SUGAR BEET VARIETY TESTING RESULTS, 2000

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Introduction

The sugar beet industry, in cooperation with the University of Idaho and Oregon State University, 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 growers can plant. This report provides the agronomic practices, experimental procedures, and beet yields and quality for the Malheur Experiment Station replicate of the trials.

Methods

Sugar beet varieties were entered by ACH Seeds, Betaseed, Hilleshog Mono Hy, Holly Hybrids-Spreckels, and Seedex, with 22 varieties in the Commercial Trial, and 29 varieties (including 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 Greenleaf 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, 2000, showed 11 ppm nitrate-N and 5 ppm ammonium-N in the first ft of soil; 13 ppm nitrate-N and 4 ppm ammonium-N in the second ft; 23 ppm extractable phosphorus, 1.4 ppm exchangeable zinc, pH 6.8, and 1.5 percent organic matter. Winter annual weed seedlings were controlled with Roundup herbicide at 0.5 gallon/acre applied on March 25. Nortron SC preplant herbicide was applied at 6 pints/acre and incorporated using a spiked-tooth harrow on April 3.

The Experimental Trial was planted on April 4, and the Commercial Trial was planted on April 5. 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 a 4-ft alley separating plots. 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 lb/acre. On April 7, the field was furrow irrigated to promote uniform emergence. The sugar beet seedling emergence was very uniform, and most varieties had 1-inch-long cotyledons by April 23, prior to the second irrigation on April 24. On May 3, Betamix Progress was broadcast at 1.37 pint/acre. On May 12 through 15, seedlings were pulled by hand to thin the stand to one plant every

7 inches in the row. The variety trials were cultivated and sidedressed with urea at a rate of 177 lb N/acre, and recultivated on May 19. The field was irrigated the third time on May 19. On May 23 sugar beet root maggot was discovered in the field. The maggots had not been adequately controlled by the Counter 20CR that had already been applied. To control sugar beet root maggot, the sugar beets were sidedressed on one side of each row with Temik 15G at 10 lb/acre, and recorrugated on May 24, and irrigated for the fourth time, to move the insecticide with the wetting front into the sugar beet seedlings' root zone.

On June 28 Sulfur Flowable 6 was applied by aerial applicator at 4 quart/acre for control of powdery mildew. The field was hand weeded on July 7. Sulfur dust was applied by aerial applicator at 30 lb/acre on July 11. The field was recorrugated July 17, and hand weeded on August 2. On August 3 sulfur at 30 lb/acre was applied by aerial applicator, and again on August 28 with a double application of Sulfur at 50 lb/acre. Irrigations through the summer were scheduled with Watermark (Irrometer Co. Inc., Riverside, CA) soil moisture sensors to maintain the soil water potential wetter than -70 centibar at 10-inch depth in the beet row. The last irrigation was on September 19.

Sugar beets from the Commercial Trial were harvested on October 10 and 11, and from the Experimental Trial on October 11 and 18. Foliage was flailed and crowns were removed with rotating knives. All beets in the center two rows of every plot were dug with a two-row wheel-lifter harvester and weighed, and two samples of eight sugar beets were taken in each plot. Samples were taken each day to the Amalgamated Sugar, LLC plant in Nyssa for 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 estimate beet yields. 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 this year's sugar beet variety trials at Malheur Experiment Station. Prolonged hot weather in the summer promoted powdery mildew infection on sugar beet foliage in the trials; it was not effectively controlled by sulfur dust, as was also experienced in growers' fields in the vicinity.

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, varieties

are ranked in descending order of estimated recoverable sugar in pounds per acre. Root yield in the Commercial Trial averaged 36.9 tared ton/acre, with average sugar content 17.66 percent, and average estimated recoverable sugar 11,385 lb/acre. 'SX Puma', with estimated recoverable sugar 12,336 lb/acre, 'Beta 8919', with estimated recoverable sugar 12,167 lb/acre, 'Beta 8220B', with estimated recoverable sugar 12,004 lb/acre, 'Beta 4035R', with estimated recoverable sugar 11,912 lb/acre, 'Beta 4490R', with estimated recoverable sugar 11,758 lb/acre, 'Beta 8757', with estimated recoverable sugar 11,454 lb/acre, 'HM PM21', with estimated recoverable sugar 12,034 lb/acre, 'HM Dillon', with estimated recoverable sugar 12,003 lb/acre, 'HM Oasis', with estimated recoverable sugar 11,992 lb/acre, 'HM Owyhee', with estimated recoverable sugar 11,487 lb/acre, and 'ACH Mustang', with estimated recoverable sugar 11,727 lb/acre, were among the highest yielding varieties in the Commercial Trial.

Root yield in the Experimental Trial (Table 2) averaged 40.8 tared ton/acre, with average sugar content 17.54 percent, and average estimated recoverable sugar 12,537 lb/acre. The varieties yielding the highest estimated recoverable sugar were 'HH 00HX0032' with 14,059 lb/acre, 'HH 00HX0033' with 13,777 lb/acre, 'Beta 7CG6000' with 13,915 lb/acre, 'Beta 8KG6976' with 13,756 lb/acre, 'Crystal 0003' with 13,365 lb/acre, 'SX 1516' with 13,329 lb/acre, and 'HM 2985RZ' with 13,231 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, 2000.

	Root yield	Sugar content	Gross sugar	Conductivity	Extraction	Estimated recoverable sugar	
Variety	ton/acre	%	lb/ton	mmho	%	lb/ton	lb/acre
ACH Seeds							
ACH Mustang	38.1	17.72	13,499	0.617	86.87	308	11,727
ACH Tomcat	36.5	17.37	12,686	0.610	86.88	302	11,027
Betaseed							
Beta 8919	37.1	18.70	13,865	0.561	87.75	328	12,167
Beta 8220B	39.2	17.51	13,736	0.574	87.37	306	12,004
Beta 4035R	40.1	17.11	13,704	0.604	86.91	297	11,912
Beta 4490R	37.9	17.81	13,511	0.605	87.03	310	11,758
Beta 8757	37.3	17.72	13,205	0.626	86.75	308	11,454
Beta 8348	36.0	17.02	12,262	0.536	87.76	299	10,769
Beta 8468	34.6	17.67	12,222	0.601	87.07	308	10,639
Beta 4470R	33.7	18.01	12,145	0.584	87.33	315	10,607
Beta 8422	33.8	17.89	12,087	0.606	87.04	311	10,520
Beta 8118	33.8	17.70	11,946	0.611	86.93	308	10,386
Hilleshog Mono Hy							
HM PM21	38.4	17.66	13,575	0.476	88.64	313	12,034
HM Dillon	39.1	17.40	13,597	0.505	88.23	307	12,003
HM Oasis	39.1	17.44	13,629	0.525	87.99	307	11,992
HM Owyhee	37.1	17.52	12,984	0.489	88.45	310	11,487
HM Sierra	36.3	17.67	12,817	0.521	88.08	311	11,289
HM 2980	37.2	17.53	13,021	0.646	86.45	303	11,256
HM 1642	32.0	17.86	11,419	0.528	88.02	315	10,057
Holly Hybrids-Spreckels							
HH 120	38.6	17.94	13,840	0.628	86.77	311	12,009
Seedex							
SX Puma	39.9	17.52	13,968	0.501	88.31	309	12,336
SX Blazer	35.5	17.83	12,638	0.576	87.40	312	11,047
Mean	36.9	17.66	13,016	0.570	87.46	309	11,385
LSD (.05)	2.8	0.27	991	0.046	0.62	6.3	892
LSD (.1)	2.3	0.23	830	0.039	0.52	5.2	747
CV (%)	7.6	1.6	7.7	8.2	0.7	2.0	7.9
Pr > F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

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, 2000.

	Root yield	Sugar content	Gross sugar	Conductivity	Extraction	Estimated recoverable sugar	
Variety	ton/acre	%	lb/ton	mmho	%	lb/ton	lb/acre
ACH Seeds							
Crystal 0003	42.3	17.99	15,190	0.533	88.0	316	13,365
Crystal 0002	41.8	17.64	14,748	0.558	87.6	309	12,921
ACH Mustang	41.0	17.59	14,431	0.618	86.8	306	12,530
Crystal 0001	40.3	17.26	13,912	0.596	87.0	301	12,112
Crystal 9906	38.7	17.39	13,451	0.564	87.5	304	11,768
Crystal 9908	36.7	17.51	12,850	0.628	86.7	304	11,136
Betaseed							
Beta 7CG6000	45.0	17.67	15,903	0.566	87.5	309	13,915
Beta 8KG6976	45.9	17.14	15,729	0.562	87.5	300	13,756
Beta 8CG7305	41.2	18.25	15,047	0.597	87.2	318	13,121
Beta 8CG7299	41.4	17.91	14,841	0.612	87.0	312	12,907
Beta 7CG5936	40.7	17.76	14,479	0.453	89.0	316	12,882
Beta 7KJ5073	39.6	17.28	13,681	0.598	87.0	301	11,907
Beta 8757	38.6	17.44	13,448	0.588	87.2	304	11,724
Hilleshog Mono Hy							
HM 2985RZ	43.7	17.20	15,040	0.523	88.0	303	13,231
HM PM21	42.1	17.47	14,706	0.481	88.6	310	13,021
HM 2984RZ	42.7	17.26	14,720	0.512	88.1	304	12,971
HM 2983RZ	40.4	17.21	13,902	0.539	87.8	302	12,199
HM Owyhee	40.0	17.30	13,824	0.527	87.9	304	12,156
Holly Hybrids-Spreckels							
HH 00HX0032	45.2	17.68	15,968	0.522	88.1	312	14,059
HH 00HX0033	44.4	17.50	15,546	0.475	88.6	310	13,777
HH 99HX901	38.6	18.09	13,963	0.598	87.2	316	12,176
HH 99HX905	38.6	17.71	13,605	0.551	87.7	311	11,922
HH 97HX706	36.6	18.27	13,359	0.506	88.4	323	11,805
HH 00HX0035	36.5	17.53	12,801	0.466	88.7	311	11,359
HH 00HX0036	34.6	18.14	12,543	0.576	87.5	317	10,972
Seedex							
SX 1516	42.7	17.63	15,038	0.477	88.6	313	13,329
SX 1515	42.4	16.84	14,262	0.423	89.2	300	12,714
SX 1517	41.8	16.84	14,079	0.612	86.8	292	12,217
SX 1518	38.6	17.29	13,339	0.583	87.2	302	11,634
Mean	40.8	17.54	14,290	0.546	87.7	308	12,537
LSD (0.05)	2.8	0.41	931	0.032	0.4	7.9	820
LSD (0.10)	2.4	0.34	780	0.027	0.4	6.6	687
CV (%)	7.0	2.4	6.6	6.1	0.5	2.6	6.6
Pr > F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001