SUGAR BEET VARIETY TESTING RESULTS

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Introduction

The sugar beet industry, in cooperation with Oregon State University and the University of Idaho, tests sugar beet varieties at three replicate locations each year to identify cultivars with high sugar yield and root quality. A seed advisory committee evaluates the combined data to decide which varieties can be grown for contract sugar beet production. This report provides the agronomic practices, experimental procedures, and beet yields and quality for the Malheur Experiment Station replicate of the 2001 trial.

Methods

Sugar beet varieties were entered by ACH Seeds, Betaseed, Hilleshog Mono Hy, Holly Hybrids-Spreckels, and Seedex in 2001. Twenty-two varieties were tested in the Commercial Trial, and 29 varieties were tested (including the commercial check varieties) in the Experimental Trial. All seed for the Commercial Trial was organized by Ron Roemer of the University of Idaho, as were most of the seed of varieties in the Experimental Trial. Sugar beets were grown in a field that had grown winter wheat the year before. The Owyhee silt loam received 50 lb/acre N plus 50 lb/acre P fall fertilizer, the field was then plowed, disked, groundhogged, and fall bedded on 22-inch rows.

The results of a soil test taken on March 30, 2001, showed 8 ppm nitrate-N and 3 ppm ammonium-N in the first ft of soil; 3 ppm nitrate-N and 3 ppm ammonium-N in the second ft; 15 ppm extractable phosphorus, 0.6 ppm exchangeable zinc, pH 7.4, and 1.4 percent organic matter. The beds were remade using a bed harrow and Nortron SC preplant herbicide was applied at 6 pints/acre and incorporated using a spiked-tooth bed harrow on March 30.

The Experimental Trial and the Commercial Trial were planted on April 3. Seeds were planted with a John Deere model 71 flexi-planter with double disc furrow openers equipped with cone seeders to uniformly distribute the seed at a seeding rate of 12 viable seeds/ft of row. Plots of each variety were four rows wide by 23 ft long, with 4-ft allies separating plots at their ends. Each entry was replicated eight times in a randomized complete block design. On April 6 the field was corrugated and Counter 20CR was applied in a band over the row at 8.6 lb/acre. Weed seedlings were controlled before sugar beet emergence with Roundup herbicide at 0.5 gal/acre applied on April 16. The sugar beet seedling emergence was very uniform, and the field was furrow irrigated the first time on April 26. Seedlings were thinned by hand to one plant every 7 inches in the row on May 9 through 11. The trials were sidedressed with 200 lb

N/acre, 45 lb SO_4/acre, 50 lb S/acre, 3 lb Mn/acre, 1 lb Zn/acre, and 1 lb B/acre and recultivated on May 14. Treflan was applied at 1.5 pint/acre on May 19, and the field was cultivated with sweeps, twice, in opposite directions, to incorporate the herbicide. The second irrigation was applied May 24. The field was sidedressed with Temik at 10 lb/acre on May 27 to control sugar beet root maggot, and recorrugated.The field was irrigated a third time on May 27, to move the insecticide with the wetting front into the sugar beet seedlings' root zone. The field was hand weeded on June 7, and a crew hoed the trials on June 15.

On June 23 Flowable Sulfur 6 was applied by aerial applicator at 4 qt/acre for control of powdery mildew. Sulfur dust was applied by aerial applicator at 60 lb/acre on July 1, and again on July 14. Laredo fungicide was applied by aerial applicator, tank-mixed with flowable sulfur, on July 27, and again on August 25. Irrigations were scheduled with Watermark (Irrometer Co. Inc., Riverside, CA) soil moisture sensors to maintain the soil water potential wetter than -70 centibar at 8-inch depth in the beet row. The last irrigation was on September 13.

Sugar beets were harvested from the Commercial Trial on October 11 and 12, and from the Experimental Trial on October 12. The foliage was flailed and the crowns were removed with rotating knives. All beets in the center two rows of each plot were dug with a two-row wheel-lifter harvester and weighed, and two samples of eight sugar beets were taken from each plot. Samples were delivered each day to the Amalgamated Sugar plant in Nyssa for laboratory analysis of percent sucrose (Sug), pulp nitrate concentration, and conductivity (Cond). The percent extraction (Ext) was calculated using the formula:

Ext = 250 + [(1,255.2 * Cond) - (15,000 * Sug) - 6,185] / Sug * (98.66 - 7.845 * Cond)

The weight of sugar beets from each plot was tared 5 percent to calculate beet yields, and sugar concentrations were "factored" by multiplying by 0.98 to account for respiration. The sugar, nitrate, and conductivity data were examined for extreme outliers (data values greater than two standard deviations from the mean), and extreme outliers, except for high sugar concentrations, were deleted from the analysis. Two plots with root yields too high were deleted from each trial. Variety differences in yield, sucrose content, conductivity, percent extraction, and estimated recoverable sugar were calculated using ANOVA. Sugar beet performance in both trials was compared to the check varieties ACH Seeds 'ACH Mustang', Betaseed 'Beta 8757', and Hilleshog Mono Hy 'HM Owyhee' and 'HM PM21'.

Results

Stand establishment was very uniform in the 2001 sugar beet variety trials at Malheur Experiment Station. Prolonged hot weather in the summer promoted powdery mildew infection on sugar beet foliage in growers' fields in the vicinity. In the trials, powdery mildew was controlled by applications of liquid sulfur, sulfur dust, and Laredo fungicide.

Variety performance was grouped by seed company for the Commercial Trial (Table 1) and the Experimental Trial (Table 2). Within each seed company's varieties, the varieties are ranked in descending order of estimated recoverable sugar in pounds per acre. Root yield in the Commercial Trial averaged 46.1 tared ton/acre, average sugar content was 17.54 percent, and average estimated recoverable sugar was 13,942 lb/acre. 'ACH Tomcat', with estimated recoverable sugar 15,871 lb/acre; 'ACH Mustang', with estimated recoverable sugar 15,308 lb/acre; 'Beta 8220B', with estimated recoverable sugar 15,794 lb/acre; 'HM Owyhee', with estimated recoverable sugar 14,968 lb/acre; 'HM Oasis', with estimated recoverable sugar 14,494 lb/acre; 'Puma', with estimated recoverable sugar 14,853 lb/acre; and 'Cascade', with estimated recoverable sugar 14,397 lb/acre were among the highest yielding varieties in the Commercial Trial.

Root yield in the Experimental Trial (Table 2) averaged 46.7 tared ton/acre, with average sugar content 17.50 percent, and average estimated recoverable sugar 14,161 lb/acre. The varieties yielding the highest estimated recoverable sugar were 'Crystal 0003' with 14,357 lb/acre, 'Beta 7CG5936' with 15,567 lb/acre, 'Beta 7CG6000' with 15,455 lb/acre, 'Beta 8KG6976' with 15,059 lb/acre, 'Beta 8CG7299' with 14,985 lb/acre, 'HM Owyhee' with 14,851 lb/acre, 'HM 2983Rz' with 14,324 lb/acre, 'HM PM21' with 14,322 lb/acre, '00HX32' with 15,083 lb/acre, '01HX004 RZM' with 14,632 lb/acre, '01HX029' with 14,360 lb/acre, 'SX 1516' with 14,887 lb/acre, and 'SX1517' with 14,764 lb/acre.

Table 1. Commercial sugar beet variety root yield, sugar content, root quality, and recoverable sugar from varieties entered in the trial at Malheur Experiment Station, Oregon State University, Ontario, OR, 2001.

	Root yield	Sugar content	Gross sugar	Conductivity	Extraction	Estimated recoverable sugar	
Variety	ton/acre	%	lb/acre	mmho	%	lb/ton	lb/acre
ACH Seeds							
ACH Tomcat	47.61	17.42	16,577	0.674	86.07	299.8	14,269
ACH Mustang	45.90	17.51	16,070	0.663	86.22	302.0	13,855
Crystal 9906	43.76	17.77	15,543	0.638	86.60	307.8	13,460
Betaseed							
Beta 8220B	53.45	17.16	18,328	0.661	86.18	295.7	15,794
Beta 8757	45.73	17.65	16,121	0.677	86.07	303.9	13,875
Beta 8919	44.01	18.05	15,898	0.654	86.44	312.1	13,749
Beta 4035R	46.37	17.22	15,968	0.694	85.77	295.4	13,696
Beta 8118	45.11	17.63	15,904	0.691	85.88	302.8	13,654
Beta 4490R	46.28	17.11	15,834	0.715	85.48	292.6	13,533
Beta 8348	43.67	17.28	15,079	0.706	85.62	295.9	12,911
Beta 4546	43.12	17.39	14,993	0.721	85.45	297.3	12,814
Beta 4470R	37.14	17.72	13,166	0.709	85.66	303.6	11,278
Hilleshog Mono Hy							
HM Owyhee	49.01	17.63	17,257	0.624	86.75	305.8	14,968
HM Oasis	47.87	17.43	16,688	0.612	86.87	302.9	14,494
HM 1642	45.48	18.11	16,469	0.607	87.06	315.4	14,336
HM 2980Rz	48.00	17.25	16,553	0.700	85.70	295.7	14,186
HM PM21	43.98	17.61	15,489	0.622	86.78	305.6	13,439
Holly Hybrids-Spreckels							
HH 120	46.68	17.57	16,407	0.714	85.57	300.7	14,042
HH 125	41.83	18.05	15,101	0.581	87.39	315.5	13,198
Seedex							
Puma	49.07	17.42	17,089	0.609	86.91	302.7	14,853
Cascade	47.20	17.52	16,527	0.595	87.11	305.3	14,397
Blazer	42.78	17.42	14,911	0.662	86.22	300.4	12,863
Mean	45.64	17.54	15999	0.660	86.26	302.7	13803
LSD (0.05)	2.75	0.37	942	0.049	0.66	7.8	819

Table 2. Experimental sugar beet variety root yield, sugar content, root quality, and recoverable sugar from varieties entered in the trial at Malheur Experiment Station, Oregon State University, Ontario, OR, 2001.

	Root yield	Sugar content	Gross sugar	Conductivity	Extraction	Estimated recoverable sugar	
Variety	ton/acre	%	lb/acre	mmho	%	lb/ton	lb/acre
ACH Seeds							
Crystal 0003	46.25	17.87	16,526	0.62	86.87	310.5	14,357
ACH Mustang	47.44	17.30	16,418	0.66	86.26	298.5	14,163
Crystal 0002	47.06	17.32	16,305	0.67	86.07	298.2	14,034
Crystal 9908	43.33	17.55	15,210	0.68	86.02	302.0	13,084
Crystal C111	43.52	17.24	15,008	0.67	86.14	297.0	12,930
Betaseed							
Beta 7CG5936	50.42	17.67	17,809	0.57	87.41	308.8	15,567
Beta 7CG6000	51.77	17.23	17,830	0.62	86.68	298.8	15,455
Beta 8KG6976	48.92	17.68	17,295	0.60	87.07	307.9	15,059
Beta 7KJ5073	45.21	17.63	15,939	0.66	86.36	304.6	13,765
Beta 8CG7299	44.50	17.83	15,860	0.69	85.91	306.3	13,624
Beta 1YK0012	43.21	18.01	15,569	0.60	87.13	313.9	13,568
Beta 8757	45.42	17.33	15,734	0.69	85.82	297.4	13,502
Beta 1YK0013	43.21	17.69	15,280	0.62	86.78	307.0	13,260
Beta 1YK0011	40.14	18.21	14,616	0.65	86.54	315.2	12,651
Hilleshog Mono Hy							
HM Owyhee	48.21	17.65	17,015	0.58	87.29	308.2	14,851
HM 2983Rz	47.84	17.26	16,494	0.61	86.86	299.8	14,324
HM PM21	47.11	17.44	16,420	0.58	87.24	304.3	14,322
HM 2984Rz	46.62	17.43	16,251	0.61	86.94	303.0	14,134
Holly Hybrids-Spreckels							
01HX004 RZM	50.57	16.46	16,726	0.69	86.82	285.8	14,532
01HX029	48.30	17.14	16,536	0.61	86.85	297.8	14,360
Phoenix RZM	49.13	16.86	16,548	0.68	85.94	289.8	14,224
00HX035 RZM	43.73	18.19	15,906	0.53	88.00	320.2	13,998
00HX011 RZM	45.42	17.41	15,893	0.53	87.95	306.1	13,976
00HX33	44.62	17.72	15,800	0.58	87.40	309.8	13,809
00HX32	47.20	16.99	16,033	0.70	85.70	291.2	13,737
01HX047	41.19	17.97	14,787	0.63	86.75	311.7	12,826
Seedex							
SX1516	48.73	17.43	16,980	0.55	87.69	305.6	14,887
SX1517	50.23	17.17	17,250	0.71	85.58	293.9	14,764
SX1518	44.90	17.95	16,132	0.62	86.81	311.7	14,006
Mean	46.35	17.50	16,213	0.63	86.72	303.6	14,061
LSD (0.05)	2.66	0.34	928	0.03	0.71	7.1	826