

SUGAR BEET VARIETY TRIALS, 2010

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Introduction

The sugar beet industry in southern Idaho and eastern Oregon, in cooperation with Oregon State University (OSU), tests sugar beet varieties at multiple locations each year to identify varieties with high sugar yield and root quality. A seed advisory committee evaluates the data each year and selects the best varieties for sugar production. This report provides the agronomic practices and results for the OSU Malheur Experiment Station at Ontario in 2010.

Methods

The 2010 sugar beet trials were grown on Owyhee silt loam soil where winter wheat was the previous crop. The wheat stubble was shredded and the field was irrigated and disked. Soil analysis showed pH of 8.0, 18 lb total nitrogen (N)/acre as nitrate in the first foot of soil, low sulfates at 18 ppm, and low manganese (Mn) at 6ppm. Potassium (K), calcium (Ca), magnesium (Mg), sodium (Na), zinc (Zn), copper (Cu), iron (Fe), and boron (B) were adequate. Based on soil analyses and estimated crop needs, the field received no fall fertilizer. The field was ripped, plowed, and worked down before the field was bedded in 22-inch beds on November 27, 2009. There was no fumigation treatment.

Sugar beets were planted on April 6, 2010 at a seeding rate of 8 viable seed/ft of row. Plots of each variety were 4 rows wide (22-inch row spacing) by 23 ft long, with a 4-ft alley separating each tier of plots. Each variety was replicated eight times in a randomized complete block design.

On April 14, Counter[®] 15G was applied in a 4-inch band over each row at 7.4 lb/acre. Soil moisture was monitored using Watermark soil moisture sensors. Soil moisture was maintained at a soil water tension wetter than 70 cb at 8-inch depth in the middle of the beet row for the duration of the season.

Beets began to emerge on April 18, and were fully emerged by April 27. The entire trial was broadcast sprayed with Buccaneer Plus[™] at 48 oz/acre on May 19 when beets were in the 6-true-leaf stage. The spray solution contained 5 percent AMS (ammonium sulfate) as well as a non-ionic surfactant and was applied at 30 gal/acre. Seedlings were thinned by hand to 1 plant per 7 inches on May 26. On June 2, urea was side dressed to supply 170 lb N/acre.

The field was sidedressed with Temik[®] at 10 lb/acre on June 2 and irrigated on June 3 to control sugar beet root maggot. On June 24, the trial was broadcast sprayed with Buccaneer Plus at 32 oz/acre. The spray solution contained 5 percent AMS as well as a non-ionic surfactant and at a spray rate of 30 gal/acre. This application was made using 110-degree flat fan spray nozzles mounted on the back of corrugator slicks with the spray directed upwards. This directional spray

facilitated getting the herbicide under the canopy and was effective in spraying the weeds that had escaped because they had been protected from overhead in the previous spray application by the sugar beet canopy.

To control powdery mildew, Proline[®] fungicide at 5 oz/acre with 5 lb sulfur (S) were applied on June 26 and Headline[®] fungicide was applied at 12 oz/acre with 5 lb S/acre on July 18. Petiole tests were taken on July 16 and July 29. Based on petiole analyses, manganese (Che-Man 5% chelated) at .25 lb/acre, zinc (Che-Zinc 9% chelated) at 0.2 lb/acre, boron (liquid boron 10%) at 0.1 lb/acre and foliar S at 1.5 lb/acre was added to the fungicide application on July 18.

Beets were harvested October 12-13, 2010. The foliage was flailed and the crowns were removed with rotating disks. All sugar beets in the center two rows of each plot were dug with a two-row wheel-lifter harvester, weighed, and two eight-beet samples were taken from each plot. Samples were transported daily to the Snake River Sugar factory for laboratory analysis of sucrose, nitrate, and conductivity. The root weight data were examined for outliers as is customary for calculations of sugar beet variety data in these trials. The data for each plot with two samples were averaged for analysis. Sugar sample data were checked for errors in sugar percentages and conductivity. Any erroneous sample readings were deleted from the data set. Observations more than two standard deviations from the mean for each variety were deleted.

Sugar concentrations were "factored" by multiplying measured sucrose by 0.98 to compensate for the sugar that would have been lost to respiration if the beets had been stored in a pile. The percent extraction was calculated using the formula:

$$\text{Ext} = 250 + [(1,255.2 \cdot \text{Cond}) - (15,000 \cdot \text{Sug}) - 6,185] / \text{Sug} \square \square (98.66 - 7.845 \cdot \text{Cond})$$
 where Ext is percent extraction, Cond is the electrical conductivity in mmho, and Sug is the sucrose concentration in percent.

Variety differences in yield, sucrose content, conductivity, percent extraction, and estimated recoverable sugar were calculated using least-squares means analysis. The varieties were listed in the tables of results in descending order of estimated recoverable sugar. Reports of previous years' Oregon State University variety trials are available online at www.cropinfo.net.

Results

Variety results were grouped by estimated recoverable sugar. Root yield for beet varieties in the Commercial Trial averaged 45.79 tared ton/acre and 17.93 percent sugar content (Table 1). Sugar beets with the highest root yield in the Commercial Trial included varieties Crystal RR968 (51.33 ton/acre), BTS 26RR14, Crystal RR933, and HM 9036RR. Among those with the highest recoverable sugar per acre were varieties Crystal RR968 (15,370 lb/acre), BTS 26RR14, HM 9036RR, Crystal RR892, Crystal RR933 and HH SV36602RR.

Root yield in the Experimental Trial averaged 46.48 tared ton/acre and 17.86 percent sugar content (Table 2). Sugar beets with the highest root yield included varieties HM RP9246RR (54.08 ton/acre), BTS 20RR28, and BTS 20RR63. Varieties with the highest recoverable sugar per acre included BTS 20RR28 (16,017 lb/acre), HM RP9246RR, HH SV36005RR, BTS 20RR15, and BTS 20RR63.

Table 1. Commercial Roundup Ready® sugar beet variety performance in the Amalgamated Sugar Co. LLC Variety Trial at the Oregon State University Malheur Experiment Station, Ontario, Oregon, 2010.

	Root yield (tons/acre)	Sugar content (%)	Gross sugar (lb/acre)	Conduc- tivity (mmhos)	Extrac- tion (%)	Estimated recoverable sugar		
						(lb/ton)	(lb/acre)	
Crystal RR968	51.33	17.51	17,975	0.718	85.52	299.5	15,370	a
BTS 26RR14	51.17	17.48	17,885	0.707	85.65	299.4	15,318	a
HM 9036RR	49.62	17.60	17,467	0.668	86.19	303.5	15,054	ab
Crystal RR892	48.21	18.05	17,402	0.726	85.50	308.6	14,877	abc
Crystal RR933	50.04	17.35	17,349	0.748	85.09	295.3	14,763	a-d
HH SV36602RR	47.08	18.10	17,043	0.702	85.83	310.7	14,625	a-e
HH SV36601RR	46.56	17.93	16,696	0.651	86.45	310.0	14,435	b-f
BTS 27RR10	48.17	17.63	16,980	0.807	84.36	297.5	14,323	b-g
BTS 28RR04	48.49	17.27	16,743	0.748	85.07	293.9	14,243	c-h
HH SV36803RR	46.35	17.83	16,532	0.684	86.01	306.8	14,219	c-h
HH SV36902RR	43.77	18.79	16,450	0.671	86.35	324.5	14,205	c-h
Crystal RR922	47.60	17.57	16,720	0.772	84.81	298.0	14,181	c-h
BTS 27RR20	44.14	18.58	16,400	0.714	85.75	318.7	14,067	d-i
HH SV36603RR	44.53	18.19	16,193	0.647	86.56	315.0	14,016	d-i
Crystal RR989	47.28	17.41	16,452	0.750	85.07	296.2	13,996	d-i
BTS 28RR4N	43.71	18.47	16,136	0.648	86.60	319.9	13,971	d-j
Crystal RR880	45.17	17.81	16,098	0.654	86.40	307.7	13,912	e-j
HM RP9120RR	46.12	17.74	16,361	0.766	84.93	301.4	13,895	e-j
Crystal RR835	43.31	18.58	16,096	0.708	85.84	319.0	13,817	f-k
HM 9047RR	43.63	18.13	15,820	0.643	86.61	314.1	13,699	f-l
Crystal RR929	42.02	18.52	15,568	0.578	87.51	324.2	13,624	g-l
Crystal RR876	44.34	17.67	15,669	0.673	86.13	304.4	13,497	h-l
HH SV36801RR	44.31	17.73	15,709	0.697	85.83	304.3	13,483	h-l
HM 9124RR	41.78	18.21	15,245	0.581	87.41	318.4	13,331	i-l
HM PM9122RR	43.32	17.75	15,382	0.705	85.73	304.4	13,187	jkl
BTS 28RR24	40.53	18.56	15,044	0.633	86.81	322.2	13,061	kl
Crystal 9930RR	43.58	17.61	15,329	0.770	84.84	298.8	13,005	l
LSD (0.05)	2.47	0.39	917	0.040	0.56	7.9	805	

Grand mean	45.79	17.93	16,401	0.695	85.88	308.0	14,083
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Table 2. Experimental Roundup Ready sugar beet variety performance in the Amalgamated Sugar Co. LLC Variety Trial at the Oregon State University Malheur Experiment Station, Ontario, Oregon, 2010.

	Root yield (ton/acre)	Sugar content (%)	Gross sugar (lb/acre)	Conduc- tivity (mmhos)	Extrac- tion (%)	Estimated recoverable sugar		
						(lb/ton)	(lb/acre)	
BTS 20RR28	52.24	17.80	18,601	0.676	86.12	306.7	16,017	a
HM RP9246RR	54.08	16.83	18,206	0.700	85.61	288.2	15,587	ab
HH SV36005RR	48.33	18.48	17,854	0.596	87.26	322.6	15,581	ab
BTS 20RR15	48.88	18.32	17,901	0.685	86.09	315.4	15,410	abc
BTS 20RR63	51.01	17.53	17,884	0.716	85.55	299.9	15,300	a-d
HM RP9240RR	49.59	17.65	17,496	0.694	85.85	303.1	15,021	b-e
HM 9036RR	49.23	17.59	17,329	0.634	86.61	304.7	15,013	b-e
HM PM9248RR	49.93	17.47	17,445	0.695	85.81	299.8	14,968	b-e
Crystal RR968	50.76	17.18	17,426	0.703	85.64	294.3	14,923	b-e
BTS 29RR49	46.15	18.70	17,272	0.682	86.19	322.4	14,885	b-f
Crystal RR088	48.15	17.88	17,212	0.686	86.00	307.6	14,802	b-f
HM 9294RR	47.09	18.09	17,038	0.676	86.16	311.7	14,681	b-f
BTS 29RR3N	45.70	18.38	16,802	0.587	87.37	321.2	14,681	b-f
BTS 27RR20	45.17	18.68	16,865	0.684	86.16	321.8	14,530	c-f
SX 1583RR	44.94	18.50	16,629	0.597	87.25	322.9	14,511	c-g
HH SV36901RR	45.20	18.43	16,680	0.638	86.71	319.7	14,470	d-g
Crystal RR047	49.39	17.10	16,895	0.720	85.41	292.1	14,430	d-g
SX 1502RR	45.60	18.28	16,670	0.651	86.52	316.3	14,424	d-g
HM RP9247RR	47.44	17.43	16,533	0.629	86.66	302.1	14,328	e-h
SX 1503RR	45.04	18.18	16,364	0.631	86.77	315.5	14,196	e-i
HH SV36601RR	45.27	18.06	16,353	0.640	86.63	312.8	14,167	e-i
HH SV36004RR	43.07	18.61	16,030	0.593	87.33	325.0	14,001	f-j
SX 1504NRR	46.04	17.61	16,215	0.658	86.31	304.0	13,995	f-j
HM 9242RR	44.16	17.83	15,756	0.656	86.38	308.1	13,611	g-k
HM PM9243RR	46.07	17.04	15,698	0.682	85.89	292.7	13,491	h-k
HM PM9172RR	43.99	17.70	15,573	0.651	86.41	305.9	13,458	h-k
HM 9296RR	44.28	17.67	15,645	0.711	85.63	302.7	13,398	ijk
HM PM9244RR	43.63	17.64	15,391	0.628	86.71	305.9	13,348	ijk

HM 9295RR	42.37	17.83	15,106	0.634	86.66	309.0	13,091	jkl
HM RT9241RR	42.72	17.51	14,960	0.672	86.11	301.6	12,886	kl
BTS 36RR11	41.53	18.16	15,079	0.761	85.06	309.0	12,832	kl
HM NT9245RR	41.15	17.55	14,442	0.676	86.06	302.1	12,429	l
LSD (0.05)	2.69	0.41	1026	0.040	0.55	8.1	914	
Grand mean	46.48	17.86	16,592	0.664	86.28	308.3	14,316	
