	2.0	1.0
B17545	B14311/Zenith	145	11.8	21.8	50.0	97.0	1.0	47.0	4.0	3.5	1.0
MEAN(156)			27.3	21.9	46.5	93.0	1.0	46.0	4.4	2.2	2.1
LSD(.05)			3.2	1.3	1.4	1.7	-	1.9	1.0	1.1	1.0
CV%			7.2	3.6	1.8	1.1	-	2.4	13.5	30.3	28.1

EXPERIMENT 7105 PRELIMINARY BLACK YIELD TRIAL (POP.86)								PLANTED: 6/2/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	BRONZE SCORE
B16504	Zenith//Alpena*/B09197	43	36.0	23.8	47.0	95.0	1.0	47.5	5.0	2.0
B17691	B14311/B12724	91	35.3	23.6	46.0	95.0	1.0	48.5	5.5	1.0
B17699	B14311/B12724	99	35.0	22.4	46.0	94.0	1.0	48.0	5.0	2.0
B17700	B14311/B12724	100	35.0	23.6	46.0	94.0	1.0	49.5	5.0	1.0
B17625	B14311/B12724	25	34.6	23.5	47.0	95.0	1.0	48.0	5.0	2.0
B17615	B14311/B12724	15	34.2	23.0	46.0	93.0	1.0	47.5	5.0	1.0
B17658	B14311/B12724	58	34.0	21.7	47.0	93.0	1.0	48.0	5.0	1.0
B17607	B14311/B12724	7	33.9	22.3	45.0	94.0	1.0	48.5	5.0	2.0
B17701	B14311/B12724	101	33.5	23.3	46.0	93.0	1.0	48.0	5.0	2.0
B17696	B14311/B12724	96	33.3	22.2	46.0	96.0	1.0	48.0	5.0	1.0
B17641	B14311/B12724	41	33.2	21.2	48.0	94.0	1.0	46.5	5.0	1.0
B17730	B14311/B12724	130	33.1	22.7	47.0	93.0	1.0	48.5	5.0	2.0
B17732	B14311/B12724	132	33.1	23.6	45.0	94.0	1.0	48.0	5.0	1.0
B12724	B09184/B09135	151	32.9	23.1	47.0	93.0	1.0	47.0	5.0	1.0
B17693	B14311/B12724	93	32.9	22.0	45.0	93.0	1.0	47.5	6.0	1.0
B17671	B14311/B12724	71	32.7	21.7	46.0	94.0	1.0	46.5	4.5	2.0
B17655	B14311/B12724	55	32.7	22.8	46.0	93.0	1.0	47.0	4.0	2.0
B17697	B14311/B12724	97	32.6	21.2	47.0	93.0	1.0	46.0	4.5	1.0
B17601	B14311/B12724	1	32.6	22.2	46.0	93.0	1.0	47.5	4.5	2.0
B17706	B14311/B12724	106	32.5	21.1	47.0	94.0	1.0	48.0	5.0	2.0
B17645	B14311/B12724	45	32.4	22.0	47.0	92.0	1.0	46.5	4.5	2.0
B17640	B14311/B12724	40	32.3	23.7	45.0	94.0	1.0	48.0	5.0	1.0
B17685	B14311/B12724	85	32.3	22.3	46.0	94.0	1.0	47.0	4.5	2.0
B17612	B14311/B12724	12	32.2	24.2	46.0	92.0	1.0	46.0	4.5	2.0
B17749	B14311/B12724	149	32.1	24.2	46.0	95.0	1.0	48.0	5.0	1.0
B17674	B14311/B12724	74	32.0	24.8	46.0	93.0	1.0	46.0	4.5	1.0
B17739	B14311/B12724	139	32.0	23.1	46.0	93.0	1.0	47.5	4.5	2.0
B17692	B14311/B12724	92	31.9	21.8	46.0	93.0	1.0	47.0	4.5	2.0
B17659	B14311/B12724	59	31.9	24.4	46.0	94.0	1.0	49.0	5.0	1.0
B17652	B14311/B12724	52	31.8	23.7	48.0	96.0	1.0	48.5	5.5	1.0
B17729	B14311/B12724	129	31.8	22.7	46.0	94.0	1.0	47.5	5.0	2.0
B14302	B09197/B11334	3	31.8	21.8	46.0	93.0	1.0	46.0	5.0	1.0
B17675	B14311/B12724	75	31.8	23.4	45.0	95.0	1.0	48.0	5.0	1.0
B17681	B14311/B12724	81	31.8	21.5	47.0	94.0	1.0	46.5	4.5	1.0
B17602	B14311/B12724	2	31.8	22.3	46.0	95.0	1.0	49.0	5.5	3.0
B17743	B14311/B12724	143	31.7	23.9	45.0	96.0	1.0	48.5	5.0	1.0
B17624	B14311/B12724	24	31.7	21.2	47.0	92.0	1.0	46.0	4.5	2.0
B17703	B14311/B12724	103	31.7	23.3	45.0	94.0	1.0	46.5	4.5	2.0
B17604	B14311/B12724	4	31.7	20.5	47.0	92.0	1.0	47.5	5.0	1.0
B17714	B14311/B12724	114	31.7	21.2	45.0	94.0	1.0	47.5	5.0	2.0

EXPERIMENT 7105 PRELIMINARY BLACK YIELD TRIAL (POP.86)								PLANTED: 6/2/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	BRONZE SCORE
B17745	B14311/B12724	145	31.5	23.1	45.0	94.0	1.0	46.5	4.5	1.0
B17740	B14311/B12724	140	31.4	22.3	46.0	95.0	1.0	48.0	4.5	2.0
B10244	B04644/ZORRO, **ZENITH**	152	31.4	24.9	46.0	95.0	1.0	46.5	4.5	2.0
B17642	B14311/B12724	42	31.3	21.5	47.0	93.0	1.0	46.0	4.0	2.0
B17738	B14311/B12724	138	31.3	19.7	46.0	92.0	1.0	46.5	4.5	1.0
B17689	B14311/B12724	89	31.3	22.4	45.0	93.0	1.0	47.5	5.0	1.0
B17707	B14311/B12724	107	31.3	21.8	46.0	93.0	1.0	46.5	4.0	2.0
B17619	B14311/B12724	19	31.3	22.6	46.0	93.0	1.0	47.5	5.0	2.0
B17635	B14311/B12724	35	31.2	22.7	47.0	93.0	1.0	48.5	5.5	3.0
B15430	Zenith/B12721	128	31.2	25.8	46.0	92.0	1.0	46.0	5.0	2.0
B17727	B14311/B12724	127	31.1	21.9	46.0	92.0	1.0	46.5	4.5	1.0
B17736	B14311/B12724	136	31.0	23.8	45.0	92.0	1.0	46.0	4.5	2.0
B17667	B14311/B12724	67	31.0	21.4	46.0	92.0	1.0	45.0	4.5	2.0
B16507	B12720/Zenith	155	30.9	26.7	45.0	94.0	1.0	47.5	4.5	1.0
B17688	B14311/B12724	88	30.9	22.3	46.0	94.0	1.0	46.0	4.0	2.0
B17653	B14311/B12724	53	30.8	21.9	46.0	95.0	1.0	47.5	5.0	1.0
B17680	B14311/B12724	80	30.8	22.6	45.0	95.0	1.0	47.0	4.5	2.0
B17713	B14311/B12724	113	30.8	23.1	47.0	94.0	1.0	48.0	4.5	2.0
B17712	B14311/B12724	112	30.6	21.0	48.0	94.0	1.0	48.0	4.5	1.0
B17719	B14311/B12724	119	30.6	22.0	45.0	93.0	1.0	48.0	5.0	1.0
B17638	B14311/B12724	38	30.6	21.7	46.0	92.0	1.0	45.5	4.5	2.0
B17654	B14311/B12724	54	30.5	21.0	46.0	94.0	1.0	47.5	5.0	1.0
B17644	B14311/B12724	44	30.5	22.2	46.0	95.0	1.0	47.5	5.0	1.0
B17709	B14311/B12724	109	30.4	21.9	47.0	93.0	1.0	47.5	5.0	1.0
B17724	B14311/B12724	124	30.4	24.2	47.0	95.0	1.0	46.5	4.5	1.0
B17683	B14311/B12724	83	30.4	22.4	47.0	92.0	1.0	46.5	4.5	1.0
B17726	B14311/B12724	126	30.4	23.0	46.0	92.0	1.0	46.5	4.5	1.0
B17628	B14311/B12724	28	30.3	22.6	47.0	92.0	1.0	45.5	4.0	3.0
B17695	B14311/B12724	95	30.3	24.4	46.0	92.0	1.0	46.5	4.5	1.0
B17734	B14311/B12724	134	30.3	22.8	46.0	95.0	1.0	48.5	5.0	2.0
B17672	B14311/B12724	72	30.2	22.4	47.0	92.0	1.0	46.5	4.5	1.0
B17657	B14311/B12724	57	30.1	21.3	46.0	93.0	1.0	46.0	4.0	2.0
B17704	B14311/B12724	104	30.1	21.6	47.0	93.0	1.0	47.5	5.0	1.0
B17694	B14311/B12724	94	30.0	23.2	45.0	92.0	1.0	45.5	4.5	3.0
B17684	B14311/B12724	84	30.0	21.1	46.0	93.0	1.0	45.5	4.0	1.0
B17687	B14311/B12724	87	30.0	22.6	45.0	94.0	1.0	47.5	5.5	3.0
B17668	B14311/B12724	68	29.9	21.4	46.0	93.0	1.0	45.5	4.0	1.0
B17629	B14311/B12724	29	29.9	23.2	47.0	93.0	1.0	46.5	4.5	3.0
B17673	B14311/B12724	73	29.9	22.3	46.0	92.0	1.0	47.5	5.0	2.0
B17631	B14311/B12724	31	29.9	22.2	46.0	93.0	1.0	47.0	5.0	1.0

EXPERIMENT 7105 PRELIMINARY BLACK YIELD TRIAL (POP.86)								PLANTED: 6/2/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	BRONZE SCORE
B17618	B14311/B12724	18	29.9	26.2	47.0	93.0	1.0	46.0	4.0	1.0
B17679	B14311/B12724	79	29.9	21.6	47.0	92.0	1.0	44.0	4.0	1.0
B17720	B14311/B12724	120	29.9	20.8	46.0	93.0	1.0	46.5	5.0	3.0
B14311	B11338/B10241	150	29.9	21.8	45.0	93.0	1.0	47.0	5.5	3.0
B17670	B14311/B12724	70	29.8	22.5	47.0	95.0	1.0	48.0	5.0	2.0
B17606	B14311/B12724	6	29.8	21.2	47.0	96.0	1.0	46.0	4.5	2.0
B17646	B14311/B12724	46	29.7	25.9	47.0	93.0	1.0	47.5	5.0	2.0
B17632	B14311/B12724	32	29.7	21.6	44.0	94.0	1.0	47.5	5.0	1.0
B17741	B14311/B12724	141	29.7	23.2	45.0	94.0	1.0	47.5	4.5	1.0
B17614	B14311/B12724	14	29.7	22.8	45.0	92.0	1.0	47.5	4.5	1.0
B17735	B14311/B12724	135	29.7	23.4	46.0	93.0	1.0	46.5	4.5	2.0
B16501	Zenith/B10215	156	29.6	24.5	48.0	94.0	1.0	45.0	4.0	2.0
B17705	B14311/B12724	105	29.6	21.2	47.0	94.0	1.0	48.0	5.0	1.0
B17717	B14311/B12724	117	29.6	21.8	46.0	92.0	1.0	47.0	5.0	2.0
B17647	B14311/B12724	47	29.5	24.1	47.0	96.0	1.0	48.0	4.5	1.0
B17702	B14311/B12724	102	29.5	21.4	46.0	91.0	1.0	45.5	4.5	1.0
B17715	B14311/B12724	115	29.4	23.0	45.0	93.0	1.0	46.5	4.0	2.0
B17650	B14311/B12724	50	29.4	20.8	47.0	95.0	1.0	47.5	4.5	2.0
B17690	B14311/B12724	90	29.3	21.5	45.0	93.0	1.0	45.0	4.0	2.0
B17746	B14311/B12724	146	29.2	22.9	47.0	95.0	1.0	47.5	4.5	2.0
B17610	B14311/B12724	10	29.2	21.5	44.0	94.0	1.0	48.0	5.5	1.0
B17616	B14311/B12724	16	29.2	22.3	45.0	92.0	1.0	44.5	4.0	3.0
B17651	B14311/B12724	51	29.2	21.6	46.0	94.0	1.0	48.0	5.0	1.0
B17733	B14311/B12724	133	29.1	24.4	46.0	92.0	1.0	46.0	4.5	2.0
B17656	B14311/B12724	56	29.0	20.9	46.0	94.0	1.0	46.5	4.5	1.0
B17660	B14311/B12724	60	29.0	21.6	46.0	94.0	1.0	46.5	5.0	1.0
B17633	B14311/B12724	33	28.9	22.9	45.0	93.0	1.0	46.0	4.0	1.0
B17663	B14311/B12724	63	28.8	23.4	45.0	93.0	1.0	47.0	5.0	1.0
B17725	B14311/B12724	125	28.8	21.2	47.0	92.0	1.0	47.0	4.5	2.0
B17620	B14311/B12724	20	28.7	21.6	46.0	92.0	1.0	45.0	4.0	2.0
B17630	B14311/B12724	30	28.7	20.0	49.0	91.0	1.0	46.0	4.5	1.0
B17710	B14311/B12724	110	28.7	22.3	45.0	92.0	1.0	45.0	4.0	1.0
B17661	B14311/B12724	61	28.7	22.8	47.0	95.0	1.0	47.5	4.5	2.0
B17669	B14311/B12724	69	28.6	24.0	46.0	94.0	1.5	47.5	5.0	3.0
B17677	B14311/B12724	77	28.4	20.4	45.0	93.0	1.0	45.0	4.0	1.0
B17662	B14311/B12724	62	28.4	22.0	47.0	92.0	1.0	45.5	4.0	1.0
B17744	B14311/B12724	144	28.3	22.9	46.0	92.0	1.0	45.5	4.0	1.0
B17639	B14311/B12724	39	28.1	20.3	45.0	94.0	1.0	46.0	5.0	2.0
B17731	B14311/B12724	131	28.0	21.7	46.0	93.0	1.0	45.5	4.0	2.0
B17648	B14311/B12724	48	27.9	22.6	44.0	93.0	1.0	45.0	4.5	2.0

EXPERIMENT 7105 PRELIMINARY BLACK YIELD TRIAL (POP.86)								PLANTED: 6/2/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	BRONZE SCORE
B04554	B00103*/X00822, **ZORRO**	21	27.8	23.5	47.0	93.0	1.0	46.0	4.0	2.0
B17742	B14311/B12724	142	27.8	22.0	45.0	93.0	1.0	47.0	4.5	1.0
B17678	B14311/B12724	78	27.5	21.0	46.0	95.0	1.0	46.0	4.0	1.0
B17627	B14311/B12724	27	27.5	22.0	47.0	93.0	1.0	46.5	4.5	2.0
B16506	B11363//Alpena*/B09197	154	27.3	24.0	44.0	93.0	1.0	46.0	3.5	2.0
B17722	B14311/B12724	122	27.2	21.7	46.0	93.0	1.0	46.0	4.5	1.0
B17664	B14311/B12724	64	27.2	21.4	45.0	93.0	1.0	47.0	4.5	1.0
B17611	B14311/B12724	11	27.1	20.8	46.0	94.0	1.0	46.5	5.0	1.0
B17637	B14311/B12724	37	27.0	21.3	46.0	92.0	1.0	44.5	3.5	2.0
B17718	B14311/B12724	118	26.9	22.2	46.0	94.0	1.0	46.0	5.0	3.0
B17634	B14311/B12724	34	26.8	21.6	45.0	93.0	1.0	46.0	4.0	2.0
B17682	B14311/B12724	82	26.6	21.2	47.0	93.0	1.0	46.0	4.0	1.0
B17686	B14311/B12724	86	26.6	23.0	45.0	93.0	1.0	46.0	4.0	1.0
I03390	ND9902621-2, **ECLIPSE**	153	26.5	23.2	46.0	92.0	1.0	45.0	4.0	2.0
B17708	B14311/B12724	108	26.4	22.0	46.0	92.0	1.0	45.0	4.0	2.0
B17623	B14311/B12724	23	26.2	22.8	46.0	93.0	1.0	46.0	4.5	1.0
B17748	B14311/B12724	148	26.0	20.9	47.0	92.0	1.0	44.5	4.0	2.0
B17605	B14311/B12724	5	25.9	22.9	45.0	94.0	1.0	46.5	4.5	2.0
B17711	B14311/B12724	111	25.8	21.5	47.0	92.0	1.0	44.5	4.0	2.0
B17716	B14311/B12724	116	25.7	23.6	48.0	95.0	1.0	45.5	4.5	1.0
B17723	B14311/B12724	123	25.5	22.6	45.0	93.0	1.0	45.5	4.0	1.0
B17622	B14311/B12724	22	25.4	22.8	46.0	92.0	1.0	45.0	4.0	3.0
B17665	B14311/B12724	65	25.2	21.8	45.0	93.0	1.0	47.0	4.5	1.0
B17626	B14311/B12724	26	25.1	23.6	46.0	93.0	1.0	45.0	4.0	1.0
B17698	B14311/B12724	98	25.1	20.9	47.0	92.0	1.0	44.0	3.5	1.0
B17721	B14311/B12724	121	24.9	23.5	45.0	93.0	1.0	47.0	4.5	2.0
B17636	B14311/B12724	36	24.7	21.4	46.0	93.0	1.0	47.5	5.0	1.0
B17608	B14311/B12724	8	24.5	21.1	46.0	91.0	1.0	46.0	4.5	1.0
B17747	B14311/B12724	147	24.1	20.2	47.0	92.0	1.0	45.5	4.0	2.0
B17609	B14311/B12724	9	24.0	21.8	46.0	93.0	1.0	45.0	4.0	2.0
B17666	B14311/B12724	66	24.0	20.7	46.0	92.0	1.0	45.5	4.0	1.0
B17613	B14311/B12724	13	23.9	20.8	46.0	92.0	1.0	46.0	4.0	2.0
B17737	B14311/B12724	137	23.2	22.6	45.0	94.0	1.0	45.5	4.0	1.0
B17649	B14311/B12724	49	22.7	23.2	46.0	93.0	1.0	46.0	4.5	2.0
B17617	B14311/B12724	17	22.4	23.0	45.0	94.0	1.0	46.0	4.0	1.0
B17676	B14311/B12724	76	20.4	21.0	45.0	93.0	1.0	44.0	3.5	1.0
MEAN(156)			29.6	22.4	45.8	93.0	1.0	46.6	4.6	1.4
LSD(.05)			3.0	1.4	1.6	1.5	0.1	1.6	0.9	0.8
CV%			6.2	3.9	2.1	1.0	5.6	2.1	12.1	36.5

EXPERIMENT 7106 PRELIMINARY BLACK YIELD TRIAL (POP. 11)									PLANTED: 6/2/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE (1-5)
B17875	B14302/Zenith	62	38.5	19.6	47.0	91.0	1.0	51.5	5.5	1.5	3.0
B17922	B14302/Zenith	100	36.8	21.1	49.0	93.0	1.0	51.0	5.0	2.0	2.0
B17879	B14302/Zenith	66	36.4	19.7	47.0	90.0	1.0	47.0	5.0	2.0	2.0
B17829	B14302/Zenith	24	35.6	22.5	46.0	91.0	1.0	47.0	5.5	2.0	2.0
B17880	B14302/Zenith	67	35.5	22.9	48.0	91.0	1.0	26.5	5.0	1.5	1.0
B17804	B14302/Zenith	4	35.3	20.6	47.0	90.0	1.0	49.5	5.0	2.0	3.0
B17850	B14302/Zenith	39	34.6	21.9	47.0	92.0	1.0	49.5	5.0	2.5	2.0
B17855	B14302/Zenith	43	34.3	20.9	48.0	90.0	1.0	48.0	4.5	2.0	2.0
B17825	B14302/Zenith	21	34.2	20.4	47.0	90.0	1.0	48.0	5.0	2.5	3.0
B17920	B14302/Zenith	98	34.1	20.8	46.0	90.0	1.0	50.0	5.0	1.5	1.0
B17813	B14302/Zenith	9	34.0	21.0	45.0	90.0	1.0	49.0	4.0	2.0	2.0
B17822	B14302/Zenith	18	33.9	21.7	46.0	92.0	1.0	50.5	6.5	1.0	3.0
B17820	B14302/Zenith	16	33.8	21.0	47.0	90.0	1.0	48.0	5.5	2.5	1.0
B17870	B14302/Zenith	57	33.7	21.0	46.0	91.0	1.0	49.0	5.0	2.0	2.0
B17844	B14302/Zenith	36	33.7	23.1	46.0	92.0	1.0	51.0	5.0	2.0	2.0
B17868	B14302/Zenith	55	33.7	19.2	46.0	91.0	1.0	50.0	5.0	1.5	3.0
B17863	B14302/Zenith	50	33.6	21.1	48.0	90.0	1.0	45.5	4.0	2.0	2.0
B17859	B14302/Zenith	46	33.4	20.1	47.0	90.0	1.0	47.0	4.5	2.0	1.0
B17841	B14302/Zenith	33	33.4	21.1	47.0	90.0	1.0	47.5	5.0	2.5	1.0
B17803	B14302/Zenith	3	33.3	21.3	47.0	92.0	1.0	50.0	5.0	1.5	2.0
B17828	B14302/Zenith	23	33.3	19.7	46.0	91.0	1.0	47.5	5.0	1.5	3.0
B17871	B14302/Zenith	58	33.3	20.9	47.0	92.0	1.0	50.0	5.5	2.0	1.0
B17898	B14302/Zenith	83	33.3	21.2	46.0	45.0	1.0	47.5	4.5	1.5	3.0
B17818	B14302/Zenith	14	33.1	18.9	48.0	90.0	1.0	50.0	5.0	2.0	1.0
B17823	B14302/Zenith	19	32.9	20.8	47.0	91.0	1.0	48.5	5.0	1.5	3.0
B17887	B14302/Zenith	72	32.9	22.4	48.0	92.0	1.0	49.5	5.0	1.5	2.0
B17918	B14302/Zenith	96	32.9	20.5	46.0	91.0	1.0	49.0	6.0	1.5	3.0
B17835	B14302/Zenith	28	32.7	20.9	48.0	93.0	1.0	49.5	5.5	2.0	2.0
B17861	B14302/Zenith	48	32.7	21.8	47.0	92.0	1.0	50.5	5.5	2.5	2.0
B17860	B14302/Zenith	47	32.6	21.2	46.0	90.0	1.0	49.5	5.5	2.5	1.0
B17921	B14302/Zenith	99	32.6	18.6	47.0	90.0	1.0	46.0	4.5	1.5	1.0
B17894	B14302/Zenith	79	32.5	20.4	48.0	92.0	1.0	50.0	5.5	2.5	2.0
B17923	B14302/Zenith	101	32.5	19.5	47.0	90.0	1.0	45.5	5.0	2.0	3.0
B17865	B14302/Zenith	52	32.4	19.1	47.0	90.0	1.0	47.0	4.5	2.0	1.0
B17832	B14302/Zenith	26	32.3	21.0	48.0	93.0	1.0	50.0	5.0	2.5	1.0
B17866	B14302/Zenith	53	32.0	22.9	48.0	91.0	1.0	48.0	5.5	1.5	2.0
B17892	B14302/Zenith	77	32.0	21.6	47.0	92.0	1.0	50.0	5.5	1.5	2.0
B17897	B14302/Zenith	82	32.0	20.1	47.0	91.0	1.0	50.0	5.5	1.5	2.0
B17815	B14302/Zenith	11	32.0	18.9	47.0	90.0	1.0	48.5	5.5	2.0	2.0
B17839	B14302/Zenith	31	31.9	20.5	46.0	90.0	1.0	48.5	5.0	1.0	1.0

EXPERIMENT 7106 PRELIMINARY BLACK YIELD TRIAL (POP. 11)									PLANTED: 6/2/17		
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)	BRONZE (1-5)
B17838	B14302/Zenith	30	31.9	21.8	47.0	91.0	1.0	49.5	4.5	1.5	2.0
B17906	B14302/Zenith	87	31.8	21.6	47.0	90.0	1.0	49.5	4.0	2.0	3.0
B17840	B14302/Zenith	32	31.8	20.1	47.0	90.0	1.0	45.5	4.5	2.0	2.0
B17907	B14302/Zenith	88	31.8	21.8	47.0	92.0	1.0	49.0	5.0	2.5	2.0
B17862	B14302/Zenith	49	31.4	20.2	45.0	91.0	1.0	48.0	5.0	1.5	2.0
B17926	B14302/Zenith	104	31.0	19.9	46.0	90.0	1.0	50.0	5.5	1.5	3.0
B17851	B14302/Zenith	40	30.8	19.2	48.0	90.0	1.0	46.5	4.0	2.0	1.0
B17821	B14302/Zenith	17	30.6	19.5	46.0	90.0	1.0	47.0	5.0	1.0	3.0
B17899	B14302/Zenith	84	30.6	24.2	47.0	92.0	1.0	50.5	5.5	2.0	2.0
B17801	B14302/Zenith	1	30.5	20.7	47.0	93.0	1.0	49.0	4.5	2.0	1.0
B17893	B14302/Zenith	78	30.4	21.1	48.0	93.0	1.0	51.0	5.5	1.0	1.0
B17853	B14302/Zenith	41	30.4	22.7	47.0	91.0	1.0	48.0	4.5	2.0	2.0
B17872	B14302/Zenith	59	30.2	20.3	47.0	89.0	1.0	46.5	5.0	1.0	1.0
B17856	B14302/Zenith	44	30.1	20.3	47.0	91.0	1.0	50.5	4.5	2.5	2.0
B17819	B14302/Zenith	15	30.0	21.6	47.0	91.0	1.0	48.0	5.0	2.5	2.0
B17913	B14302/Zenith	91	29.9	21.4	47.0	92.0	1.0	49.5	6.0	1.5	2.0
B17805	B14302/Zenith	5	29.8	22.1	47.0	92.0	1.0	47.5	5.0	2.0	2.0
B17895	B14302/Zenith	80	29.7	20.2	45.0	93.0	1.0	47.5	4.5	1.5	2.0
B17864	B14302/Zenith	51	29.7	19.6	46.0	91.0	1.0	49.0	4.5	2.0	2.0
B17812	B14302/Zenith	8	29.7	21.3	48.0	93.0	1.0	51.0	5.5	2.0	2.0
B17901	B14302/Zenith	86	29.7	20.6	48.0	90.0	1.0	47.0	4.0	3.0	1.0
B17830	B14302/Zenith	25	29.6	20.7	47.0	90.0	1.0	45.5	4.0	2.0	1.0
B17890	B14302/Zenith	75	29.5	21.4	48.0	93.0	1.0	50.0	6.0	2.0	3.0
B17807	B14302/Zenith	6	29.5	19.3	46.0	90.0	1.0	45.5	4.5	2.5	2.0
B17925	B14302/Zenith	103	29.5	21.0	48.0	92.0	1.0	49.5	5.5	2.5	2.0
B17854	B14302/Zenith	42	29.5	20.0	47.0	92.0	1.0	50.0	5.0	2.0	2.0
B17836	B14302/Zenith	29	29.4	19.5	49.0	91.0	1.0	48.0	4.5	3.5	1.0
B17883	B14302/Zenith	70	29.2	18.7	46.0	90.0	1.0	46.0	4.5	1.5	2.0
B17876	B14302/Zenith	63	29.1	21.5	47.0	90.0	1.0	47.0	4.0	2.0	2.0
B17911	B14302/Zenith	90	29.1	18.8	46.0	90.0	1.0	47.0	4.5	2.5	3.0
B17909	B14302/Zenith	89	29.0	21.9	48.0	91.0	1.0	48.5	4.5	2.5	1.0
B17817	B14302/Zenith	13	29.0	18.7	47.0	90.0	1.0	48.5	5.5	2.5	1.0
B17814	B14302/Zenith	10	28.9	21.0	47.0	90.0	1.0	46.5	5.0	2.0	2.0
B17846	B14302/Zenith	38	28.9	20.1	47.0	94.0	1.0	51.5	5.0	1.5	1.0
B17881	B14302/Zenith	68	28.8	22.7	47.0	92.0	1.0	48.5	4.5	1.0	1.0
B17891	B14302/Zenith	76	28.7	21.8	48.0	93.0	1.0	48.0	4.5	2.0	3.0
B17900	B14302/Zenith	85	28.4	20.5	46.0	91.0	1.0	47.0	5.0	2.0	1.0
B17919	B14302/Zenith	97	28.4	18.8	45.0	90.0	1.0	44.0	4.0	1.5	3.0
B17842	B14302/Zenith	34	28.3	19.9	46.0	91.0	1.0	48.0	5.0	2.5	1.0
B17843	B14302/Zenith	35	28.2	19.9	47.0	90.0	1.0	46.0	4.5	1.0	3.0

EXPERIMENT 7106 PRELIMINARY BLACK YIELD TRIAL (POP. 11)									PLANTED: 6/2/17		
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**	**CBB (1-5)**	**BRONZE (1-5)**
B17869	B14302/Zenith	56	28.2	21.1	47.0	93.0	1.0	48.0	5.0	2.5	1.0
B17889	B14302/Zenith	74	27.9	18.6	48.0	91.0	1.0	48.0	5.0	1.5	2.0
B17833	B14302/Zenith	27	27.8	20.4	47.0	91.0	1.0	50.0	4.5	3.0	2.0
B10244	B04644/ZORRO, **ZENITH**	106	27.8	22.9	47.0	93.0	1.0	49.5	5.0	1.5	1.0
B14302	B09197/B11334	107	27.5	19.3	47.0	90.0	1.0	47.0	5.0	2.0	1.0
B17877	B14302/Zenith	64	27.5	22.0	47.0	92.0	1.0	46.5	4.0	2.5	1.0
B17873	B14302/Zenith	60	27.4	20.0	46.0	90.0	1.0	45.0	4.5	1.0	2.0
B17915	B14302/Zenith	93	27.3	20.0	47.0	91.0	1.0	49.0	5.0	2.0	2.0
B17845	B14302/Zenith	37	27.3	20.3	46.0	89.0	1.0	47.0	4.5	1.0	2.0
B17816	B14302/Zenith	12	27.2	22.3	47.0	92.0	1.0	49.0	5.0	1.5	3.0
B17914	B14302/Zenith	92	27.2	20.4	48.0	92.0	1.0	48.0	4.5	1.5	1.0
B17924	B14302/Zenith	102	27.1	22.5	47.0	91.0	1.0	46.0	5.0	2.0	1.0
B17857	B14302/Zenith	45	26.9	20.0	47.0	91.0	1.0	45.5	4.5	2.0	2.0
B17917	B14302/Zenith	95	26.8	21.1	48.0	92.0	1.0	47.5	4.5	3.0	2.0
B17882	B14302/Zenith	69	26.8	19.8	47.0	90.0	1.0	46.5	4.5	2.5	2.0
B17874	B14302/Zenith	61	25.8	18.5	45.0	89.0	1.0	45.5	4.0	2.5	1.0
B04554	B00103*/X00822, **ZORRO**	105	25.7	22.4	47.0	92.0	1.0	48.5	4.5	2.0	2.0
B17827	B14302/Zenith	22	25.2	19.8	48.0	90.0	1.0	45.5	4.0	2.0	1.0
B17884	B14302/Zenith	71	25.1	20.0	47.0	91.0	1.0	46.0	4.5	2.0	3.0
B17867	B14302/Zenith	54	25.1	21.8	48.0	93.0	1.0	50.5	5.0	1.5	2.0
B17802	B14302/Zenith	2	25.0	20.4	47.0	92.0	1.0	49.5	4.5	2.0	2.0
B17824	B14302/Zenith	20	24.9	18.3	48.0	92.0	1.0	50.5	5.0	2.0	1.0
B17878	B14302/Zenith	65	24.7	19.5	47.0	92.0	1.0	49.0	4.5	2.0	2.0
B17888	B14302/Zenith	73	24.6	21.3	47.0	92.0	1.0	48.0	5.5	2.0	1.0
B17916	B14302/Zenith	94	23.4	19.9	47.0	91.0	1.0	47.0	4.5	2.0	1.0
I03390	ND9902621-2, **ECLIPSE**	108	22.2	22.9	47.0	90.0	1.0	48.0	4.0	2.5	2.0
B17896	B14302/Zenith	81	22.2	22.6	48.0	95.0	1.0	51.5	4.5	2.0	1.0
B17809	B14302/Zenith	7	21.8	21.0	47.0	89.0	1.0	44.0	4.0	2.0	2.0
MEAN(108)			30.2	20.7	46.7	90.4	1.0	48.1	4.9	1.9	1.6
LSD(.05)			3.1	1.3	1.4	10.1	-	6.6	1.0	1.0	0.8
CV%			6.2	3.9	1.9	6.7	-	8.3	12.8	31.9	30.0

EXPERIMENT 7107 PRELIMINARY BLACK YIELD TRIAL (POP. 31 & 45)									PLANTED: 6/2/17	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)
B17003	B14303/Zenith	42	33.0	21.6	48.0	90.0	1.0	46.5	5.5	1.5
B17076	B14303/Zenith	60	32.5	20.5	48.0	93.0	1.0	49.5	4.5	3.0
B17096	B14303/Zenith	64	30.9	20.5	48.0	91.0	1.0	47.0	5.0	1.5
B17023	B14303/Zenith	48	30.8	22.0	49.0	94.0	1.0	47.0	5.0	2.0
B17959	B14302/B12724	9	30.5	21.8	48.0	91.0	1.0	47.5	6.0	2.5
B10244	B04644/ZORRO, **ZENITH**	69	30.4	25.3	48.0	94.0	1.5	48.5	5.5	2.5
B17042	B14303/Zenith	52	30.2	23.0	48.0	93.0	1.0	46.0	4.5	2.0
B17052	B14303/Zenith	55	30.0	21.0	48.0	92.0	1.0	46.0	5.5	2.0
B17083	B14303/Zenith	62	29.2	22.2	48.0	91.0	1.0	46.0	4.5	2.0
B17978	B14302/B12724	28	29.1	19.7	47.0	89.0	1.0	46.5	5.5	2.0
B17130	B14303/Zenith	65	29.0	20.0	47.0	91.0	1.0	46.0	5.0	1.5
B17002	B14303/Zenith	41	28.9	21.9	47.0	90.0	1.0	43.5	5.0	1.5
B17080	B14303/Zenith	61	28.5	19.6	47.0	92.0	1.0	45.5	5.0	2.0
B17062	B14303/Zenith	59	28.5	22.0	48.0	92.0	1.0	46.5	5.0	3.0
B17009	B14303/Zenith	43	28.1	20.8	48.0	92.0	1.0	46.0	5.0	2.5
B17043	B14303/Zenith	53	28.0	20.6	48.0	91.0	1.0	46.0	4.5	2.5
B17142	B14303/Zenith	68	27.8	20.4	47.0	92.0	1.0	47.5	5.5	2.0
B17029	B14303/Zenith	50	27.4	22.3	48.0	91.0	1.0	45.0	4.5	2.5
B17976	B14302/B12724	26	27.0	21.7	49.0	92.0	1.0	45.5	5.0	1.5
B17970	B14302/B12724	20	27.0	23.2	48.0	90.0	1.0	48.0	6.0	2.0
B17037	B14303/Zenith	51	26.3	20.8	48.0	92.0	1.0	45.5	5.0	1.0
B17977	B14302/B12724	27	26.2	22.2	48.0	91.0	1.0	46.0	5.0	1.5
B17969	B14302/B12724	19	25.9	22.4	47.0	91.0	1.0	46.0	5.5	2.0
B17020	B14303/Zenith	46	25.9	19.6	47.0	90.0	1.0	46.0	5.0	2.0
B17058	B14303/Zenith	58	25.7	20.3	48.0	91.0	1.0	46.0	4.5	2.0
B17021	B14303/Zenith	47	25.7	20.4	47.0	90.0	1.0	46.0	5.0	2.0
B17054	B14303/Zenith	56	25.6	20.3	47.0	91.0	1.0	46.0	4.5	2.5
B17014	B14303/Zenith	44	25.4	21.6	48.0	92.0	1.0	46.0	5.0	2.0
B17988	B09197/B11334, B14302-02	38	25.2	20.9	48.0	92.0	1.0	45.5	5.5	2.0
B17027	B14303/Zenith	49	25.0	19.6	48.0	91.0	1.0	46.5	5.0	1.5
B17967	B14302/B12724	17	24.6	21.2	48.0	89.0	1.0	44.5	4.5	2.0
B17972	B14302/B12724	22	24.4	22.0	47.0	91.0	1.0	45.0	4.5	1.0
B17965	B14302/B12724	15	24.4	22.8	48.0	89.0	1.0	44.5	4.5	3.0
B17953	B14302/B12724	3	24.0	19.6	47.0	89.0	1.0	45.0	4.5	1.5
B17018	B14303/Zenith	45	23.9	20.1	48.0	89.0	1.0	45.0	4.5	1.5
B17135	B14303/Zenith	66	23.8	20.5	47.0	93.0	1.0	46.0	5.0	1.5
B17983	B14302/B12724	33	23.8	19.7	48.0	91.0	1.0	45.0	5.0	2.0
B17047	B14303/Zenith	54	23.7	22.3	46.0	91.0	1.0	46.5	4.5	2.5
B12724	B09184/B09135	72	23.6	22.2	47.0	91.0	1.0	46.5	4.5	1.5
B17955	B14302/B12724	5	23.6	20.0	48.0	89.0	1.0	46.0	5.0	2.5

EXPERIMENT 7107 PRELIMINARY BLACK YIELD TRIAL (POP. 31 & 45)									PLANTED: 6/2/17	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)
B17984	B14302/B12724	34	23.2	22.6	47.0	93.0	1.0	45.0	5.0	3.0
B17968	B14302/B12724	18	23.0	21.8	48.0	91.0	1.0	46.0	5.0	1.5
B17986	B14302/B12724	36	23.0	22.1	47.0	92.0	1.0	46.0	5.5	2.0
B17963	B14302/B12724	13	22.9	19.0	47.0	89.0	1.0	43.5	4.0	2.0
B14303	B09197/B11334	70	22.7	21.2	47.0	90.0	1.0	22.5	5.5	1.5
B17958	B14302/B12724	8	22.6	21.0	47.0	91.0	1.0	45.0	4.5	2.5
B17960	B14302/B12724	10	22.5	19.4	47.0	91.0	1.0	46.5	6.0	2.5
B17962	B14302/B12724	12	22.3	21.4	47.0	89.0	1.0	45.5	5.0	2.0
B17966	B14302/B12724	16	22.2	21.7	47.0	91.0	1.0	45.5	5.0	2.0
B17139	B14303/Zenith	67	22.2	19.5	47.0	89.0	1.0	44.5	4.5	2.0
B17990	B14302/B12724	40	22.1	21.7	47.0	90.0	1.0	44.5	5.0	2.0
B17056	B14303/Zenith	57	22.0	19.0	47.0	90.0	1.0	44.5	5.0	2.5
B17975	B14302/B12724	25	21.9	22.4	48.0	91.0	1.0	44.0	4.5	2.0
B17094	B14303/Zenith	63	21.8	20.4	48.0	94.0	1.0	49.0	5.5	2.0
B17974	B14302/B12724	24	21.8	21.0	47.0	93.0	1.0	43.5	4.0	2.5
B17957	B14302/B12724	7	21.8	20.5	47.0	89.0	1.0	44.5	4.5	1.0
B17961	B14302/B12724	11	21.6	22.6	47.0	91.0	1.0	47.0	5.5	1.5
B17952	B14302/B12724	2	21.5	20.9	48.0	91.0	1.0	45.5	4.5	2.0
B17971	B14302/B12724	21	21.5	21.7	48.0	93.0	1.0	45.0	5.0	1.5
B17987	B09197/B11334, B14302-01	37	21.0	21.5	47.0	90.0	1.0	45.5	5.5	2.0
B17980	B14302/B12724	30	21.0	20.7	48.0	90.0	1.0	44.0	5.0	2.0
B17985	B14302/B12724	35	20.7	21.5	48.0	92.0	1.0	45.0	4.5	2.0
B17973	B14302/B12724	23	20.2	22.2	48.0	89.0	1.0	44.0	4.0	1.5
B17956	B14302/B12724	6	20.1	21.5	48.0	88.0	1.0	46.0	5.0	3.0
B17982	B14302/B12724	32	20.1	22.1	48.0	90.0	1.0	45.0	4.5	2.5
B17989	B14302/B12724	39	19.9	19.9	47.0	92.0	1.0	44.0	4.5	1.5
B17979	B14302/B12724	29	19.9	20.2	47.0	88.0	1.0	44.0	4.5	2.0
B17954	B14302/B12724	4	19.7	20.0	47.0	89.0	1.0	43.0	4.5	3.0
B17964	B14302/B12724	14	19.5	17.7	47.0	91.0	1.0	45.5	5.0	2.0
B14302	B09197/B11334	71	19.0	19.4	49.0	91.0	1.0	45.5	5.5	1.5
B17981	B14302/B12724	31	18.5	23.0	47.0	91.0	1.0	43.5	4.5	1.5
B17951	B14302/B12724	1	16.8	21.0	47.0	91.0	1.0	43.5	4.5	2.5
MEAN(72)			24.5	21.1	47.3	90.7	1.0	45.3	4.9	2.0
LSD(.05)			4.2	1.4	1.3	2.1	0.1	6.7	1.0	1.3
CV%			10.3	3.9	1.7	1.4	8.3	8.8	11.7	39.2

EXPERIMENT 7108 STANDARD GREAT NORTHERN YIELD TRIAL								PLANTED: 6/2/17	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
G17410	G13467/G13479	30	26.0	37.9	45.0	92.0	1.0	49.0	5.3
G16351	Eldorado/G13467	1	25.5	41.3	44.0	94.0	1.0	50.3	4.8
G16339	G12508/G13478	6	24.7	31.3	44.0	91.0	1.3	48.8	5.0
G12901	G07321/Fuji, **SAMURAI**	42	24.4	26.3	43.0	93.0	1.3	50.3	5.0
G16347	G13467/G11429	14	23.9	37.2	44.0	88.0	1.0	48.3	4.8
G16319	G11464/G11404	15	23.9	37.4	44.0	90.0	1.3	47.0	4.0
G16345	G12508/G13455	18	23.7	35.2	43.0	91.0	1.0	47.8	5.0
G16346	G13455/G13478	2	23.5	46.9	44.0	94.0	1.0	49.5	4.3
G16314	G11429/G11438	7	23.0	39.4	45.0	94.0	1.0	49.8	5.0
G16328	G12508/G11464	13	22.9	37.1	44.0	91.0	1.0	47.0	5.3
G17411	G13467/G13479	31	22.8	42.4	43.0	92.0	1.0	47.8	4.5
G16318	G11438/G12502	3	22.5	41.9	44.0	89.0	1.0	46.0	4.3
G16308	G11404/G12502	16	22.3	41.2	44.0	89.0	1.0	47.0	3.3
G16301	Powderhorn/GN9-4	4	22.3	37.1	44.0	88.0	1.0	47.8	5.0
G14503	G11404/G11469	8	21.8	41.3	44.0	89.0	1.0	45.8	4.3
G17418	G14530/G11431	38	21.3	39.6	44.0	95.0	1.0	52.0	4.5
G17401	G13424/G13479	21	21.3	24.9	44.0	89.0	1.3	48.5	4.3
G17408	G13444/G14508	28	21.1	33.7	45.0	90.0	1.0	48.5	5.5
G16306	Powderhorn/G12501	12	21.1	39.6	44.0	89.0	1.0	47.0	5.3
G17419	G14505/P07863	39	21.0	34.8	44.0	90.0	1.0	46.8	4.5
G16317	G11438/G11464	10	20.5	41.2	43.0	89.0	1.3	47.5	4.3
G17417	G14530/G11431	37	20.3	38.8	44.0	93.0	1.0	48.8	4.0
G16338	G12508/G11429	9	20.3	35.4	44.0	95.0	2.0	50.5	4.8
G17406	G13444/G14508	26	20.3	35.3	43.0	95.0	2.0	50.8	4.5
G16309	G11404/G12502	5	20.1	42.6	43.0	89.0	1.0	46.0	3.8
G16305	Powderhorn/G12501	11	20.1	40.8	44.0	89.0	1.0	47.5	5.3
G17403	G13424/G13479	23	20.0	33.4	44.0	91.0	1.0	48.8	4.8
G17412	G13444/G13479	32	20.0	32.1	43.0	89.0	1.0	45.3	4.0
G16332	G11429/Eldorado	17	19.5	37.8	44.0	96.0	2.0	50.8	4.3
G16344	Powderhorn//GN9-4/G12501	19	19.4	35.2	43.0	88.0	1.0	44.0	4.0
G17416	G14530/G11431	36	19.3	42.1	45.0	93.0	1.0	48.5	4.3
G17405	G13424/G13479	25	19.3	39.2	43.0	90.0	1.0	46.5	4.5
G17413	G13444/G13479	33	19.1	33.8	43.0	89.0	1.0	45.5	4.8
G17409	G13444/G14508	29	19.0	31.4	45.0	91.0	1.0	49.8	4.3
G17414	G14530/G11431	34	18.8	39.5	44.0	92.0	1.0	48.5	4.3

EXPERIMENT 7108 STANDARD GREAT NORTHERN YIELD TRIAL								PLANTED: 6/2/17	
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**
G17404	G13424/G13479	24	18.8	39.1	44.0	91.0	1.0	47.0	4.8
G08254	G04514/Matterhorn, **POWDERHORN**	20	18.5	36.9	43.0	88.0	1.0	46.3	4.8
G17402	G13424/G13479	22	18.4	34.1	44.0	92.0	1.0	48.5	5.5
G17407	G13444/G14508	27	17.8	35.1	44.0	91.0	1.0	48.3	4.8
G17811	G12901/G14524	40	15.8	31.7	44.0	95.0	1.0	48.3	3.8
G17415	G14530/G11431	35	15.4	33.8	44.0	89.0	1.0	45.3	4.3
G17810	G12901/G14524	41	12.0	33.4	45.0	98.0	1.3	53.8	3.8
MEAN(42)			20.7	36.9	43.6	91.0	1.1	48.1	4.5
LSD(.05)			2.8	1.7	1.0	1.9	0.3	1.6	0.8
CV%			11.6	3.9	1.4	1.8	19.3	2.8	14.3

EXPERIMENT 7109 STANDARD PINTO YIELD TRIAL								PLANTED: 6/5/17	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
P16901	Eldorado/P11519	6	21.6	44.9	44.0	94.0	2.0	47.5	5.5
I07113	PNE-6-94-75/Kodiak, **LAPAZ**	11	20.2	43.9	42.0	92.0	1.0	48.5	4.5
P17510	SDP H/H BULK	35	19.9	42.3	41.0	93.0	1.0	49.0	5.0
P16905	P11519/P12610	4	19.3	40.5	44.0	92.0	1.0	48.0	5.5
P07863	AN-37/P02630, **ELDORADO**	16	18.8	46.8	44.0	96.0	2.0	48.5	4.0
P17509	SDP H/H BULK	34	18.7	43.8	45.0	95.0	1.5	48.8	5.0
I15633	PT 9-5-6	18	18.7	41.5	41.0	92.0	1.3	47.8	4.3
P16902	P11519/P12610	2	18.4	40.6	45.0	93.0	1.0	48.0	5.0
P17404	G14505/P07863	25	18.2	46.6	42.0	93.0	1.0	47.8	4.5
P16909	P12604/P12610	5	17.5	44.9	44.0	92.0	1.0	47.5	5.5
P14812	P09425/P08161	3	16.8	47.7	42.0	91.0	1.0	47.3	4.5
P16914	P11519/G13467	9	16.6	41.6	42.0	93.0	1.0	48.3	4.8
P17507	SDP H/H BULK	32	16.6	46.7	41.0	94.0	1.3	47.8	4.5
P16904	P11519/P12610	15	16.5	42.4	42.0	92.0	1.0	47.8	5.0
P17508	SDP H/H BULK	33	16.5	45.4	41.0	94.0	1.0	48.8	4.8
P16907	P12604/P12610	36	16.0	42.6	41.0	92.0	1.0	46.8	4.8
I17502	**RADIANT**	20	15.8	40.6	39.0	92.0	1.0	47.8	4.0
P16918	CO 91212-3/P12613	8	15.5	44.0	42.0	93.0	1.0	48.5	5.0
P16906	P11519/P12610	14	15.3	37.6	42.0	92.0	1.0	46.8	4.8
P17502	P07863/X14110	27	15.0	44.4	41.0	92.0	1.0	47.5	5.0
P16903	P11519/P12610	7	14.8	42.9	44.0	93.0	1.0	48.3	5.3
P14814	P11522/LONG'S PEAK	12	14.4	42.9	44.0	93.0	1.0	49.3	5.0
P17401	P14801/I14531	22	14.3	39.2	42.0	92.0	1.0	46.0	4.5
I16705	ND121448	19	14.2	40.4	43.0	93.0	1.0	49.0	5.0
P17501	P07863/X14110	26	14.0	44.8	42.0	93.0	1.0	45.3	4.3
I14520	Santa Fe/PS08-108, SF103-8, **PALOMINO**	17	13.6	42.4	40.0	95.0	2.0	47.8	4.0
P17402	P14801/I14531	23	13.5	42.0	43.0	94.0	1.0	46.3	4.5
P16911	P12610/P11519	1	12.6	40.5	42.0	92.0	1.0	48.5	5.0
P16908	P12604/P12610	10	12.3	44.7	42.0	92.0	1.0	45.8	4.0
P16910	P12610/P11519	13	11.8	39.9	41.0	92.0	1.0	47.8	5.0
I17503	**VIBRANT**	21	11.8	40.0	40.0	91.0	1.0	47.0	4.0
P17505	SDP H/H BULK	30	11.6	41.7	40.0	93.0	1.0	44.8	4.0
P17403	P07863/P11523	24	11.3	45.3	43.0	91.0	1.0	46.5	4.5
P17504	SDP H/H BULK	29	11.1	45.5	41.0	92.0	1.0	44.0	4.0
P17503	SDP H/H BULK	28	10.6	41.5	41.0	93.0	1.0	45.8	4.0
P17506	SDP H/H BULK	31	9.6	43.7	40.0	93.0	1.0	44.8	4.0
MEAN(36)			15.4	42.9	41.9	92.7	1.1	47.4	4.6
LSD(.05)			2.8	1.6	2.0	1.1	0.2	1.5	0.5
CV%			15.5	3.3	2.9	1.0	13.7	2.7	8.7

EXPERIMENT 7110 STANDARD RED AND PINK YIELD TRIAL									PLANTED: 6/5/17
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
R17603	R12859/R12844	18	27.9	38.4	45.0	93.0	1.0	47.8	5.0
I13401	SR 09303, **VIPER**	1	26.8	34.6	45.0	96.0	1.0	49.3	4.3
R12844	SR9-5/R09508, **CAYENNE**	3	25.5	38.8	44.0	92.0	1.0	49.3	5.0
R17604	R12859/R12844	19	25.3	36.8	45.0	95.0	1.3	48.8	5.5
S17706	S14708/X14117	29	24.6	40.4	45.0	94.0	1.0	49.3	5.0
R11806	X07714/X07710, **GYPSY ROSE**	36	24.5	34.9	45.0	96.0	2.0	47.5	4.0
R17605	R12859/R12844	20	24.3	38.8	46.0	95.0	1.0	48.8	5.0
S16804	S08418/S12904	11	24.1	42.1	44.0	95.0	1.0	48.8	5.3
R16522	R98026/I11207	9	23.6	44.0	43.0	93.0	1.0	47.8	4.5
R17602	R12845/R12859	17	23.3	40.5	43.0	93.0	1.0	48.0	4.8
S08418	S02754/S04503, **ROSETTA**	15	23.1	41.3	40.0	95.0	1.0	48.8	5.0
S17703	S14705/R14605	26	22.0	45.2	41.0	93.0	1.0	47.5	4.5
S17705	S14708/X14117	28	21.9	43.7	46.0	95.0	1.0	48.8	5.3
S17707	S12909/R12859	32	21.8	42.4	42.0	93.0	1.0	47.5	5.0
R17601	R12844/S14707	16	21.7	41.0	46.0	95.0	1.0	48.3	4.3
S17704	S14705/R14605	27	21.3	43.4	43.0	94.0	1.0	46.8	4.5
S16809	S12906/R11614	12	21.1	40.2	43.0	94.0	1.0	47.8	4.5
R98026	R94037/R94161, **MERLOT**	8	20.9	43.1	41.0	95.0	1.0	48.5	4.0
R16521	R98026/I11207	6	20.9	46.3	42.0	94.0	1.3	48.3	4.3
S17701	R12843/S14705	24	20.7	38.9	45.0	96.0	1.5	48.8	5.5
S17702	R12843/S14705	25	20.0	37.9	45.0	95.0	2.0	48.5	5.0
R16503	R12859/R13506	5	19.9	38.6	44.0	95.0	1.0	49.0	5.0
R16519	S12909/I13423	7	19.6	37.0	42.0	94.0	1.0	48.0	4.8
R16514	R12859/S12904	13	19.5	41.3	42.0	95.0	1.0	48.0	4.5
R17610	S12909/R12859	31	19.4	45.5	42.0	91.0	1.0	45.8	4.0
S16807	S08418/S12909	10	19.2	39.3	42.0	95.0	1.0	48.0	4.8
R16518	S12909/I13423	4	18.3	39.4	42.0	94.0	1.3	47.5	4.8
S16808	S08418/S12906	2	18.0	39.9	42.0	94.0	1.0	47.8	4.5
R17609	S12909/R12859	30	18.0	44.7	41.0	92.0	1.0	46.5	4.3
R11801	X07712/X07721, **DESERT SONG**	35	17.6	39.4	40.0	91.0	2.3	44.0	3.8
S16801	R12859/S12904	14	17.1	42.3	41.0	92.0	1.0	47.0	4.0
I16711	ACUG 13-SR1, **OAC ROSITO**	34	16.6	24.6	45.0	93.0	1.0	46.5	4.0
R17608	R12832/R12859	23	16.3	37.1	40.0	92.0	1.0	46.8	4.3
I15605	SR10-2-1	33	15.8	42.3	40.0	92.0	1.0	46.5	4.0
R17607	R12832/R12859	22	14.6	34.0	40.0	92.0	1.0	44.5	4.0
R17606	R12832/R12859	21	13.5	34.4	40.0	92.0	1.0	46.0	4.0
MEAN(36)			20.8	39.8	42.6	93.6	1.1	47.7	4.6
LSD(.05)			2.8	1.4	1.4	1.0	0.3	1.1	0.6
CV%			11.3	3.0	2.0	1.0	20.8	2.0	11.1

EXPERIMENT 7111 PRELIMINARY TEBO YIELD TRIAL								PLANTED: 6/5/17	
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**
G17913	G14505/Samurai	13	28.3	32.6	41.0	96.0	1.3	48.0	5.3
G17925	G14505/Samurai	25	26.6	37.9	45.0	99.0	1.7	51.0	6.0
G17923	G14505/Samurai	23	26.0	28.7	46.0	99.0	1.0	49.7	5.3
G17919	G14505/Samurai	19	24.7	28.4	44.0	98.0	1.0	49.3	5.3
G17806	Samurai/G13424	43	23.8	29.5	44.0	99.0	1.0	47.7	5.7
G17916	G14505/Samurai	16	23.6	29.3	42.0	95.0	1.0	46.3	5.0
G17909	G14505/Samurai	9	23.1	26.9	44.0	98.0	1.0	48.0	5.7
G17805	Samurai/G13424	42	22.9	28.6	43.0	99.0	1.0	47.7	5.7
G12901	G07321/Fuji, **SAMURAI**	48	22.7	29.0	43.0	98.0	1.0	48.0	5.0
G17926	G14505/Samurai	26	22.0	29.2	44.0	98.0	1.3	48.3	5.0
G17804	Samurai/G11431	41	21.7	28.0	43.0	98.0	1.0	47.7	5.7
G17932	Samurai/G15479	32	21.4	30.1	41.0	95.0	1.0	47.0	5.0
G17910	G14505/Samurai	10	21.1	27.6	44.0	99.0	1.7	51.3	5.3
G17802	Samurai/G11431	39	20.8	28.8	43.0	96.0	1.0	48.3	5.0
G17936	Samurai/G15479	36	20.8	27.6	42.0	97.0	1.0	46.3	4.7
G17803	Samurai/G11431	40	20.8	28.5	44.0	98.0	1.0	47.3	5.0
G17807	Samurai/G13424	44	20.5	28.9	42.0	100.0	1.0	48.3	5.3
G17905	G14505/Samurai	5	20.0	27.4	43.0	95.0	1.0	46.0	4.3
G17920	G14505/Samurai	20	19.9	29.2	41.0	96.0	1.3	48.0	4.7
G17801	Samurai/G11431	38	19.8	29.1	46.0	98.0	1.0	47.3	5.0
G17918	G14505/Samurai	18	19.6	31.1	42.0	97.0	1.0	45.7	4.0
G17911	G14505/Samurai	11	19.6	27.8	45.0	97.0	1.0	49.3	6.0
G17928	G14505/Samurai	28	19.6	27.0	42.0	96.0	1.0	46.0	4.3
G17901	G14505/Samurai	1	19.1	31.0	44.0	98.0	1.0	48.3	5.7
G17917	G14505/Samurai	17	19.0	26.2	41.0	94.0	1.0	42.7	4.0
G17931	Samurai/G15479	31	18.6	33.3	41.0	93.0	1.0	47.0	4.0
G17924	G14505/Samurai	24	18.2	31.6	42.0	97.0	1.0	46.7	5.0
G17903	G14505/Samurai	3	17.9	23.8	45.0	99.0	1.0	49.3	5.3
G17933	Samurai/G15479	33	17.6	32.0	41.0	95.0	1.0	44.7	4.0
G17930	G14505/Samurai	30	17.5	24.8	45.0	101.0	1.0	48.7	5.3
G17937	Samurai/G15479	37	17.5	36.3	41.0	94.0	1.0	46.7	4.7
G17927	G14505/Samurai	27	17.4	27.3	43.0	97.0	1.0	46.7	5.0
G17809	Samurai/G14524	46	17.1	35.9	43.0	101.0	1.0	51.3	5.3
G17906	G14505/Samurai	6	17.1	29.6	44.0	100.0	1.0	47.3	5.0
G17914	G14505/Samurai	14	16.9	30.3	43.0	95.0	1.0	46.3	5.0

EXPERIMENT 7111 PRELIMINARY TEBO YIELD TRIAL								PLANTED: 6/5/17	
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**
G17922	G14505/Samurai	22	16.2	25.1	42.0	95.0	1.0	44.7	4.0
G17921	G14505/Samurai	21	16.1	28.4	42.0	96.0	1.0	43.7	3.7
G17929	G14505/Samurai	29	15.9	25.9	41.0	93.0	1.0	44.3	4.0
G17915	G14505/Samurai	15	15.9	30.2	42.0	96.0	1.0	45.7	4.7
G08254	G04514/Matterhorn, **POWDERHORN**	47	15.5	41.4	40.0	93.0	1.0	44.7	4.7
G17902	G14505/Samurai	2	15.5	27.0	41.0	94.0	1.0	44.0	4.3
G17908	G14505/Samurai	8	14.2	27.5	42.0	94.0	1.0	45.0	4.3
G17912	G14505/Samurai	12	14.1	30.5	41.0	94.0	1.0	43.7	4.0
G17808	Samurai/G14524	45	13.8	34.2	46.0	101.0	1.0	46.3	4.7
G17904	G14505/Samurai	4	12.1	27.3	43.0	94.0	1.0	45.7	4.7
G17907	G14505/Samurai	7	11.9	25.8	41.0	94.0	1.0	44.7	4.0
G17935	Samurai/G15479	35	11.4	29.6	43.0	93.0	1.0	43.3	3.7
G17934	Samurai/G15479	34	9.7	30.3	40.0	94.0	1.0	41.7	3.7
MEAN(48)			18.9	29.5	42.5	96.6	1.0	46.8	4.8
LSD(.05)			3.6	1.1	1.9	1.7	0.2	2.4	0.7
CV%			14.1	2.8	2.6	1.3	17.5	3.7	11.1

EXPERIMENT 7112 MRPN/CDBN YIELD TRIAL								PLANTED: 6/5/17	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
I17521	CO 43732-15	14	26.4	44.5	42.0	97.0	1.3	49.3	5.3
G16309	G11404/G12502	24	24.3	41.8	44.0	93.0	1.0	49.0	5.0
I17523	CO 33123-13	16	24.1	43.9	44.0	101.0	2.0	50.0	4.3
R12844	SR9-5/R09508, **CAYENNE**	36	23.8	39.6	46.0	97.0	1.0	48.0	5.0
I17525	CO 33503-5	18	23.4	44.6	42.0	97.0	1.3	49.3	5.7
I17533	NE2-16-41	35	22.1	52.6	45.0	96.0	2.7	47.0	3.7
I15644	COSD-35, **STAYBRIGHT**	8	22.0	39.0	42.0	94.0	1.0	49.0	5.3
I07113	PNE-6-94-75/Kodiak, **LAPAZ**	6	21.9	44.3	44.0	93.0	1.0	48.3	4.7
I17524	CO 34435-15	17	21.7	42.5	43.0	94.0	1.0	49.7	5.7
I14531	CO 14790-3	11	21.1	45.8	44.0	101.0	1.3	49.3	4.3
P14814	P11522/LONG'S PEAK	27	21.0	42.8	46.0	95.0	1.0	48.7	5.3
I16707	ND121315	21	20.9	46.6	41.0	94.0	1.0	46.7	4.3
I17513	NE2-16-33	2	20.8	48.7	42.0	95.0	3.0	45.7	3.0
P14812	P09425/P08161	26	20.1	45.2	43.0	94.0	1.0	47.3	4.7
I17531	NE1-16-33	33	19.9	47.9	41.0	93.0	1.0	47.0	4.0
I17516	**TWIN FALLS**	5	19.2	39.5	45.0	95.0	1.0	49.3	5.7
I15642	COSD-7, **SUNDANCE**	9	19.0	41.0	41.0	93.0	1.0	47.0	3.0
I15652	ND121630	22	18.7	43.5	43.0	94.0	1.0	49.0	5.3
P16911	P12610/P11519	28	18.7	41.6	45.0	94.0	1.0	49.0	5.3
I16705	ND121448	19	17.9	42.1	46.0	96.0	1.0	48.0	5.0
G16328	G12508/G11464	25	17.5	40.7	44.0	93.0	1.0	46.7	5.3
I17532	NE2-16-24	34	16.8	46.2	42.0	92.0	2.0	46.7	4.0
I17512	PT10-12-1	1	16.3	39.4	40.0	94.0	1.0	48.3	5.0
I17519	ND131413	12	15.9	42.5	43.0	94.0	1.7	46.0	3.7
I16706	ND121479	20	15.7	45.4	43.0	95.0	1.0	47.3	4.3
G16301	Powderhorn/GN9-4	23	15.6	41.8	41.0	92.0	1.0	46.7	5.3
I98313	CO51715, **MONTROSE**	30	15.0	46.9	41.0	91.0	3.0	41.3	3.0
I17515	**NEZ PERCE**	4	14.1	35.8	42.0	94.0	2.0	48.0	4.0
I14520	Santa Fe/PS08-108, SF103-8, **PALOMINO**	10	13.5	41.8	40.0	98.0	2.0	47.3	4.0
G93414	**MATTERHORN**	29	13.5	39.3	41.0	92.0	1.0	45.7	4.0
I17530	NE1-16-16	32	13.2	41.5	41.0	93.0	1.0	46.3	4.3
I17520	NDF140813	13	13.2	50.3	40.0	98.0	1.0	48.7	4.0
I84002	NW410//VICTOR/AURORA, **OTHELLO**	7	11.7	42.6	39.0	90.0	2.7	42.3	3.0
I17522	CO 41767-15	15	11.1	43.2	40.0	94.0	1.0	46.0	4.0
I99117	**BUSTER**	31	10.2	48.0	41.0	91.0	1.7	43.7	3.3
I17514	**BLACKFOOT**	3	7.6	34.2	41.0	91.0	1.3	45.3	3.0
MEAN(36)			18.0	43.2	42.2	94.4	1.4	47.3	4.4
LSD(.05)			2.8	1.8	1.8	1.6	0.4	1.6	0.9
CV%			11.5	3.1	2.6	1.2	19.5	2.5	14.4

EXPERIMENT 7113 DRYBEAN DROUGHT TRIAL								PLANTED: 6/5/17	
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, **CAYENNE**	11	24.5	41.3	45.0	95.0	1.0	48.3	5.3
I15647	CO 14790-3	12	24.5	47.6	43.0	101.0	2.0	50.3	4.7
R98026	R94037/R94161, **MERLOT**	39	22.7	44.3	44.0	97.0	2.0	48.3	4.3
I17541	PT16-15	24	21.8	37.1	43.0	96.0	2.0	48.0	5.0
I06251	CO23704, **CROISSANT**	14	20.7	43.4	41.0	93.0	2.3	47.3	4.3
I09109	CO55646, **LONG'S PEAK**	13	20.7	43.8	42.0	93.0	1.0	47.7	5.3
I17546	PK16-1	29	20.5	39.3	41.0	92.0	3.0	46.3	3.0
B10244	B04644/ZORRO, **ZENITH**	10	20.4	26.7	46.0	98.0	1.0	47.7	5.0
I16716	SB2_171, MATT/G21212///MATT/DOR364//USPT-ANT1/H405-8-1-1	6	19.8	25.7	43.0	93.0	3.7	44.7	3.0
I17544	GN16-7	27	19.6	46.1	43.0	94.0	1.0	48.0	5.0
I16717	P00646/TARS PT03-1//CBB-5/456-4, SB2_259_0	7	19.2	35.7	40.0	92.0	1.0	46.3	4.3
I17542	NDZ-1408	25	18.8	37.3	42.0	97.0	3.3	47.3	3.3
I17516	**TWIN FALLS**	32	18.7	38.0	46.0	93.0	1.0	48.3	6.0
I16714	ABC USPT-CBB-5/Stampede, SB2_143	3	18.4	36.7	40.0	93.0	1.0	46.7	4.0
I15633	PT 9-5-6	22	18.0	41.9	42.0	94.0	1.0	47.7	5.0
I14509	PT11-13	23	17.0	44.7	43.0	93.0	1.0	47.7	5.0
I05834	ND020351, **STAMPEDE**	40	16.9	42.3	41.0	93.0	1.3	46.0	3.7
I17539	1675 (737-752)	18	16.8	23.2	47.0	95.0	1.0	48.0	4.3
I17512	PT10-12-1	21	16.8	40.4	43.0	94.0	1.0	48.0	5.0
I17537	SB2_89_9, 15F-13029	8	16.7	32.6	41.0	92.0	1.0	46.0	4.0
B04554	B00103*/X00822, **ZORRO**	9	16.7	23.7	46.0	96.0	1.0	46.0	5.0
I17534	SB2_1_0, Matterhon/EMP509	2	16.7	36.4	43.0	92.0	1.0	48.0	5.0
I17515	**NEZ PERCE**	31	16.1	38.2	42.0	96.0	2.3	48.3	4.0
I17545	GN16-8	28	16.0	44.1	45.0	97.0	1.3	48.7	5.0
I17540	1765 (689-736)	20	15.3	25.9	45.0	94.0	1.0	46.0	4.3
I13450	CO 91212-4, **CENTENNIAL**	15	15.2	46.7	42.0	98.0	1.7	48.0	4.7
I17548	NZ14-732	34	14.7	50.3	40.0	96.0	2.0	47.0	4.0
BC138	**MARQUIS**	38	14.5	32.2	40.0	94.0	2.7	44.7	3.7
I17535	SB2_4, Matterhon/EMP509	4	14.4	35.4	44.0	94.0	1.3	47.7	4.3
I17538	PR1217-6	17	14.0	28.8	42.0	92.0	1.0	44.0	3.7
I16708	XRAV-40-4	19	13.4	22.9	45.0	91.0	1.0	44.7	3.3
BC200	NE1-09-19	36	13.3	41.0	40.0	94.0	1.7	47.3	4.0
G93414	**MATTERHORN**	37	13.0	39.5	41.0	92.0	1.3	46.0	4.0
I17543	GN16-3	26	12.6	39.1	41.0	92.0	1.0	47.0	3.9

EXPERIMENT 7113 DRYBEAN DROUGHT TRIAL								PLANTED: 6/5/17
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**
I17549	NE14-14-241	35	12.1	24.1	45.0	93.0	1.0	45.3	4.7
I17547	NE1-16-10	33	11.7	36.2	41.0	91.0	1.7	45.3	3.7
I17526	PR0801-81A	16	11.7	23.5	42.0	97.0	1.0	47.0	4.3
I17536	SB2_148, ABC USPT-CBB-5/Stampede	5	11.6	43.9	40.0	91.0	2.0	45.3	3.3
I14546	(USPT-ANT)x('Matterhornx98078-5-1-5-1)	1	9.7	44.8	40.0	92.0	1.0	44.0	3.7
I17514	**BLACKFOOT**	30	8.1	38.5	40.0	91.0	1.7	45.7	3.3
MEAN(40)			16.6	37.1	42.2	94.0	1.5	46.9	4.3
LSD (.05			2.5	1.7	1.7	1.8	0.5	1.5	0.7
CV (%)			10.9	3.4	2.4	1.4	24.4	2.3	12.0

EXPERIMENT 7214 STANDARD KIDNEY YIELD TRIAL								PLANTED: 6/13/17	
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
I17507	ND122386	59	43.2	64.8	37.0	100.0	1.3	49.5	5.0
K16131	K11914/K12209	64	41.6	75.3	38.0	101.0	1.3	48.3	5.0
K16957	K12206/K08961	54	40.4	68.5	39.0	100.0	1.0	49.8	5.8
K15901	K11714/K11914	4	40.3	69.3	36.0	98.0	1.0	47.5	4.5
I15620	DRK 07323, **CHAPARRAL**	58	40.0	52.5	37.0	99.0	1.8	48.3	4.0
K16934	I05101/K08961	49	40.0	66.9	37.0	98.0	1.3	48.5	4.8
K16924	K11917/K08961	44	39.8	67.9	35.0	100.0	1.0	47.5	4.5
K15601	K11306/K11916	2	39.8	54.9	38.0	100.0	1.0	49.5	6.0
K16658	K13603/H9659-21-1	33	39.7	65.5	35.0	104.0	1.3	48.8	3.8
K90902	BEA/50B1807//LASSEN, **BELUGA**	12	39.6	67.2	37.0	101.0	1.0	49.8	5.0
K16640	K11914/K12209	27	39.5	66.5	37.0	101.0	1.8	49.5	4.8
I11201	Pink Panther//ZAA/Montcalm, **CLOUSEAU**	10	39.0	71.8	36.0	101.0	1.5	49.0	3.8
K16911	K08961/K12214	57	38.7	69.5	37.0	98.0	1.0	48.5	5.0
K16657	K13603/H9659-21-1	28	38.6	62.3	36.0	104.0	1.0	47.5	4.0
K16962	K12206/K08961	42	38.6	65.1	41.0	100.0	1.3	50.5	5.8
I15622	**DYNASTY**	61	38.6	73.8	37.0	103.0	1.3	48.5	4.0
K16981	K13902/I93127	40	38.5	59.4	39.0	100.0	1.0	50.0	5.8
K16943	K12209/K13907	47	38.3	57.1	38.0	99.0	1.0	49.8	5.3
I17511	**Cornell 612**	63	38.1	65.8	37.0	100.0	1.5	48.0	4.0
K16136	K12206/I07151	13	38.0	61.5	38.0	101.0	1.0	47.8	4.3
K16117	K74002/K12225	14	38.0	53.3	38.0	98.0	1.0	48.3	4.8
I17510	DRK 1	62	38.0	58.6	36.0	99.0	1.0	46.5	3.3
I13420	ND061210, **TALON**	6	37.8	61.7	37.0	100.0	1.5	48.8	4.5
K15304	K11306/K11916	1	37.5	55.9	38.0	98.0	1.0	48.3	5.3
K16933	I05101/K08961	43	37.2	67.1	40.0	100.0	1.3	51.3	5.8
K16955	I05101/K11914	39	37.1	66.0	40.0	105.0	1.5	52.5	4.8
K16130	K11320/I07151	23	36.7	55.4	38.0	100.0	1.0	49.8	5.0
I11234	Drake//ZAA/Montcalm, **RED ROVER**	60	36.5	65.2	36.0	99.0	1.0	48.5	4.0
K16135	K12206/I07151	15	36.2	63.3	37.0	100.0	1.3	47.3	4.0
I13421	ND061106, **ROSIE**	7	36.1	63.0	38.0	102.0	1.3	51.3	5.0
K16967	K08961/I13465	56	36.1	68.5	37.0	100.0	1.3	49.0	4.5
K16982	K13902/I93127	41	35.9	57.4	39.0	102.0	1.0	48.5	4.8
K16624	CBB-15/Snowdon	37	35.5	69.9	38.0	98.0	1.3	49.0	5.0
K16128	K11320/I07151	18	35.5	53.9	40.0	100.0	1.0	48.8	5.0
K16134	K12206/I07151	17	35.3	64.5	37.0	101.0	1.0	47.5	4.0

EXPERIMENT 7214 STANDARD KIDNEY YIELD TRIAL								PLANTED: 6/13/17	
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**
K16950	K12219/K08961	46	35.2	63.4	40.0	101.0	1.3	51.8	5.5
K16607	K11709/K13602	32	35.0	64.6	36.0	101.0	2.0	48.3	4.0
K16661	K13603/H9659-21-1	36	34.6	59.7	36.0	103.0	1.0	49.5	3.8
K16643	K12602/K13602	38	34.5	55.1	37.0	97.0	1.3	47.8	3.5
K16622	CBB-15/Snowdon	35	34.4	66.8	40.0	98.0	1.3	49.8	5.0
K90101	CHAR/2*MONT, **RED HAWK**	5	34.2	63.7	36.0	100.0	1.0	48.5	4.5
K16656	K13603/H9659-21-1	29	33.9	63.4	35.0	103.0	1.0	47.5	3.8
K16927	K13604/K08961	53	33.9	58.7	36.0	101.0	1.3	50.5	5.5
K16961	K12206/K08961	48	33.8	68.2	40.0	99.0	1.0	49.5	4.8
K16983	K13902/K12206	50	33.4	64.9	40.0	102.0	1.0	50.0	5.3
K16149	K12206/K08961	22	33.0	60.9	38.0	99.0	1.3	47.3	4.0
K16102	K11320/K12219	24	32.9	55.5	40.0	99.0	1.0	48.3	4.8
K74002	MDRK/CN(3)-HBR(NEB#1), **MONTCALM**	9	32.8	64.1	37.0	105.0	1.0	48.3	3.3
K11306	K06621/USDK-CBB-15, **RED CEDAR**	3	32.7	58.8	37.0	101.0	1.0	49.5	5.5
K16129	K11320/I07151	25	32.5	52.9	39.0	100.0	1.0	49.5	4.8
K16985	K11713/K13902	51	32.2	63.0	35.0	99.0	1.0	46.3	4.3
K16110	K12205/K11320	19	31.7	54.9	41.0	98.0	1.0	48.3	4.3
K16133	K12206/I07151	26	31.6	69.3	37.0	99.0	1.0	48.8	4.5
K16137	K12225/K11303	20	31.5	60.7	39.0	100.0	1.3	49.3	4.5
K16638	K11714/K12811	31	31.4	67.8	35.0	99.0	1.0	45.0	3.8
K16605	K11709/K13602	34	31.2	64.4	36.0	98.0	1.3	48.3	4.0
K08961	K04604/USDK-CBB-15, **SNOWDON**	8	31.0	76.4	37.0	98.0	1.0	48.0	4.3
K16655	K11713/K13902	30	30.8	64.9	35.0	102.0	1.0	46.8	3.5
K16930	K13604/K08961	52	30.6	64.8	35.0	98.0	1.0	48.8	5.0
K16984	K12803/K12811	45	30.5	69.1	36.0	98.0	1.0	46.3	4.3
K16121	K08961/K12602	16	30.2	50.1	40.0	97.0	1.0	47.3	4.3
I90013	**CELRK**	11	29.9	74.4	34.0	97.0	1.0	45.3	3.0
K16146	K11306/I13464	21	29.6	58.7	37.0	99.0	1.0	47.5	4.3
K16975	K12811/K12803	55	29.0	58.9	34.0	101.0	1.0	45.5	3.8
MEAN(64)			35.6	63.2	37.1	99.9	1.1	48.6	4.5
LSD(.05)			3.9	2.8	1.6	1.5	0.4	1.3	0.6
CV%			9.4	3.7	2.6	1.3	27.4	2.3	12.1

EXPERIMENT 7215 PRELIMINARY KIDNEY YIELD TRIAL										PLANTED: 6/13/17
NAME	PEDIGREE	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE	CBB (1-5)
K17805	K11714/X14211	21	49.9	78.0	36.0	103.0	2.0	50.7	3.7	2.0
K17804	K11714/X14211	20	48.9	68.4	35.0	102.0	2.0	51.7	4.7	3.0
K17816	K11306/K14806	32	45.2	56.5	38.0	100.0	2.0	50.0	5.7	2.0
K17206	K11306/X14202	6	45.1	59.6	38.0	99.0	2.0	49.7	5.3	1.0
K17823	K14811/K14804	39	44.4	60.3	35.0	98.0	1.0	48.7	4.0	5.0
K17815	K11306/K08961	31	44.1	68.0	39.0	100.0	2.0	50.3	6.0	3.0
K17827	K13902/K14804	43	44.1	71.1	37.0	100.0	1.7	48.3	5.0	2.0
K17209	K11306/K08961	9	43.6	69.8	36.0	104.0	2.0	52.7	3.7	2.0
K17818	K14101/K14804	34	43.3	57.9	37.0	100.0	1.7	50.0	4.7	3.0
K17703	K11714/X14209	12	43.1	67.5	37.0	102.0	2.0	49.7	4.7	1.0
K17825	K13902/K14804	41	42.2	69.2	37.0	100.0	1.3	48.7	5.3	1.0
K17207	K11306/X14202	7	41.8	59.7	39.0	100.0	1.7	48.7	5.0	2.0
K17819	K14101/K14804	35	41.2	70.3	38.0	100.0	2.0	50.0	4.0	2.0
K17824	K13902/K14804	40	41.2	58.8	35.0	97.0	1.3	47.0	4.3	2.0
I11201	Pink Panther//ZAA/Montcalm, **CLOUSEAU**	46	41.2	75.9	35.0	99.0	2.0	48.0	4.3	3.0
K17208	K11306/X14202	8	40.7	62.5	36.0	100.0	1.7	49.0	5.3	1.0
K17704	K11714/X14209	13	40.6	67.9	36.0	101.0	2.0	49.3	5.0	1.0
K17806	K08961/K14810	22	40.5	71.0	36.0	100.0	1.0	48.0	4.7	3.0
K17702	K11714/X14208	11	40.3	67.7	35.0	100.0	1.7	48.3	4.3	2.0
K17814	K11306/K08961	30	40.3	68.6	38.0	99.0	2.0	49.7	5.3	1.0
K17706	K11306/K14806	15	40.2	68.6	38.0	98.0	1.7	49.0	4.7	3.0
K17203	K11306/X14202	3	40.2	63.7	37.0	100.0	1.7	49.3	6.0	1.0
K17807	K08961/K14810	23	39.9	78.2	36.0	99.0	1.3	47.3	5.0	4.0
K17202	K11306/X14202	2	38.8	65.8	36.0	100.0	1.0	48.7	4.7	1.0
K17201	K11306/X14202	1	38.7	63.7	36.0	99.0	1.7	48.7	5.0	1.0
K17701	K11714/X14208	10	38.3	69.6	35.0	101.0	1.7	48.0	4.3	1.0
K17802	K12225/X14206	18	38.3	60.0	35.0	99.0	1.0	47.0	4.3	1.0
K17821	K14809/K14810	37	38.2	71.7	36.0	97.0	1.3	46.7	3.7	4.0
K17812	K08961/K14810	28	37.9	65.6	35.0	96.0	1.0	47.0	3.7	5.0
K17820	K14809/K14810	36	37.7	61.9	35.0	99.0	1.0	46.7	4.0	2.0
K17204	K11306/X14202	4	37.6	61.8	37.0	99.0	1.0	49.3	5.7	1.0
K17205	K11306/X14202	5	37.3	59.6	37.0	99.0	1.3	48.0	5.3	1.0
K17810	K08961/K14810	26	37.0	62.5	35.0	99.0	1.0	46.3	4.3	2.0
K17828	X14221/X14223	44	36.9	56.3	37.0	101.0	2.0	50.0	4.3	3.0
K17826	K13902/K14804	42	36.7	69.7	35.0	99.0	1.0	47.0	4.3	2.0

EXPERIMENT 7215 PRELIMINARY KIDNEY YIELD TRIAL										PLANTED: 6/13/17
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**	**CBB (1-5)**
K17707	K12203/K14704	16	36.7	52.2	35.0	97.0	1.3	46.0	3.3	3.0
K17813	K08961/K14810	29	36.5	62.3	35.0	97.0	1.0	47.0	4.0	4.0
K17803	K12225/X14206	19	35.4	60.4	35.0	98.0	1.0	46.7	4.0	0.0
K17801	K12225/X14206	17	34.5	55.9	35.0	98.0	1.0	46.3	4.0	2.0
K90101	CHAR/2*MONT, **RED HAWK**	45	33.7	66.9	37.0	99.0	1.7	48.7	5.0	3.0
K11306	K06621/USDK-CBB-15, **RED CEDAR**	48	33.1	59.3	39.0	100.0	2.0	50.0	5.0	1.0
K17811	K08961/K14810	27	32.8	56.6	36.0	96.0	1.0	46.3	3.7	0.0
K17808	K08961/K14810	24	32.8	67.4	36.0	98.0	1.0	46.3	3.7	5.0
K17822	K14811/K14804	38	32.8	68.9	35.0	100.0	1.0	47.0	4.0	0.0
K17809	K08961/K14810	25	32.6	60.8	35.0	96.0	1.0	45.3	3.3	4.0
K17817	K12203/K13902	33	32.2	64.6	35.0	100.0	1.0	47.0	3.3	3.0
K08961	K04604/USDK-CBB-15, **SNOWDON**	47	29.9	74.0	37.0	98.0	1.7	48.0	4.3	2.0
K17705	K11714/X14209	14	28.8	66.2	35.0	101.0	1.0	46.7	3.3	2.0
MEAN(48)			38.9	65.1	36.0	99.3	1.5	48.3	4.5	2.3
LSD(.05)			5.8	3.2	1.4	1.7	0.5	1.3	0.8	0.0
CV%			10.9	3.6	2.3	1.2	23.6	2.0	13.0	51.8

EXPERIMENT 7216 STANDARD YELLOW YIELD TRIAL								PLANTED: 6/13/17	
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**
I14515	DBY-60-1, **PATRON**	24	54.2	57.2	42.0	100.0	2.0	47.9	5.4
I14513	DBY-28-1	1	52.3	57.6	42.0	100.0	2.0	47.3	5.0
I17506	**SVS-0863**	27	51.8	52.0	42.0	100.0	2.0	48.0	5.0
Y16503	Y11405/UC Canario 707	2	49.8	49.7	41.0	101.0	1.1	51.0	5.7
Y17501	Y11405/PR1146-123 (oblong)	4	48.7	57.5	41.0	100.0	1.3	48.8	5.8
Y17502	Y11405/PR1146-123 (round)	28	47.6	56.1	41.0	101.0	1.4	49.4	5.7
I17504	**AAC Y012**	25	42.6	52.4	35.0	98.0	1.1	47.4	4.7
I17505	**AAC Y015**	26	39.9	57.9	36.0	100.0	1.5	48.0	4.8
Y17603	Y11405*/UC Canario707	8	39.0	55.9	42.0	102.0	1.0	48.3	4.5
Y17606	Y11405*/UC Canario707	11	38.8	53.7	42.0	101.0	1.1	48.7	4.7
Y17604	Y11405*/UC Canario707	9	37.8	51.4	41.0	101.0	1.3	48.3	4.8
Y17601	Y11405*/UC Canario707	6	37.8	58.1	42.0	102.0	1.1	49.4	5.0
Y11405	FR-07-AZP-14-06	3	37.5	59.3	42.0	101.0	1.1	47.6	4.5
Y16507	PR1146-123/Y11405	5	37.3	51.7	41.0	98.0	1.3	47.9	5.7
Y17612	Y11405*/UC Canario707	17	36.2	53.3	42.0	99.0	1.0	47.8	4.0
Y17610	Y11405*/UC Canario707	15	35.9	63.9	41.0	101.0	1.1	48.0	4.4
Y17611	Y11405*/UC Canario707	16	35.1	58.2	41.0	100.0	1.3	47.3	3.5
Y17607	Y11405*/UC Canario707	12	35.0	50.9	42.0	101.0	1.0	48.0	4.0
Y17605	Y11405*/UC Canario707	10	34.0	52.8	41.0	101.0	1.1	48.7	4.7
Y17609	Y11405*/UC Canario707	14	33.7	55.2	41.0	101.0	1.1	48.7	4.4
Y17618	Y11405*/UC Canario707	23	33.4	64.0	42.0	101.0	1.0	48.0	4.0
Y17616	Y11405/UC Canario707//Y11405	21	31.8	52.7	42.0	103.0	1.5	48.3	4.0
Y17617	Y11405/UC Canario707//Y11405	22	30.8	55.3	43.0	101.0	1.3	47.9	4.4
Y17613	Y11405*/UC Canario707	18	30.6	54.2	42.0	98.0	1.0	46.9	3.4
Y17602	Y11405*/UC Canario707	7	29.7	58.6	42.0	100.0	1.0	47.0	4.3
Y17614	UC Canario707/Y11405//PR1146-123/Y11405	19	29.7	50.2	42.0	103.0	1.3	49.2	4.4
Y17615	Y11405/UC Canario707//Y11405	20	29.4	57.0	42.0	101.0	1.3	47.5	3.8
Y17608	Y11405*/UC Canario707	13	29.2	47.7	41.0	101.0	1.4	48.0	3.7
MEAN(28)			38.2	55.2	41.0	100.4	1.3	48.2	4.6
LSD(.05)			4.1	2.4	0.9	1.8	0.4	1.0	0.6
CV%			9.2	3.7	1.9	1.5	23.9	1.8	10.5

EXPERIMENT 7217 NATIONAL WHITE MOLD YIELD TRIAL									PLANTED: 6/14/17		
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 %
P16911	P12610/P11519	27	40.8	37.4	42.0	98.0	1.5	53.0	6.1	4.5	49.6
I15633	PT 9-5-6	5	39.5	39.0	47.0	98.0	2.0	50.5	5.1	5.0	55.1
B15430	Zenith/B12721	2	36.5	25.9	48.0	98.0	1.0	50.0	5.1	3.0	32.9
B16504	Zenith//Alpena*/B09197	23	36.3	24.8	49.0	103.0	1.0	53.7	6.0	4.0	44.4
B16507	B12720/Zenith	25	35.3	28.4	48.0	98.0	1.0	50.5	5.6	3.0	32.9
B10244	B04644/ZORRO, **ZENITH**	19	32.8	25.7	46.0	101.0	1.0	50.0	5.3	3.0	33.3
B15442	B11363/B09175	21	32.1	25.2	48.0	101.0	1.1	51.0	6.1	4.0	44.4
P14812	P09425/P08161	26	31.2	45.7	43.0	96.0	1.5	48.5	5.5	3.0	33.7
N16405	N12466/N11264	18	30.5	20.0	50.0	99.0	1.1	52.0	6.1	5.0	55.5
P14814	P11522/LONG'S PEAK	3	29.0	39.0	47.0	99.0	1.1	50.0	6.1	3.0	33.3
N15331	N12438/N12468	15	28.6	21.3	48.0	101.0	1.0	49.0	5.5	4.5	50.4
I13445	PS08-039-A-5	8	26.6	35.2	44.0	102.0	2.0	51.0	5.5	3.5	39.3
B04554	B00103*/X00822, **ZORRO**	20	26.0	23.9	48.0	98.0	1.0	49.0	5.1	4.0	44.0
I81010	JAPON3/MAGDALENE, **BUNSI**	10	25.0	23.7	44.0	99.0	1.1	47.0	4.1	4.0	44.4
B15451	B11371/B11363	22	24.5	23.6	49.0	103.0	1.0	51.0	5.7	3.3	37.0
N11283	MEDALIST/N08003, **ALPENA**	13	23.0	20.7	48.0	101.0	1.0	51.0	5.5	3.5	39.3
B16506	B11363//Alpena*/B09197	24	22.8	25.4	49.0	103.0	1.0	51.5	5.5	2.5	28.2
N14229	N11275/N11256	1	22.7	20.5	47.0	100.0	1.0	52.0	6.1	4.0	44.0
N16401	N09175/Alpena	17	21.3	23.0	45.0	98.0	1.0	47.5	5.0	5.5	61.5
I17551	SR16-5	7	20.3	44.3	43.0	95.0	1.0	45.3	4.0	2.3	25.9
N14218	N11256/N11298	14	19.8	21.2	49.0	102.0	1.3	51.0	5.0	3.7	40.7
I96417	**G122**	12	18.4	46.0	41.0	107.0	2.1	49.0	3.1	4.0	44.4
R16503	R12859/R13506	9	18.4	36.6	48.0	105.0	1.0	52.5	5.5	3.0	33.7
R98026	R94037/R94161, **MERLOT**	28	17.6	40.3	42.0	100.0	1.5	51.0	4.0	5.0	55.9
I17550	NDZ14083	6	16.4	41.0	41.0	96.0	1.7	44.0	4.0	2.7	29.6
N15341	N12468/N12466	16	15.7	23.5	49.0	102.0	0.9	50.5	5.5	5.0	55.5
I89011	RB, **BERYL**	11	14.7	34.2	42.0	95.0	3.0	41.7	3.0	4.3	48.1
R12844	SR9-5/R09508, **CAYENNE**	4	14.4	40.7	44.0	98.0	1.1	49.0	5.1	3.0	33.3
I17552	NE5-16-101	29	12.4	44.5	47.0	110.0	5.0	44.5	2.6	3.5	38.5
K15601	K11306/K11916	33	11.2	57.5	39.0	98.0	1.0	48.5	5.0	3.0	33.7
K90101	CHAR/2*MONT, **RED HAWK**	31	10.5	63.5	38.0	97.0	0.9	46.0	3.9	2.5	28.2
I17553	NE5-16-98	30	9.3	38.7	47.0	110.0	5.0	43.0	2.3	3.7	40.7
K11306	K06621/USDK-CBB-15, **RED CEDAR**	32	6.9	57.8	38.0	99.0	1.0	49.0	5.1	2.0	21.8
K08961	K04604/USDK-CBB-15, **SNOWDON**	34	2.7	69.4	40.0	97.0	0.9	47.0	3.9	2.1	23.0
K15901	K11714/K11914	35	2.6	62.7	38.0	95.0	0.9	44.5	4.0	1.0	11.1
MEAN(35)			22.2	35.7	44.9	100.0	1.5	49.0	4.9	3.5	39.1
LSD(.05)			4.4	1.6	2.1	2.2	0.3	2.4	0.7	1.1	12.4
CV%			14.6	3.3	3.4	1.6	12.6	3.6	10.6	23.3	23.3

EXPERIMENT 7219 IOWA STATE YIELD TRIAL						PLANTED: 6/13/17		
NAME	ENTRY	YIELD CWT /ACRE	100 SEED WT. (g)	DAYS TO FLOWER	DAYS TO MATURITY	LODGING (1-5)	HEIGHT (cm)	DES. SCORE
MY 06326	4	58.6	54.1	39.0	101.0	2.0	48.0	4.0
TAURUS	2	50.5	46.4	41.0	101.0	3.0	51.3	4.0
ECLIPSE	3	45.1	25.8	42.0	97.0	1.0	49.3	5.0
MONTCALM	1	37.3	67.3	35.0	104.0	1.3	47.7	4.0
MEAN(4)		47.9	48.4	39.5	100.8	1.8	49.1	4.3
LSD(.05)		3.3	1.3	0.8	0.9	0.5	1.1	-
CV%		4.2	1.7	1.3	0.6	15.7	1.4	-

EXPERIMENT 7220 YELLOW BEAN ROOT ROT TRIAL								PLANTED: 6/14/17	
NAME	**PEDIGREE**	**ENTRY**	**YIELD CWT /ACRE**	**100 SEED WT. (g)**	**DAYS TO FLOWER**	**DAYS TO MATURITY**	**LODGING (1-5)**	**HEIGHT (cm)**	**DES. SCORE**
Y16503	Y11405/UC Canario 707	5	36.2	49.4	41.0	102.0	3.7	49.0	5.5
Y17501	Y11405/PR1146-123 (oblong)	3	32.6	59.5	41.0	98.0	5.5	46.5	5.0
Y17502	Y11405/PR1146-123 (round)	4	27.9	52.2	41.0	98.0	1.0	47.0	5.0
Y11405	FR-07-AZP-14-06	2	27.1	59.8	41.0	100.0	3.5	48.5	5.0
I14515	DBY-60-1, **PATRON**	1	24.2	55.8	42.0	99.0	1.6	47.8	4.9
Y16507	PR1146-123/Y11405	6	22.5	42.7	42.0	96.0	3.7	45.8	4.9
MEAN(6)			28.4	53.2	41.3	98.4	3.2	47.4	5.1
LSD(.05)			2.9	3.2	0.0	1.4	0.0	0.6	0.6
CV(%)			4.7	3.0	0.5	0.7	47.3	0.7	5.4

USDA-ARS Cranberry and Yellow Bean Breeding Progress

Karen Cichy and Scott Shaw

USDA-ARS, Sugarbeet and Bean Research Unit and Plant Soil and Microbial Sciences Dept. Michigan State University, East Lansing, MI.

Cranberry Bean Trial: A 33 entry cranberry bean trial was planted at the Montcalm Research Farm on June 27, 2017 with two replications per entry. The entries included 30 breeding lines and three checks: Etna, Bellagio, and MICRAN. The major goal of this breeding project is to develop a high yielding, CBB resistant cranberry determinate line with seed shape and canning quality comparable to the vine MICRAN. Seed yields ranged from 17.6 to 29.1 CWT/acre with an average of 24.4 CWT/acre. The coefficient of variation (CV) was very high for seed yield (Table 1). This can partly be explained by the need to rearrange the field layout just prior to planting due to heavy rains and flooding. The canned bean appearance scores of the breeding lines ranged from 2.5 to 4.6, whereas MICRAN was rated at 4.8. The best canning score in a line that also has a low lodging score was 3.6. This is well below the 4.8 of MICRAN but much better than the 1.7 of Etna. MICRAN has been used extensively in crossing. It is a parent of the USDA-ARS breeding line CR1405. Many of the best canning lines that also exhibit upright plant architecture in this trial have CR1405 as a parent. Future goals of this program are to develop lines with root rot resistance, minimal seed coat check in a slow darkening seed background.

Yellow Bean Trial: This small seven entry trial was planted at the Montcalm Research Farm on June 27, 2017 with two replications per entry. These seven lines are all sister lines of a cross between two African yellow beans, one pale yellow fast cooking line, Ervilha, and one green/yellow slow cooking line PI527538. These particular lines were selected because they combined relatively high yield with a light yellow seed coat and fast cooking time. These lines exhibited a wide range of canned bean appearance from 1.5 to 3.3 (Table 2) and the best canning line was similar to a white kidney bean for canned bean color and shape. Future yellow bean breeding goals are to develop a very fast cooking line that also has appealing dry seed color and appearance.

Table 1. USDA-ARS 2017 Cranberry Bean Advanced Yield Trial at the Montcalm Research Farm in Entrican, Michigan

		Agronomic Measures					Canning & Cooking Quality				
ID	**Parents**	**Seed yield**	**Lodging[1]**	**CBB[2]**	**Maturity**	**Seed wt.**	**HC[3]**	**WDC[4]**	**Texture[5]**	**Rating**	**CookTime[7]**
		CTW/ACRE	**1 to 5**	**1 to 5**	**days**	**g -100 seeds**			**kg force**	**1 to 5**	**min**
CR1502_3	Dolly/CR1405	29.1	2	3	106	63	2.0	1.3	36.1	3.3	38
14L1203B		28.9	1.5	1.5	96	55	2.0	1.3	37.4	3.2	25
CR1506_1	Hooter/CR1405	28.3	1.5	2.5	102	56	2.0	1.3	36.5	3.4	34
CR1506_2	Hooter/CR1405	28.3	2	2.5	102	57	2.0	1.3	32.6	2.9	29
CR1506_8	Hooter/CR1405	28.2	2	2	96	59	2.0	1.3	34.4	2.6	28
CR1505_5	CR1405/PI661781(ADP39)	27.9	3.5	2.5	102	56	2.0	1.3	39.1	3.1	22
CR1402-1	MICRAN/CR1221	27.6	5	3.5	102	54	2.0	1.2	54.4	4.6	33
CR1504_12	CR1405/RedRider	27.6	4	2	98	57	2.0	1.3	37.3	3.3	32
CR1503_1	CR1405/Dolly	26.2	2.5	1.5	106	61	2.0	1.3	36.5	3.6	24
CR1504_1	CR1405/RedRider	25.8	1	2.5	96	63	2.0	1.3	28.5	2.5	22
CR1502_10	Dolly/CR1405	25.6	1	3	106	63	2.0	1.3	35.6	3.6	40
CR1503_9	CR1405/Dolly	25.3	1.5	2	102	59	2.0	1.3	35.6	3.2	23
CR1502_8	Dolly/CR1405	24.6	2.5	3.5	100	56	2.0	1.3	34.8	3.5	27
CR1512_2	CR1405/A483(ADP117)	24.6	1	2	94	58	2.0	1.4	27.6	2.0	27
CR1506_15	Hooter/CR1405	24.5	2.5	3	106	58	2.0	1.3	35.1	3.0	28
CR1503_4	CR1405/Dolly	24.3	2	2	98	57	1.9	1.3	33.6	3.4	51
CR1503_11	CR1405/Dolly	23.8	4.5	2	106	63	2.0	1.3	36.5	3.5	20
CR1502_1	Dolly/CR1405	23.4	2.5	3	106	55	1.9	1.3	35.2	3.5	24
CR1502_5	Dolly/CR1405	23.3	2.5	2.5	106	55	2.1	1.3	35.9	3.4	31

		Agronomic Measures					Canning & Cooking Quality				
ID	**Parents**	**Seed yield**	**Lodging[1]**	**CBB[2]**	**Maturity**	**Seed wt.**	**HC[3]**	**WDC[4]**	**Texture[5]**	**Rating**	**CookTime[7]**
		CTW/ACRE	**1 to 5**	**1 to 5**	**days**	**g -100 seeds**			**kg force**	**1 to 5**	**min**
CR1502_4	Dolly/CR1405	23.1	3	2	98	61	2.0	1.3	35.3	3.3	34
CR1504_14	CR1405/RedRider	22.1	4	2	102	45	2.0	1.3	36.5	3.5	26
CR1504_13	CR1405/RedRider	21.8	4	2	102	52	2.1	1.3	37.2	3.0	27
13-L903	C11222/C11266	21.5	1.5	1.5	102	63	2.1	1.3	31.2	2.6	35
CR1502_11	Dolly/CR1405	21.5	2	1.5	98	62	2.0	1.3	36.8	3.4	29
CR1506_3	Hooter/CR1405	21.3	1.5	2	102	55	2.0	1.3	36.3	3.5	27
CR1502_12	Dolly/CR1405	21.3	3	3	106	55	2.0	1.3	34.9	3.4	30
CR1503_2	CR1405/Dolly	20.8	3.5	2	102	55	2.0	1.3	40.0	3.6	24
CR1506_5	Hooter/CR1405	20.7	4.5	4	96	54	2.0	1.2	49.8	4.1	27
CR1503_12	CR1405/Dolly	20.3	4	2.5	98	58	2.1	1.2	42.1	3.5	20
CR1211-9	C11260/C11240	17.6	1	2	94	56	2.1	1.3	37.4	3.2	27
Checks											
Etna	Etna	27.4	1	4	94	55	2.0	1.4	27.0	1.7	24
MI Cran	MI Cran	27.1	4.5	3	106	51	2.0	1.2	50.1	4.8	25
Bellagio	Bellagio	19.9	3	2	96	54	2.1	1.2	46.7	3.0	27
	Mean	24.4	2.6	2.4	101	57	2.0	1.3	37.1	3.3	28
	CV	27.1	24.7	26.5	3	5	1.2	1.9	8.0	11.2	19
	LSD	11.2	1.3	n/a	7	6	0.1	0.1	6.0	0.7	11

[1]Lodging: Based on a scale of 1 to 5 where 1 is completely upright and 5 is completely prostrate.

[2]CBB: Common Bacterial Blight disease rating on a 1 to 5 scale where 1 is the absence of CBB on leaves and pods and 5 is 100% infection

[3]HC: Hydration coefficient: The ratio of the soaked seed weight (following an overnight soak prior to canning) and the dry seed solids in a can.

[4]WDC: Washed drained weight coefficient: The ratio of the seed weight after canning to the soaked seed weight

[5]Texture: Force required to smash a 100 g sample of canned beans.

[6]Rating: The appearance rating of canned beans on a scale of 1 to 5 where 1 is the poorest quality (i.e seed do not hold together, starch in brine, seed coat check, seed clumping) and 5 is the best quality (i.e. not seed coat check, seed coat splitting or starchy brine)

[7]Cook Time: The time required to cook 80% of a 25 seed sample in distilled water following a 12 hr soak in distilled water.

Table 2. USDA-ARS 2017 Yellow Bean Advanced Yield Trial at the Montcalm Research Farm in Entrican, Michigan

		Agronomic Measures					Canning & Cooking Quality				
ID	**Parents**	**Seed yield**	**Lodging[1]**	**CBB[2]**	**Maturity**	**Seed wt.**	**HC[3]**	**WDC[4]**	**Texture[5]**	**Rating**	**CookTime[7]**
		CTW/ACRE	**1 to 5**	**1 to 5**	**days**	**g -100 seeds**			**kg force**	**1 to 5**	**min**
YY_040	Ervilha	27	1.5	3.5	106	55.5	2.1	1.2	26.6	3.3	16
YY_172	(ADP512)	27	1	.	106	50.6	2.1	1.3	30.6	2.2	15
YY_116	/PI527538	24	1	3	106	52.2	2.0	1.3	29.2	1.5	16
YY_062	(ADP468)	22	1	3	106	52.6	1.9	1.4	27.8	2.1	19
YY_122		21	2	3	106	52.2	2.1	1.3	25.3	2.1	19
YY_053		21	1.5	2.5	106	46.6	2.0	1.3	25.9	1.8	15
YY_054		15	1	2.5	106	46.2	2.0	1.3	29.7	1.8	19
	mean	22	1.3	2.9	106	50.8	2.0	1.3	27.8	2.1	17
	CV%	6	29.4	15.8	n/a	3.9	2.6	2.1	5.8	10.8	9
	LSD	3	0.9	1.1	n/a	4.7	0.1	0.1	3.8	0.5	4

[1]Lodging: Based on a scale of 1 to 5 where 1 is completely upright and 5 is completely prostrate.

[2]CBB: Common Bacterial Blight disease rating on a 1 to 5 scale where 1 is the absence of CBB on leaves and pods and 5 is 100% infection

[3]HC: Hydration coefficient: The ratio of the soaked seed weight (following an overnight soak prior to canning) and the dry seed solids in a can.

[4]WDC: Washed drained weight coefficient: The ratio of the seed weight after canning to the soaked seed weight

[5]Texture: Force required to smash a 100 g sample of canned beans.

[6]Rating: The appearance rating of canned beans on a scale of 1 to 5 where 1 is the poorest quality (i.e seed do not hold together, starch in brine, seed coat check, seed clumping) and 5 is the best quality (i.e. not seed coat check, seed coat splitting or starchy brine)

[7]Cook Time: The time required to cook 80% of a 25 seed sample in distilled water following a 12 hr soak in distilled water.

2017 White Mold Fungicide Trial
Giles Farm, Wheeler, Michigan

Treatment	Rate	Application Code	Visual Rating	Incidence % infection	YIELD
Untreated Check			5	84	1933
Edura	8 oz	AB	3	42	2765
Omega	8 oz	AB	2	26	2945
Propulse	10.3 oz	AB	2	40	2808
Aproach	12 oz	AB	5	52	2502
Topsin M	24 oz	AB	3	52	2406
Proline	6 oz	AB	2	45	2308
Quadris	7 oz	AB	2	53	2547
Priaxor	6 oz	AB	4	70	2433
		LSD .05 =	1.82	14	543
		C. V. =	48.8%	22.6%	14.6%

Located at Varner Farm, Midland County
Application Code:A=100% or first bloom, B=10 days after 100% bloom
Rating Date: % infection "rating" on September 18, % Incidence, % Severity
Zenith Black Beans planted in 20" rows. Population of 130,680. 7 Irrigations of one half inch per week.
Planted:June 10 Harvested: October 4
First Spray: July 29, 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.
Visual Rating on August 27
A field trial was conducted to determine the efficacy of various fungicide applications on controlling white mold in Midland County. The white mold trial had seven treatments and one non-sprayed control with four replications of each treatment.

Modern vs. Conventional Sugarbeet Nitrogen Application Strategies

Kurt Steinke and Andrew Chomas, Michigan State University

See soil.msu.edu for more information

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conv., 30-in. row
Planting Date: April 26, 2017 (Harvest 10/27/17)	**Trt's**: See below
Soil Type: Clay loam; 2.9 OM; 8.0 pH; 23 ppm P; 122 ppm K	**Population**: 4 ¼ in. spacing
Variety: B1399	**Replicated**: 4 replications

N Strategy[a]	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
0 – Check	5197	265	20	17.5	96.5	87	5.5
Coulter SD 2-4 lf	8516	263	32	17.6	95.7	133	8.3
Y-Drop SD 2-4 lf	8130	265	31	17.6	95.8	102	6.7
Pre-Plant Inc.	8969	273	33	18.1	96.0	108	7.0
Surface Band SD 2-4 lf w/ UI[b]	8324	273	31	18.1	96.1	101	6.2
Rain Drop SD 2-4lf	8676	268	32	17.8	96.0	102	6.6
Streamer SD 2-4 lf	8817	275	32	18.1	96.3	93	5.6
$LSD_{(0.10)}$[c]	**1328**	**5**	**4.6**	**0.2**	**NS**	**NS**	**NS**

[a] ALL TREATMENTS OTHER THAN CHECK RECEIVED 40 N 2X2 AT-PLANT.

[b] UI, Urease inhibitor

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

Summary: Trial quality was average to good. Please note all treatments received 2x2 N at-plant (40 lb./A). Sidedress N applications were completed at the 2-4 leaf stage on May 30 for a total N application rate of 160 lb./A. Very few differences in tonnage and quality were observed in 2017 due to N strategy. Nitrogen still requires moisture for root uptake and the dry July through September soil conditions likely limited both N movement and plant growth resulting in few differences between N application methods. Trial will be repeated in 2018. Across cropping systems, 2x2 subsurface N applications have continued to offer the most consistency across variable spring and summer weather conditions but this may not translate to yield benefits each and every year. Nitrogen stabilizers, specifically urease inhibitors, can have both positive and negative effects on yield depending upon weather conditions soon after application. As N application strategies continue to evolve, remember that a more efficient strategy to apply N may not necessarily improve (and can also reduce) the efficacy of the applied N.

Early-Harvest Sugarbeet Nitrogen Response

Kurt Steinke and Andrew Chomas, Michigan State University

See soil.msu.edu for more information

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conv., 30-in. row
Planting Date: April 26, 2016 **(Harvest 8/29/17)**	**N Rates**: See below
Soil Type: Clay loam; 2.9 OM; 8.0 pH; 23 ppm P; 122 ppm K	**Population**: 4 ¼ in. spacing
Variety: B1399 **Prev. Crop**: Non-interseeded winter wheat	**Replicated**: 4 replications

N Trt. (Total lb. N/A)	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
0 – Check	2294	259	8.9	17.3	95.9	56	3.8
40	3248	261	12.4	17.5	95.4	59	4.1
80	4614	269	17.1	18.0	95.7	70	4.5
120	4526	267	17.1	17.8	95.7	82	5.2
160	4728	263	18.0	17.7	95.2	104	6.7
200	4197	253	16.6	17.3	94.7	109	7.0
$LSD_{(0.10)}$[a]	**985**	**NS**	**3.8**	**0.4**	**0.6**	**21**	**1.1**

[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)[a]	Net Economic Return Minus N Costs and Trucking ($/A)[b]
0 – Check	636	636	602
40	895	880	835
80	1,273	1,243	1,179
120	1,260	1,214	1,150
160	1,300	1,239	1,172
200	1,161	1,085	1,021

[a, b] Gross grower payment and net economic returns based upon a $40/ton base payment with early delivery, volume, and quality incentives; N price of $0.38/lb.; trucking costs of $3.75/T.

Summary: Trial quality was average to good. 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 April 26. Sidedress N applications were completed at the 2-4 leaf stage on May 30. In the current study, nitrogen treatments receiving 80 lb. total N (40 N as 2x2) resulted in the best combination of tonnage, sugar quality, and profitability for this early harvest date. Worth noting was that yield and RWSA were in some cases 50% reduced from 2016 early harvest data due to dry weather conditions.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Sugarbeet Nitrogen Response Following Wheat

Kurt Steinke and Andrew Chomas, Michigan State University

See soil.msu.edu for more information

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conv., 30-in. row
Planting Date: April 26, 2017 (Harvest 10/27/17)	**N Rates**: See below
Soil Type: Clay loam; 2.9 OM; 8.0 pH; 23 ppm P; 122 ppm K	**Population**: 4 ¼ in. spacing
Variety: B1399	**Replicated**: 4 replications

N Trt. (Total lb. N/A)	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
0 – Check	5396	272	20	17.9	96.5	65	4.2
40	6576	274	24	18.1	96.3	60	3.9
80	6910	274	25	18.0	96.4	74	4.7
120	7599	274	28	18.2	96.0	73	4.6
160	7466	268	28	17.7	96.1	96	6.2
200	7151	263	27	17.6	95.7	119	7.8
240	7364	249	30	16.9	95.1	174	11.4
$LSD_{(0.10)}$[a]	**NS**	**13**	**NS**	**0.7**	**0.4**	**41**	**2.7**

[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)[a]	Net Economic Return Minus N Costs and Trucking ($/A)[b]
0 – Check	791	791	716
40	957	942	852
80	996	966	872
120	1,116	1,070	965
160	1,092	1,031	926
200	1,033	957	856
240	1,087	996	905

[a, b] Gross grower payment and net economic returns based upon a $40/ton base payment with volume and quality incentives, an N price of $0.38/lb., and trucking costs of $3.75/T.

Summary: Trial quality was average to good. 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 April 26. Sidedress N applications were completed at the 2-4 leaf stage on May 30. Dry July through September soil conditions limited plant growth. In this particular study, 120 lb. total N (40 N as 2x2 and 80 N sidedress) resulted in the best combinations of tonnage, quality, and profitability. Rates greater than 120 lb. N did not increase yield or sugar and increased amino-N concentrations beyond 5.0.

Sugarbeet Response to Phosphorus Fertilizer

Kurt Steinke and Andrew Chomas, Michigan State University

See soil.msu.edu for more information

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conv., 30-in. row
Planting Date: April 26, 2017 (Harvest 10/27/17)	**Trt's**: See below
Soil Type: Clay loam; 2.9 OM; 8.0 pH; 23 ppm P; 122 ppm K	**Population**: 4 ¼ in. spacing
Variety: B1399	**Replicated**: 4 replications

P Trt. (Total lb. P_2O_5/A)	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
0 – Check	8243	269	31	17.8	96.2	103	7.1
25	8872	269	33	17.8	96.1	144	9.4
50	8161	269	30	17.8	96.0	101	6.8
100	8081	261	31	17.5	95.6	110	7.0
200	8608	268	32	17.8	96.0	98	6.5
$LSD_{(0.10)}$[a]	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

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

P Trt. (Total lb. P_2O_5/A)	Gross Grower Payment ($/A)	Net Economic Return Minus Trucking ($/A)[a]
0 – Check	1,213	1,097
25	1,291	1,167
50	1,174	1,062
100	1,177	1,061
200	1,247	1,127

[a] Gross grower payment and net economic returns based upon a $40/ton base payment with volume and quality incentives and trucking costs of $3.75/T.

Summary: Trial quality was average to good. All treatments received 40 lbs. N/A as 28% placed 2x2 on April 26. Phosphorus applications consisted of triple superphosphate applied as a 2x2 at-planting. The 200 lb. P_2O_5/A treatment was applied per-plant incorporated. Sidedress N applications (120 lb. N/A) were completed at the 2-4 leaf stage on May 30 for a total N application of 160 lb./A. In the current study, phosphorus application did not influence tonnage or quality. Producers will want to monitor residual soil P levels to determine whether or not a P application is warranted.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Raindrop Nozzles as a Sugarbeet N Application Strategy

Kurt Steinke and Andrew Chomas, Michigan State University

See soil.msu.edu for more information

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conv., 30-in. row
Planting Date: April 26, 2017 (Harvest 10/27/17)	**Trt's**: See below
Soil Type: Clay loam; 2.9 OM; 8.0 pH; 23 ppm P; 122 ppm K	**Population**: 4 ¼ in. spacing
Variety: B1399	**Replicated**: 4 replications

N Strategy	2x2 N (lb/A)	Method, Rate, Timing of SD N (lb/A)
1	40	Raindrop, 120 N, 2-4 lf
2	40	Raindrop, 80 N, 2-4 lf
3	40	Raindrop, 120 N in a 50% water solution, 2-4 lf
4	40	Raindrop, 80 N in a 50% water solution, 2-4 lf
5	40	Raindrop, 120 N, 8-10 lf
6	40	Raindrop, 80 N, 8-10 lf
7	40	Raindrop, 120 N in a 50% water solution, 8-10 lf
8	40	Raindrop, 80 N in a 50% water solution, 8-10 lf
9	40	Flat-fan, 120 N, 2-4 lf
10	40	Flat-fan, 120 N, 8-10 lf
11	40	Surface Band, 120 N, 2-4 lf
12	Check – 0 N	Check – 0 N

N Strategy[a]	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
1	9291	278	34	18.4	96.0	87	5.6
2	8816	279	31	18.3	96.3	65	4.2
3	7864	281	28	18.5	96.1	64	3.9
4	7832	275	28	18.1	96.3	70	4.5
5	8330	276	30	18.2	96.1	89	5.6
6	8984	272	32	18.0	96.1	86	5.7
7	8989	270	33	17.8	96.2	86	5.6
8	8752	273	32	18.0	96.2	75	4.8
9	9676	277	35	18.3	96.0	103	6.4
10	8731	269	33	17.8	96.0	70	4.7
11	9553	275	35	18.1	96.2	95	6.1
12	5567	266	21	17.5	96.4	79	4.9
$LSD_{(0.10)}$[b]	**1198**	**8**	**4.2**	**0.5**	**NS**	**NS**	**NS**

[a] ALL TREATMENTS OTHER THAN CHECK RECEIVED 40 N 2X2 AT-PLANT.

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

Preliminary Summary: Trial quality was average to good. Please note all treatments received 2x2 N at-plant (40 lb./A). Sidedress N applications were completed at the 2-4 or 8-10 leaf stage for a total N application rate of 120 - 160 lb./A (see treatment list). At the 2-4 lf stage, data show significantly less % foliar damage where UAN was blended with water using raindrop nozzles but yield declines were greater where UAN was blended with water as compared to straight UAN. These results carried through to RWSA. Few differences in tonnage and RWSA were observed among the 8-10 lf SD treatments. The two flat-fan application methods were intended to serve as a worst-case scenario comparison but resulted in comparable yield and RWSA to other treatments. Greater foliar damage was observed with the 8-10 lf flat-fan treatment as compared to the 2-4 lf flat-fan. The more conventional SD strategy banded to the side of the row at 2-4 lf resulted in one of the better combinations of tonnage and quality. Dry mid- and late-summer growing conditions may have influenced results of some treatments more than others. Trial will be repeated in 2018 to gauge the sugarbeet response to the raindrop nozzle application method under additional environmental conditions.

MSU Wheat Breeding and Genetics 2016 Report

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Introduction

Michigan had the second highest non-irrigated wheat yield in the United States at 79 bu/ac in 2017 (nass.usda.gov). The counties of the thumb region have the highest yields in the state and account for up to 35% of all wheat bushels produced in Michigan. To observe high-end yield potential and target the largest production area of the state, MSU Wheat Breeding and Genetics conducts early generation selection and yield testing at the Saginaw Valley Research and Extension Center near Richville, MI.

Three large yield testing projects were conducted at SVREC in 2017. As part of the variety development program, advanced yield trials (AYT), preliminary yield trials (PYT) and the Uniform Eastern Soft White Winter Wheat Nursery were tested in order to target new high yielding varieties to the thumb region of Michigan.

Advanced Yield Trials

Plant Materials

A total of 100 new soft red and white winter wheat lines were entered into advanced testing at SVREC in 2017. Soft white winter wheat check varieties were Ambassador and Dyna-Gro 9242. Soft red winter wheat check varieties were DF 112R and Pioneer 25R40.

Trial Design

Entries and checks were tested in two replicates in an alpha lattice design. In addition to SVREC, the advanced yield trial was tested in Allegan, Huron, Lenawee, and Sanilac counties.

Results and Discussion

Grain yield was lower in 2017 than previous year due to extreme conditions throughout the growing season. Early in the season, wet conditions caused waterlogging and uneven stands across trials. In June and July, very dry conditions were present during the grain fill period which lowered grain yield significantly. Extreme temperature spikes above 90°F led to low test weights. Blocking factors and adjusted plot values allowed for the recovery of valuable grain yield data.

A total of 10 soft winter wheat lines have been advanced to further testing in the Michigan State Wheat Performance Trial using data collected from five locations including SVREC (Table 1). The soft white winter line MI14W0906 yielded significantly

higher than the adapted check variety Ambassador and was the highest yielding breeding line overall. MI14W0906 was also the highest yielding entry in the 2016 preliminary yield trials at SVREC. High yield performance across multiple years suggests this line will soon be a candidate for release as a new soft white winter wheat variety.

Preliminary Yield Trials

Plant Materials

Preliminary yield trials were comprised of 800 new soft red and soft white winter wheat entries and the check varieties Ambassador and Pioneer 25R40 (Table 1). Preliminary yield trials were comprised of 1000 new soft red and soft white winter wheat entries and the check varieties Ambassador and Pioneer 25R40 (Table 2).

Trial Design

An augmented design was used where new entries were planted in single replicates. Check varieties were replicated across blocks to account for field variation. Effects of individual blocks were determined and yield values of experimental lines were adjusted accordingly. Ambassador was replicated four times in each block. The Pioneer 25R40 check was planted randomly across the field. A random effects model was used to account for variation due to random effects of range, pass and blocks $y_{ijk} = \mu + g_i + r_j + p_j + error_{ij}$, where g_i is the random effect of the i^{th} genotype, e_j is the random effect of the j^{th} range, and p_j is the random effect of the j^{th} pass. BLUPs were estimated for all entries and checks and the random effect of genotype.

Results and Discussion

Field variation was extensive across the preliminary yield trial. However, all source of variation could be accounted for in analysis and reliable yield estimates were obtained. A total of 10 soft winter wheat lines from the preliminary yield trial yielded higher than the check variety Ambassador. From the PYT, 76 entries are being tested in replicated trials at six locations in 2018. The ten highest yielding breeding entries are shown in Table 2.

Uniform Eastern Soft White Winter Wheat Nursery

Plant Materials

The UESWWWN is comprised of soft white winter wheat entries from Michigan State University (MI14 entries), Cornell University (NY entries) and KWS Cereals. In 2017, the UESWWWN was comprised of 19 entries and five check varieties (Table 3).

Results and Discussion

Waterlogging early in the season and additional soil fertility factors led to highly variable results and a very high LSD. Results from the UESWWWN did not correlate well with result from other states including Indiana and Ohio.

Acknowledgements

MSU Wheat Breeding and Genetics is supported by The Michigan Wheat Program, Michigan Crop Improvement Association, companies of the Michigan Millers Association, Project GREEEN, The US Wheat and Barley Scab Initiative and USDA-National Institute of Food and Agriculture.

Table 1. Yield performance of ten soft red and white winter wheat entries and check varieties in the MSU Wheat Breeding and Genetics advanced yield trial.

Line	Pedigree	Overall Yield bu/ac	Overall Rank	SVREC Yield bu/ac	SVREC Rank
DF 112R	-	90.7	1	97.2	1
P25R40	-	87.8	2	77.9	23
MI14W0906	MISCHDS-148/VA03W-412	87.2	3	93.6	3
MI15W0461	Jupiter/D6234	84.6	4	81.9	16
MI14W1039	Ambassador/D6234	84.5	5	84.2	13
MI14W0742	UNKNOWN	84.3	6	84.7	12
MI15W0193	E0009/E5024	82.8	7	73.2	41
MI14R1140	Ambassador/Shirley	82.5	8	74.8	36
MI14W0901	MISCHDS-148/VA03W-412	82.5	8	72.3	47
MI14W1046	D6234/3/E6003//FHB12/Ambassador	82.5	8	82.9	15
MI15R0388	OH04-264.58/Truman	82.5	8	86.7	9
MI15R0068	Ambassador//D6234/VA06W-553	82.2	12	81.4	17
Ambassador	P2737W/D1148	78.3	38	77.8	24
DG9242W	-	77.6	46	68.4	70
	MEAN	76.5		72.3	
	LSD (0.05)	3.4		11.0	
	CV (%)	5.6		9.2	

Table 2. Wheat lines in preliminary testing with grain yield higher than the check variety Ambassador. PHS is preharvest sprouting rated on a 0 to 9 scale (0 = no visible sprouting). FHB is resistance to Fusarium head blight resistance rated 1 to 5 (1 = most resistant).

Line	Pedigree	BLUP	Rank	PHS	FHB 1-5
MI16W1105	E0009/Jupiter	5.90	2	6.6	4.1
MI16W0209	E2041//E6003/Truman	5.45	3	4.5	2.7
MI16W0159	E0001/E6012	4.90	4	7.9	3.5
MI16R1262	OH04-264.58/Jensen	4.76	5	-	-
MI16R0677	E5024/MO080103	4.66	6	-	3.3
MI16R0918	E2041//Coral/Ernie	4.62	7	-	3.2
MI16R0727	E8052/MO080373	4.31	8	-	3.0
MI16W0275	E8052/E8007	4.16	9	6.6	-
MI16R0936	E2041//E6003/WSY	3.98	11	-	3.2
MI16W0425	Jupiter//25R47/WA-1-93	3.96	12	4.7	3.1
Ambassador		4.03	10	5.5	5.0

Table 3. Results from the Uniform Eastern Soft White Winter Wheat Nursery

Line	Pedigree	Yield bu/ac	Test Weight	Flowering JDF	Height in.
Ambassador	P2737W/D1148	55.8	54.6	151.5	26.5
Caledonia	Offtype selection out of Geneva (Cornell)	56.3	55.4	151.5	25.5
Cayuga	Reselection of NY262-37-10W	53.1	55.7	152.0	34.5
Venus	PIONEER25W60//PIONEER25W33/VAN98W-170WS	58.6	53.8	151.5	27.5
Jupiter	Caledonia / NY88024-117	56.6	55.7	152.0	25
KWS148	W06202B7202/W06-597A	74.0	59.0	151.0	32
KWS145	Arena/INW803	68.6	54.7	151.5	26.5
MI14W0652	TW93213/D6234	68.5	56.1	151.0	29.5
KWS147	W07-999/W06703	68.0	49.6	151.0	23
MI14W0245	Oasis/Ambassador	67.4	57.0	151.0	28.5
MI14W0003	Unknown	63.8	55.9	151.5	29.5
MI14W0064	Ambassador/Jupiter	62.5	55.2	151.5	26
NY07078-876	Pio25W41 x NY88046-8138	61.6	53.4	151.5	27.5
MI14W0250	Shirley/Ambassador	61.5	57.3	151.5	28
MI14W0190	Jupiter/3/E6003//FHB12/Ambassador	61.3	56.3	152.0	25.5
MI14W0300	Aubrey/MO050699	59.0	55.9	151.5	25
NY94052-6090B-1074	Pio2737w/Harus(18)	57.7	53.1	152.0	27
NY99056-161	NY85020-395/Pio25W33	57.6	54.2	151.5	24.5
MI14W0334	D8006W//FHB12/D8006W	56.3	56.4	152.0	26.5
MI14W0598	E0027/E5201	55.0	52.4	152.0	28
KWS146	D8006*/W06703	52.4	58.5	151.0	28.5
NY99069-249	Harus x P89204A8-1-59	51.5	56.0	151.0	25
MI14W0054	P25W33/D8006W	50.5	52.0	150.0	30.5
MI14W0013	Unknown	48.0	55.9	152.0	30.5
	MEAN	59.4	55.2	151.5	27.5
	LSD (0.05)	11.2	3.1	1.5	4.1
	CV (%)	11.0	3.3	0.6	8.7

2017 Seedless Pickling Cucumber Variety Trial

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A pickling cucumber variety trial was planted at the Saginaw Valley Research and Extension Center (43.399097, -83.694497, Frankenmuth, Michigan). Rijk Zwaan (RZ) and Bejo seed companies donated parthenocarpic (seedless) cucumber seeds for the trial.

On 7 June, 2017, 11 varieties were planted in a completely randomized design with four replications. Seeds were pre-counted and distributed into four rows by a cone planter. Rows were 20 ft long, 20 inches on-center, with 10 inch in-row spacing, targeting 30,000 seeds per acre. The soil type was a Tappan-Londo loam with a poor-moderate drainage class, typical of the pickling cucumber-growing region of Michigan's Saginaw Valley.

On 23 May, 300 pounds 18-15-12-4S-0.9Mn-0.8Zn was preplant incorporated, resulting in 54 lb N, 45 lb P, 36 lb K, 12 lb S, 2.7 lb Mn, and 2.4 lb Zn per acre. On 8 June, Curbit preemergent herbicide was applied at 2pt/a. Before tip-over on 3 July, the plots were rototilled between the rows. Three protective downy mildew sprays occurred 3 July (Zampro 14 fl oz/ac + Bravo 2 pt/ac), 12 July (Zampro 14 fl oz/ac + Badge 1.5 pt/ac), and 19 July (Ranman 2.5 fl oz/ac+ Koverall 3 lb/ac).

All cultivars were harvested and measured on 30 July (day 53). Harvest transects were entire 20 ft long sections of one of the middle rows in the 4-row plots. Each transect was destructively harvested by hand, and all fruit were sent through a sorter to separate into size classes: 4s (> 2" in diameter), 3Bs (1.75 - 2"), 3As (1.5 - 1.75"), 2Bs (1.25 – 1.5"), 2As (1.0625 – 1.25"), and 1s (0.5 – 1.0625"). Harvest weights and L:D ratios of each size class were measured. L:D ratios were measured from ten cucumbers per size class. If there were fewer than ten cucumbers in a size class, they were all measured. Fruit per plant, and total bushel per acre yield calculations do not include culls. This year, I also measured the percentage of plants that had zero harvestable fruit, one harvestable fruit, and two or more harvestable fruit. Plants with zero fruit were almost always late germinating, small plants.

Results

All varieties germinated within seven days. It was discovered that one plot of RZ71 had been skipped and overplanted into an Ansor plot. Those plots were rogued and replanted by hand, but were consequently washed out in a heavy, late June rain. Due to having only 3 replications they were compared with a different LSD value than the others.

Rubinstein, Gershwin, Liszt, and RZ71 were good overall performers with high mature plant density, high yields, and a high ratio of plants producing two or more fruit. Rubinstein, Liszt, RZ71, and Artist appeared to be shorter maturing varieties, with more fruit in size class 4 at time of harvest. All Bejo varieties produced European-style warty fruit of high quality, borne on plants with long vines due to the hand-pick sector they were bred for originally. However, the mature plant density of Bejo varieties was among the lowest in the trial. RZ72, Ansor, and B3088 had nearly equal numbers of plants producing no fruit, and plants producing two or more fruit.

Cull rates were between 0% and 12.42%, depending on the variety. Culls for all varieties were primarily from crooked fruit.

Table 1. Data on 11 seedless picking cucumber varieties planted at the Saginaw Valley Research and Extension Center in 2017. Values are averaged across four replicates, or three replicates (RZ71, Ansor). Values in **bold** indicate that the variety performed statistically similar to the variety with the highest value for that column, as determined through a Least Significant Difference test at alpha = 5% and a two-tailed t-statistic $_{(31,0.05\%)}$. NS indicates that there were No Significant differences between varieties.

Variety	Bushels Per Acre						Fruit Per Plant	Plants Per Acre	% Cull
	Total	4	3B	3A	2B	2A			
Rubinstein	**414.84**	**143.27**	**137.83**	75.89	43.90	13.95	2.06	**31037**	**10.56**
RZ71*	**392.95**	**179.23**	**117.07**	68.97	23.60	4.08	1.84	**29621**	**11.49**
Gershwin	**366.86**	44.92	**134.42**	**132.38**	46.96	8.17	1.72	**33324**	**15.61**
Liszt	**363.11**	**128.64**	**109.92**	81.68	31.65	11.23	1.76	**33324**	**10.89**
Bowie	296.75	33.35	**130.34**	91.54	34.71	6.81	1.64	**27116**	**11.32**
Artist	254.21	**102.09**	**98.01**	31.65	17.36	5.10	1.72	20255	3.46
RZ72	251.49	45.60	79.97	67.38	41.86	16.68	1.50	**30710**	6.38
RZ70	238.22	23.14	62.28	93.59	49.01	10.21	1.55	**27443**	**10.86**
Ansor*	191.94	58.53	62.16	40.84	24.96	5.45	1.15	**25265**	8.01
B3088	169.82	43.56	33.01	43.22	37.43	12.59	1.24	**26136**	0.00
Amour	151.44	35.39	34.71	51.05	24.16	6.13	1.36	18949	3.45
Average	280.52	74.12	90.94	71.50	34.61	9.33	1.60	27567.37	8.30
LSD 5%	**90.84**	**81.09**	**42.10**	**35.33**	NS	NS	NS	**7614.63**	**6.97**
LSD 5%*	**97.84**	**87.34**	**45.35**	**38.05**	NS	NS	NS	**8201.21**	**7.51**
P-value 5%	<0.001	0.006	<0.001	<0.001	0.461	0.247	0.086	0.006	0.003
CV %	37.08	94.09	50.06	49.62	60.01	76.33	25.75	23.80	74.23

Variety	Company	Skin Type	L:D Ratios				Percentage of plants with		
			3B	3A	2B	2A	0 fruit	1 fruit	>2 fruit
Rubinstein	RZ	Am	2.46	2.73	2.95	3.16	21.31	3.25	75.43
RZ71*	RZ	Eur	2.52	2.69	2.92	2.17	15.90	9.24	74.86
Gershwin	RZ	Am	**2.77**	**2.91**	3.11	3.47	23.39	7.25	69.36
Liszt	RZ	Am	2.61	2.65	2.79	2.41	5.90	23.32	70.78
Bowie	RZ	Am	**2.72**	**2.82**	3.02	3.47	27.78	13.17	59.04
Artist	BE	Eur	2.61	2.73	2.85	2.37	26.67	8.75	64.58
RZ72	RZ	Eur	**2.63**	**2.92**	2.97	3.10	**48.27**	1.00	50.73
RZ70	RZ	Am	**2.78**	**2.91**	3.10	3.54	**35.28**	7.34	57.38
Ansor*	BE	Eur	**2.80**	**2.85**	3.04	3.26	**42.77**	9.31	47.92
B3088	BE	Eur	2.83	**2.81**	3.20	3.26	**48.49**	5.29	46.22
Amour	BE	Eur	**2.67**	**2.78**	2.97	2.95	27.20	14.29	58.52
Average	-	-	2.67	2.80	2.99	3.03	29.36	9.29	61.35
LSD 5%	-	-	**0.21**	**0.16**	NS	NS	**18.17**	NS	NS
LSD 5%*	-	-	**0.23**	**0.17**	NS	NS	**19.57**	NS	NS
P-value 5%	-	-	0.027	0.017	0.320	0.509	0.001	0.178	0.084
CV %	-	-	6.36	4.70	7.40	31.23	57.52	112.05	26.19

Control of Rhizoctonia crown and root rot with fungicides in sugarbeet-Richville 2017

Sugar beet cv. Crystal G351NT was PAT-treated and planted at the Michigan State University Bean and Beet Farm, Richville, MI on 11 May (Figure 1). Seed was planted at 1" depth into four-row by 15-ft plots (ca. 2.5 in. between plants to give a target population of 480 plants/100 ft. row) with 20" 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 XR8002VR nozzle per row in a 6" band at planting (A) or on 21 Jun at GS 2-8 (B). Weeds were controlled by cultivation and with Roundup Original Max 2.0 pt/A applied at GS 2-4 and GS 6-8. Insects were controlled as necessary. Plant stand was rated 15, 22 and 29 days after planting (DAP) and relative rate of emergence was calculated as the Relative Area Under the Emergence Progress Curve [RAUEPC from 0 – 40 DAP, maximum value = 100]. Plots were inoculated on 6 June [27 days after planting (DAP)] by spreading *R. solani* Anastomosis Group 2.2 (IIIB) infested millet across all plants in each plot (Figures 2-9). Plots were hand hoed at 14 days after inoculation (DAI) to achieve ca. 6 in between plants to give a target population of 200 plants/100 ft. and the relative rate of disease progression was calculated as the Relative Area Under the Disease Progress Curve [RAUDPC from 0 – 55 DAI, maximum value = 100]. Beetroots were machine-harvested on 23 August and individual treatments were weighed. Two rows of beets per plot were harvested 104 DAP (15 ft from start of each plot from two center rows) and assessed for crown and root rot (*R. solani*) incidence (%) and severity. Sugar content was measured at the Michigan Sugar Company analytical service laboratory. Severity of crown and root rot was measured as an index calculated by counting the number of roots falling in class 0 = 0%; 1 = <5% (inactive lesions); 2 = <5% (active lesions, no cracking); 3 = 6 – 25% (surface area of root affected by lesions); 4 =26 - 50% (surface area of root affected by lesions); 5 = 51 – 75% (surface area of root affected by lesions); 6 = >75% (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.

Meteorological Data

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 56.6, 70.5, 70.1 and 66.6 (May, Jun, Jul and Aug, respectively) and the number of days with maximum temperature >90°F over the same period was 0 for each month except Jun with 2 days. Average daily relative humidity (%) over the same period was 63.1 69.0 73.1 and 70.2.8. Average daily soil temperature at 4" depth (°F) over the same period was 56.0, 66.3, 73.0, and 62.6. Average daily soil moisture at 4" depth (% of field capacity) over the same period was 31.4, 36.1, 38.2, and 38.3. Precipitation (in.) over the same period was 1.97, 4.83, 1.1 and 4.52.

Results

Soil temperature and moisture conditions enhanced development of crown and root rot throughout the season. Treatments with final plant stand less than 67.5% had significantly lower plant stand in comparison the non-treated check. No treatments were significantly different from either check in terms of RAUEPC. Treatments with a RAUDPC value of less than 81.8 were significantly lower than the non-treated check. All treatments that had a severity index higher than 23.3 at 104 DAP were significantly lower than non-treated check (26.1). All treatments with greater than 33.9% marketable beets were significantly different from not-treated check (14.8%). No phytotoxicity was observed from any treatments.

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

Treatment and rate/1000 ft. row (A)= at planting; (B)= at GS 2-8[a, j]	Plant stand[b] 29 DAP[c] (%)[j]	RAUEPC[d] 0 – 29 DAP[j]	RAUDPC[e] 0 – 55 DAI[f, j]	Crown and root rot Severity[g] 104 DAP (%)[j]	Yield (t)[j]	Sugar content (%)[j]	RWST (lb)[h, j]	Marketable beets (%)[i, j]
Non-treated	73.6 ab	44.6 ab	86.1 b	26.1 a	6.0 b	13.8 b	182.8 b	14.8 c
Quadris 2.08SC 0.545 fl oz (A)	68.8 b	49.5 a	83.2 ab	17.1 cd	7.0 a	16.2 a	230.6 a	50.4 ab
Quadris 2.08SC 0545 fl oz (A); Quadris 2.08SC 0.545 fl oz (B)	78.8 a	43.5 b	81.8 b	17.2 cd	6.9 a	15.8 a	222.6 a	54.5 ab
Aprovia 0.83EC 0.391 fl oz (A)	74.7 ab	44.1 ab	84.0 ab	18.3 bcd	7 a	16.0 a	227.2 a	48.5 ab
Aprovia 0.83EC 0.391 fl oz (B)	76.7 ab	43.8 b	81.5 b	19.9 bc	6.9 a	15.9 a	226.0 a	47.4 ab
Elatus 45WG 0.273 fl oz (A)	76.7 ab	44.8 ab	81.4 b	23.3 ab	6.7 a	15.3 a	214.4 a	33.9 bc
Elatus 45WG 0.273 fl oz (B)	71.0 ab	46.7 ab	83.1 ab	18.0 bcd	7.0 a	16.1 a	227.3 a	53.3 ab
Elatus 45WG 0.273 fl oz (A); Elatus 45WG 0.273 fl oz (B)	67.5 b	49.1 ab	81.1 b	15.2 d	7.0 a	16.0 a	226.9 a	68.9 a

[a] Application dates; A= 11 May; B= 21 Jun.
[b] Plant stand expressed as a percentage of the target population of 480 plants/100ft. row from a sample of 2 x 15 ft rows per plot.
[c] DAP = days after planting on 11 May.
[d] Relative area under the emergence progress curve from planting to 29 days after planting.
[e] Relative area under the disease progress curve from inoculation to 55 days after inoculation.
[f] DAI = days after inoculation on 6 Jun.
[g] Severity of crown and root rot was measured as an index calculated as described in the text.
[h] RWST= Recoverable White Sucrose per Ton
[i] The number of beets falling into classes 0 – 3 was summed and a percentage calculated as marketable beets.
[j] Means followed by same letter are not significantly different at $p = 0.05$ (Fishers LSD).

Figure 1. Sugarbeet Rhizoctonia management experimental research trial at Michigan State University Saginaw Valley Research and Extension Center in 2017.

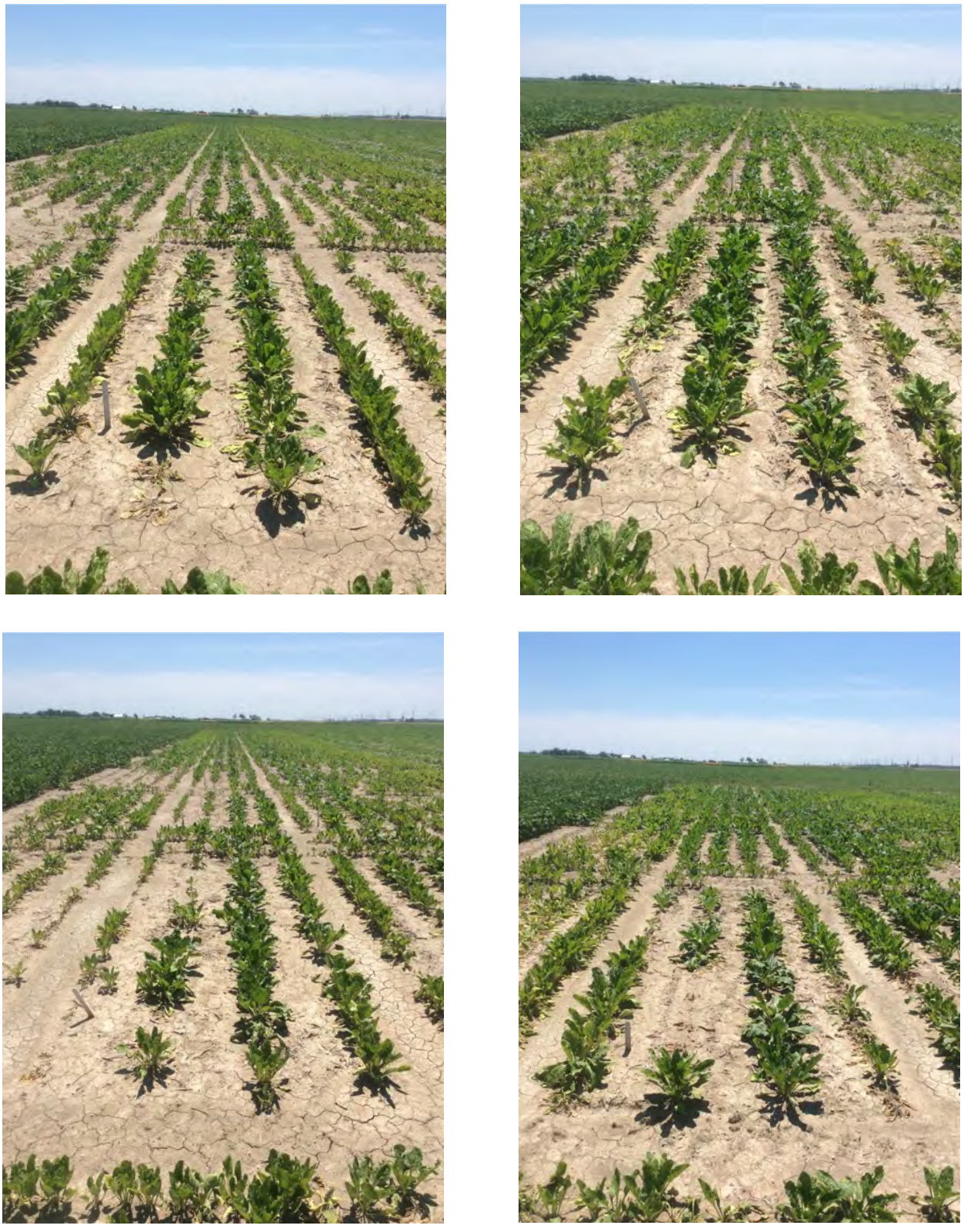

Figure 2. Sugarbeet Rhizoctonia management experimental research plots left as non-treated control.

Figure 3. Sugarbeet Rhizoctonia management experimental research plots treated with Quadris at a rate of 0.545 fl oz/A in furrow at planting.

Figure 4. Sugarbeet Rhizoctonia management experimental research plots treated with Quadris at a rate of 0.545 fl oz in furrow at planting and banded application at 6-8 leaf growth stage.

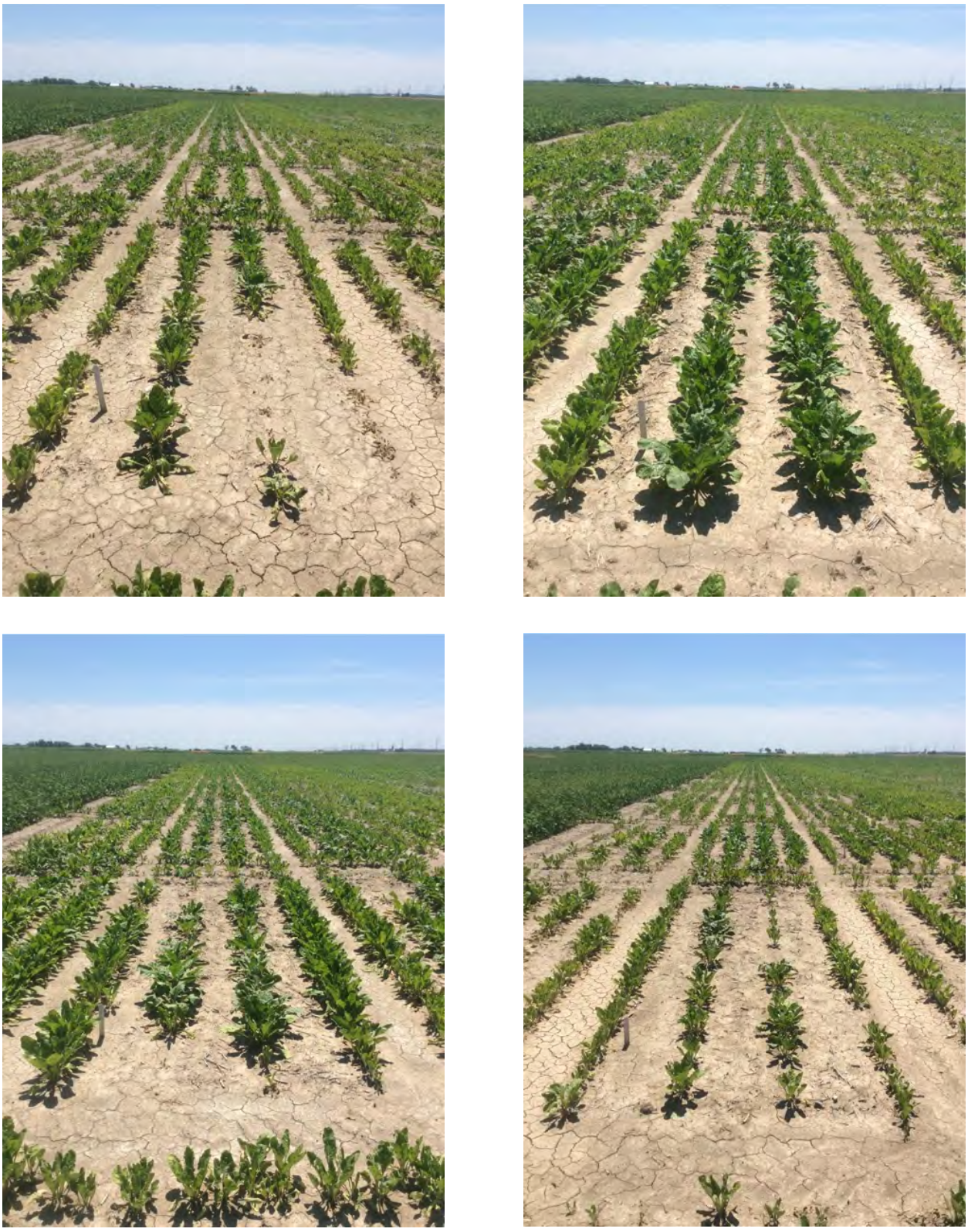

Figure 5. Sugarbeet Rhizoctonia management experimental research plots treated with Aprovia at a rate of 0.391 fl oz in furrow at planting.

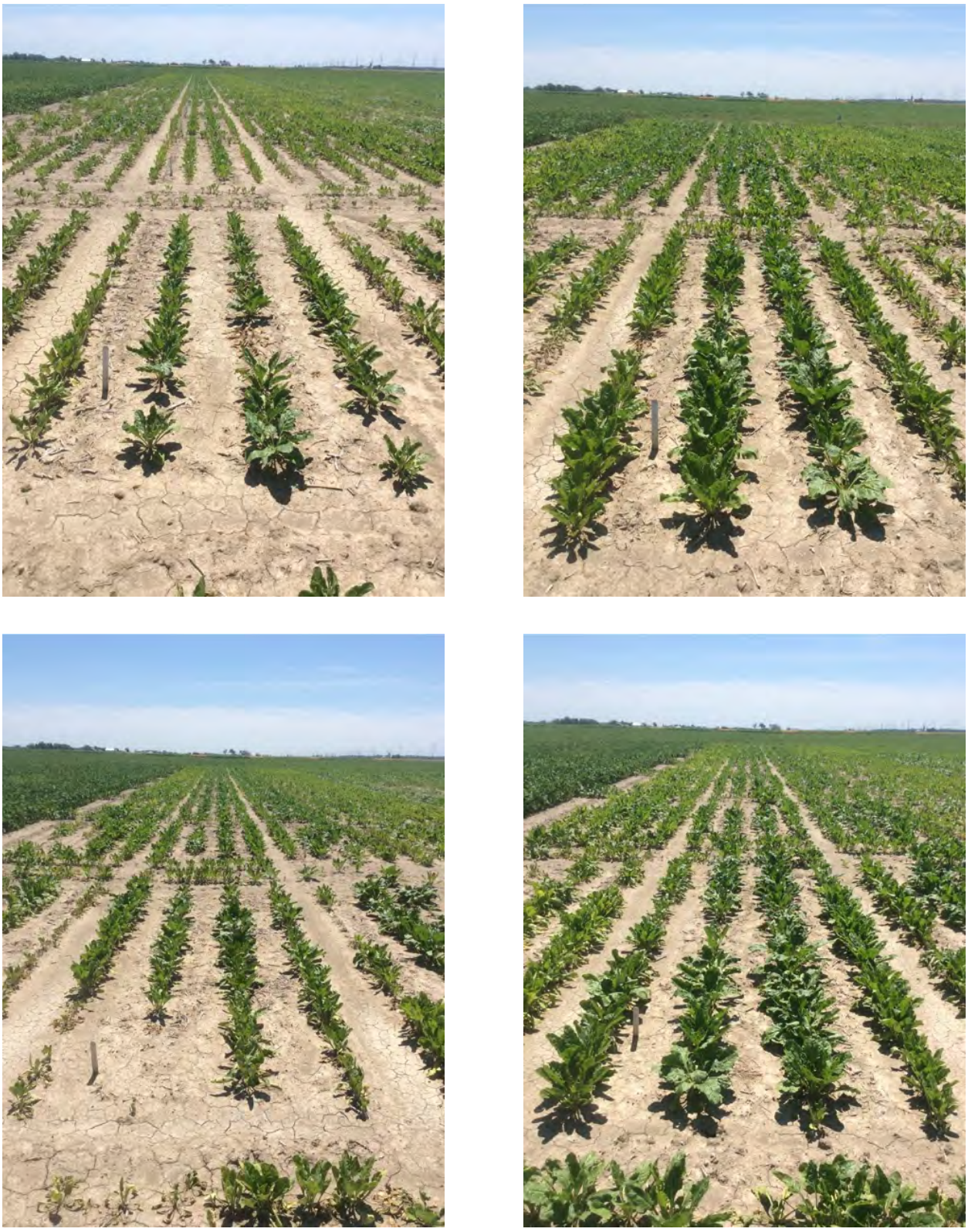

Figure 6. Sugarbeet Rhizoctonia management experimental research plots treated with Aprovia at a rate of 0.391 fl oz in furrow at planting and banded application at 6-8 leaf growth stage.

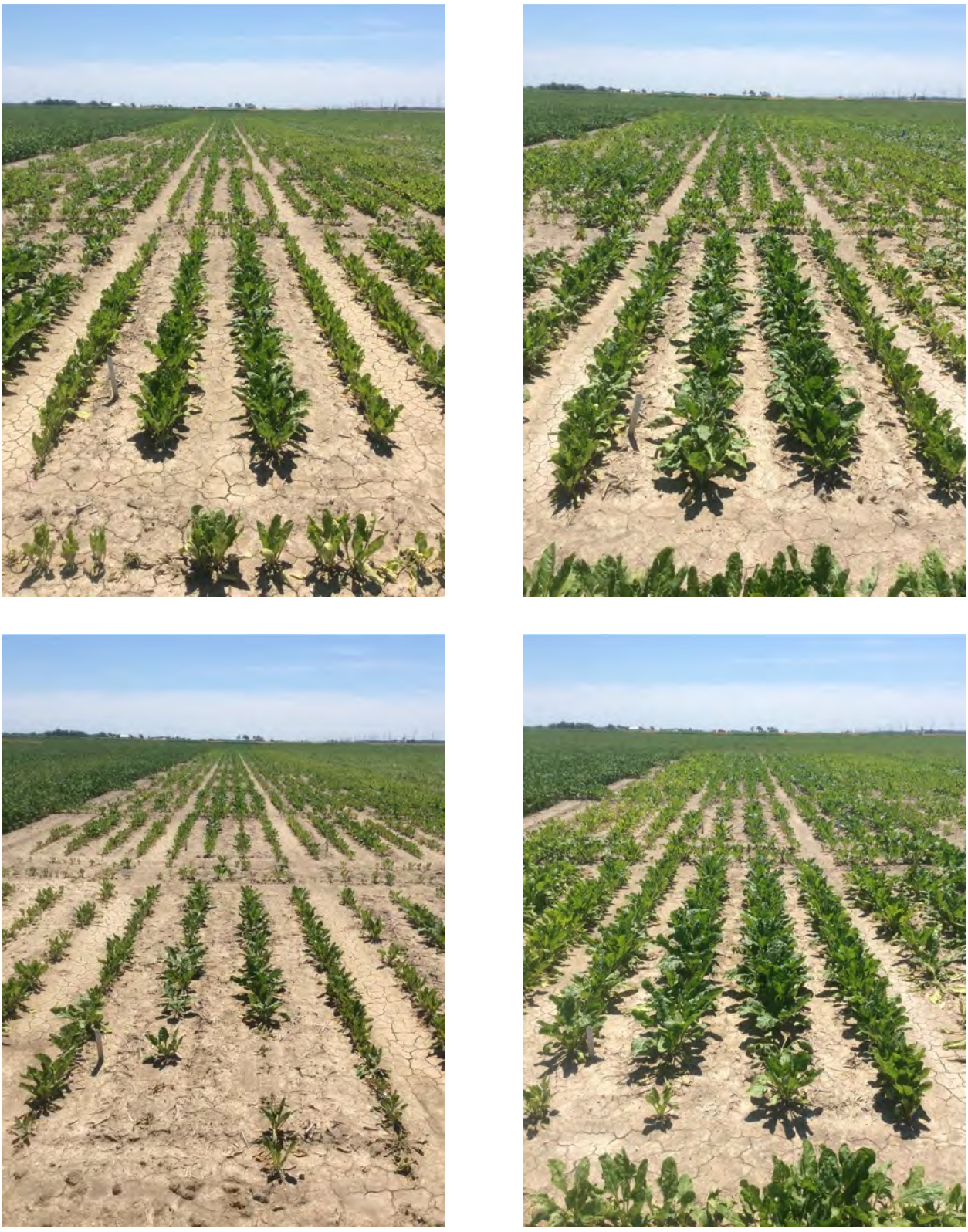

Figure 7. Sugarbeet Rhizoctonia management experimental research plots treated with Elatus at a rate of 1.7 fl oz/A in furrow at planting.

Figure 8. Sugarbeet Rhizoctonia management experimental research plots treated with Elatus at a rate of 0.273 fl oz banded application at 6-8 leaf growth stage.

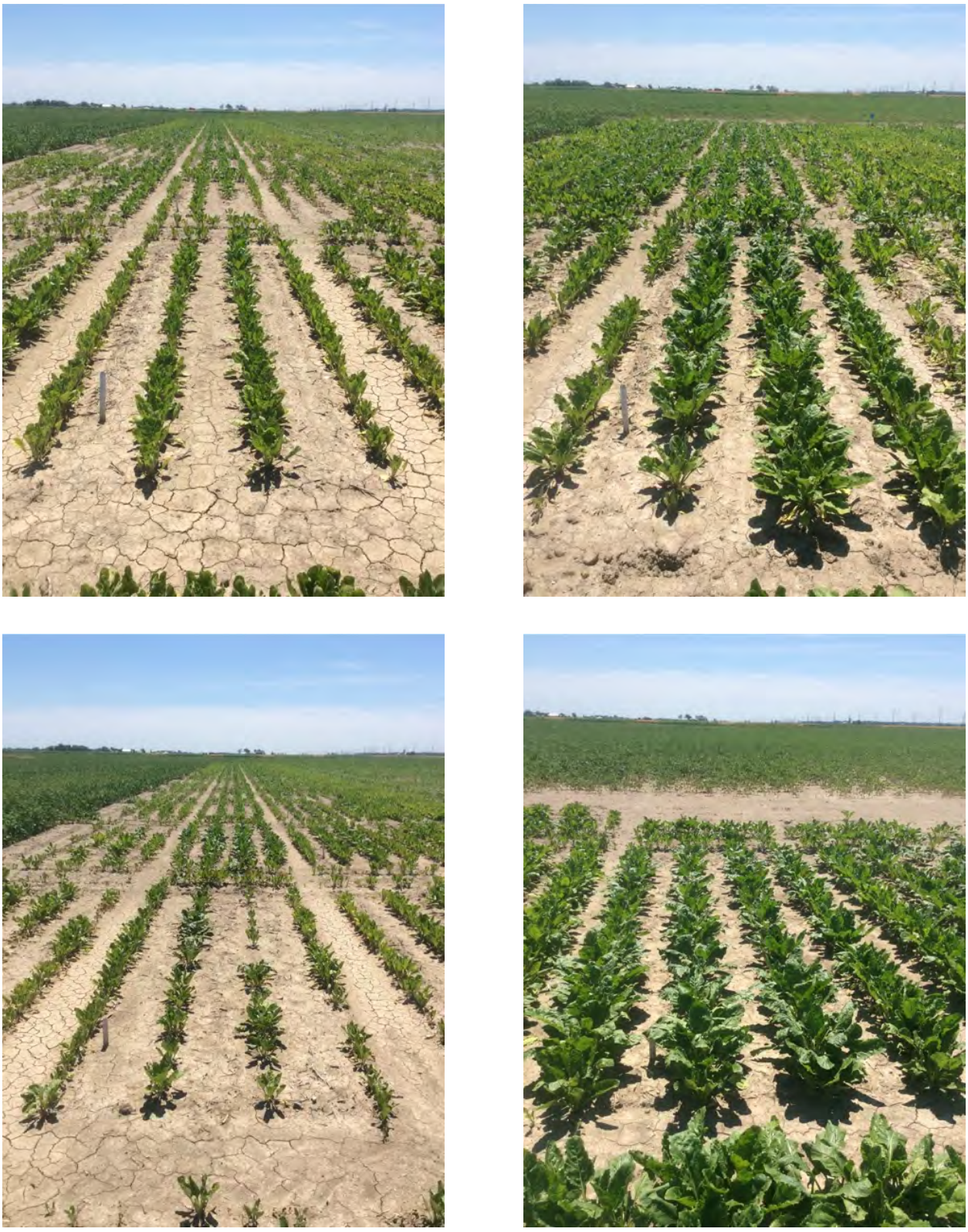

Figure 9. Sugarbeet Rhizoctonia management experimental research plots treated with Elatus at a rate of 0.273 fl oz in furrow at planting and banded application at 6-8 leaf growth stage.