

# 2013 SUGAR BEET VARIETY TRIALS

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*Lamont D. Saunders and Clinton C. Shock, Malheur Experiment Station, Oregon State University, Ontario, OR*

## 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 OSU Malheur Experiment Station at Ontario in 2013.

## Methods

The 2013 sugar beet trials were grown on Owyhee silt loam soil where winter wheat was the previous crop. In the fall of 2012 the wheat stubble was shredded and the field was irrigated and disked. Based on soil analyses and estimated crop needs, the field received 32 lb nitrogen (N)/acre, 150 lb phosphate (P<sub>2</sub>O<sub>5</sub>)/acre, and 100 lb elemental sulfur (S)/acre on September 5, 2012. The field was ripped, plowed, and worked down in the fall. The field was bedded to 22-inch beds and 15 gal/acre of Telone<sup>®</sup> C-17 was shanked into the beds on September 19, 2012.

Sugar beets were planted on April 3, 2013 at a seeding rate of 8 viable seed/ft of row. Plots of each variety are 4 rows wide (22-inch row spacing) by 23 ft long, with a 4-ft alley separating each tier of plots. Each entry was replicated eight times in a randomized complete block design.

On April 4, Counter<sup>®</sup> 15G was applied in a 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 centibars (kPa) at 8-inch depth in the beet row for the duration of the season.

The entire trial was broadcast sprayed with Roundup Ultra<sup>®</sup> at 32 oz/acre on April 9. The spray solution (30 gal/acre) contained 5% ammonium sulfate (AMS) as well as a non-ionic surfactant (NIS). Beets began to emerge on April 12. On May 10 and again on June 15, the trial was broadcast sprayed with Roundup Ultra at 22 oz/acre. The spray solution contained 5% AMS as well as a NIS and at a spray rate of 30 gal/acre.

Seedlings were thinned by hand to 1 plant per 7 inches on May 16-17. On May 20, urea was side-dressed to supply 170 lb N/acre and Temik<sup>®</sup> at 10 lb/acre to control sugar beet root maggot, then promptly irrigated.

Petiole tests were taken on June 20, July 9, and August 2. Based on petiole analyses, 20 lb N, 10 lb S, 5 lb magnesium (Mg), 0.25 lb manganese (Mn), 1 lb copper, and 0.2 lb boron (B) were applied through the irrigation water on June 25. Based on petiole analyses, 10 lb N, 10 lb S, 5 lb Mg, 0.25 lb Mn, 0.25 lb zinc, and 0.2 lb B were applied through the irrigation water on July 15.

Powdery mildew was controlled by applying Inspire<sup>™</sup> fungicide at 7 oz/acre plus 5 lb S/acre on June 29 and July 31; Gem<sup>®</sup> fungicide was applied at 5 oz/acre plus 5 lb S/acre on July 13 and August 19; Proline<sup>®</sup> fungicide was applied at 7 oz/acre with 5 lb S/acre on August 31.

Beets were harvested on October 8 and 9, 2013. The foliage was flailed and the crowns were removed mechanically 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 seven-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 root weights for each plot and the average of the two laboratory analyses were used to calculate beet yields and sugar yields. 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:

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

Varietal differences in yield, sucrose content, conductivity, percent extraction, and estimated recoverable sugar were calculated using least-squares means analysis. The varieties are 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](http://www.cropinfo.net).

## Results

Varietal results are grouped by estimated recoverable sugar per acre. Root yield for beet varieties in the Commercial Trial averaged 54.4 tared ton/acre and 16.08% sugar content (Table 1). Sugar beet varieties with among the highest root yield in the Commercial Trial were BTS 20RR15 (61.04 ton/acre), BTS 20RR28, Crystal RR9333, BTS 21RR25, and Crystal RR0473. Varieties with among the highest recoverable sugar per acre were HH SV36106RR (16,097 lb/acre), Crystal RR240NT, BTS 21RR25, Crystal RR892, Crystal RR9333, HH SV36005RR, SX 1517RR, BTS 20RR28, BTS 29RR3N, BTS 20RR15, Crystal RR915NT, and Crystal RR0473.

Root yield in the Experimental Trial averaged 53.42 tared ton/acre and 16.28% sugar content (Table 2). Sugar beet varieties with among the highest root yields were HM 9507RR (58.94 ton/acre), Crystal A399NT, HH SV36602RR3, HH SVRR032, SX RR1533N, Crystal RR8923, BTS 236N, and SX RR1532. The variety with the highest recoverable sugar per acre was Crystal A399NT (17,547 lb/acre).

Table 1. Commercial Trial of Roundup Ready® sugar beet variety performance in the Amalgamated Sugar Co. LLC Variety Trial at Malheur Experiment Station, Oregon State University, Ontario, OR, 2013.

Variety	Root yield (ton/acre)	Sugar content (%)	Gross sugar (lb/acre)	Conductivity (mmhos)	Extraction (%)	Estimated recoverable sugar <sup>a</sup>	
						(lb/ton)	(lb/acre)
HH SV36106RR	54.42	16.96	18,454	0.577	87.23	295.8	16,097 a
Crystal RR240NT	56.63	16.59	18,787	0.701	85.54	283.9	16,073 a
BTS 21RR25	58.88	15.88	18,694	0.661	85.92	272.9	16,062 a
Crystal RR892	57.25	16.22	18,580	0.661	85.98	279.0	15,977 a
Crystal RR933	59.11	15.75	18,601	0.678	85.67	269.8	15,938 ab
HH SV36005RR	56.60	16.24	18,369	0.631	86.38	280.6	15,872 ab
SX 1517RR	55.89	16.58	18,520	0.694	85.64	283.9	15,861 ab
BTS 20RR28	60.55	15.20	18,397	0.676	85.56	260.0	15,742 abc
BTS 29RR3N	54.40	16.65	18,102	0.608	86.76	289.0	15,706 a-d
BTS 20RR15	61.04	15.09	18,395	0.701	85.20	257.1	15,670 a-d
Crystal RR915NT	55.07	16.39	18,056	0.671	85.91	281.7	15,513 a-e
Crystal RR047	58.69	15.34	17,991	0.690	85.41	262.1	15,364 a-f
BTS 22RR5N	51.19	17.04	17,438	0.621	86.67	295.4	15,119 b-g
HM 9294RR	55.56	15.63	17,371	0.636	86.17	269.4	14,972 c-h
Crystal RR275	54.49	16.04	17,488	0.694	85.53	274.5	14,960 c-h
HH SV36004RR	52.99	16.35	17,325	0.639	86.30	282.2	14,951 c-h
SX 1502RR	54.94	15.80	17,353	0.648	86.07	271.9	14,935 c-h
HH SV36602RR	55.00	15.86	17,447	0.693	85.50	271.2	14,917 d-i
BTS 27RR20	52.03	16.50	17,171	0.675	85.87	283.4	14,746 e-j
HM 9341RR	50.41	16.66	16,792	0.590	87.00	289.9	14,608 f-k
HH SV36203NRR	50.35	16.73	16,847	0.643	86.34	289.0	14,549 f-k
SX 1521NRR	50.08	16.79	16,804	0.674	85.94	288.6	14,441 g-l
HM 9295RR	51.52	15.98	16,466	0.634	86.28	275.8	14,209 h-l
HM 9047RR	54.21	15.36	16,641	0.703	85.25	261.9	14,181 h-l
HM 9338RR	53.52	15.43	16,492	0.683	85.52	263.9	14,111 i-l
HM RT9334RR	51.16	15.93	16,276	0.655	86.00	274.1	13,993 j-m
HM PM9172RR	51.95	15.60	16,197	0.673	85.69	267.4	13,877 klm
Crystal 9930RR	52.08	15.36	15,991	0.689	85.42	262.4	13,664 lm
BTS 22RR22	47.66	16.41	15,640	0.768	84.63	277.8	13,239 m
LSD (0.05)	2.78	0.38	911	0.069	0.93	8.4	820
Grand Mean	54.40	16.08	17472	0.664	85.91	276.4	15,012

<sup>a</sup>Estimated recoverable sugar amounts followed by different letters are significantly different. If the same letter is shared, the amounts are not statistically different.

Table 2. Experimental Trail of Roundup Ready® sugar beet variety performance in the Amalgamated Sugar Co. LLC Variety Trial at Malheur Experiment Station, Oregon State University, Ontario, OR, 2013.

Variety	Root yield (ton/acre)	Sugar content (%)	Gross sugar (lb/acre)	Conductivity (mmhos)	Extraction (%)	Estimated recoverable sugar <sup>a</sup>		
						(lb/ton)	(lb/acre)	
Crystal A399NT	57.87	17.43	20,189	0.609	86.89	302.9	17,547	a
BTS 236N	56.04	16.93	18,974	0.689	85.77	290.4	16,281	b
Crystal RR892	56.13	16.51	18,476	0.650	86.19	284.7	15,925	bc
Crystal A353NT	53.80	16.89	18,153	0.619	86.68	292.9	15,730	bc
SX RR1535	53.85	16.90	18,176	0.677	85.92	290.5	15,612	bcd
HM 9507RR	58.94	15.53	18,295	0.704	85.27	264.9	15,603	bcd
BTS 232N	55.52	16.43	18,231	0.728	85.16	279.9	15,522	bcd
HH SVRR032	57.00	15.92	18,117	0.711	85.27	271.6	15,448	b-e
SX RR1533N	56.35	16.07	18,102	0.712	85.28	274.1	15,448	b-e
HM 9508RR	54.95	16.28	17,868	0.665	85.95	280.0	15,353	b-f
HH SV36602RR	57.60	15.80	18,197	0.785	84.28	266.2	15,339	b-f
HH SVRR033N	55.53	16.12	17,892	0.718	85.23	274.8	15,246	c-g
MARIBO 121RR	52.94	16.58	17,553	0.618	86.62	287.3	15,204	c-h
SX RR1532	55.96	15.97	17,842	0.775	84.44	269.9	15,061	c-h
SX RR1534	50.37	17.15	17,265	0.614	86.79	297.7	14,984	c-h
BTS 27RR20	52.27	16.83	17,584	0.734	85.17	286.7	14,974	c-i
HH SVRR034	52.27	16.41	17,137	0.678	85.81	281.7	14,705	d-j
HM 9501RR	51.96	16.49	17,115	0.736	85.06	280.6	14,551	e-j
HM RT9418RR	52.69	15.90	16,744	0.655	85.98	273.4	14,397	f-j
MARIBO 308RR	54.48	15.52	16,861	0.694	85.40	265.1	14,390	f-j
HM 9504RR	51.22	16.28	16,667	0.650	86.15	280.5	14,360	g-j
MARIBO 310RR	55.47	15.13	16,771	0.714	85.04	257.3	14,263	h-k
HM NT9337RR	50.44	16.13	16,265	0.648	86.13	277.9	14,011	ijk
HM 9295RR	50.14	16.19	16,234	0.658	86.03	278.6	13,970	jk
Crystal A311	51.43	16.02	16,471	0.825	83.79	268.5	13,802	jkl
HH SVRR031	50.54	16.05	16,205	0.729	85.07	273.2	13,787	jkl
HM 9506RR	49.27	16.02	15,781	0.777	84.43	270.6	13,334	kl
BTS 36RR11	48.65	16.22	15,778	0.788	84.33	273.6	13,308	kl
HM 9502RR	45.55	16.53	15,047	0.651	86.19	284.9	12,965	l
LSD (0.05)	3.36	0.47	1095	0.084	1.13	10.0	966	
Grand Mean	53.42	16.28	17,379	0.697	85.53	278.6	14,866	

<sup>a</sup>Estimated recoverable sugar amounts followed by different letters are significantly different. If the same letter is shared, the amounts are not statistically different.