

SUGAR BEET VARIETY TRIAL RESULTS FOR 1997

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Introduction

Sugar beet seed companies and the beet growers associations have cooperated for many years to test sugar beets at the Malheur Experiment Station. Commercial cultivars and experimental lines of sugar beets were evaluated to identify lines with high sugar yields and root quality. A joint seed advisory committee evaluates the accumulated performance data for the varieties over several years and locations, then it restricts growers in Idaho and Malheur County of Oregon to planting only those varieties ranking above minimum industry requirements.

Procedures

Twenty-three commercial cultivars and 32 experimental lines (including check cultivars) of sugar beets were evaluated in separate trials conducted at the Malheur Experiment Station, Ontario, Oregon. Sugar beets were planted in Owyhee silt loam and Greenleaf silt loam where winter wheat had been grown the previous year. Fields were plowed in the fall of 1996. For the commercial cultivars, the March 13 test results in the first foot of soil were $\text{NO}_3\text{-N}$ 6 lb/acre, $\text{NH}_4\text{-N}$ 9 lb/acre, and in the second foot were $\text{NO}_3\text{-N}$ 9 lb/acre, $\text{NH}_4\text{-N}$ 9 lb/acre. Extractable phosphorus was 23 ppm, and zinc was 1.5 ppm. Soil pH was 7.7, and soil organic matter was 1.7 percent. For the experimental lines, the March 13 test results in the first foot of soil were $\text{NO}_3\text{-N}$ 6 lb/acre, $\text{NH}_4\text{-N}$ 15 lb/acre, and in the second foot were $\text{NO}_3\text{-N}$ 9 lb/acre, $\text{NH}_4\text{-N}$ 7 lb/acre. Extractable phosphorus was 22 ppm, and zinc was 1.8 ppm. Soil pH was 7.7, and soil organic matter was 1.6 percent.

Nortron was banded 11 inches wide at 1 qt/acre for weed control and was incorporated using a spike-tooth bed harrow before planting. Each entry was replicated eight times using a randomized complete block experimental design. Each plot was four rows wide and 23 feet long with 3-foot alleys separating plots. Approximately 12 viable seeds per foot of row were planted in each plot row. The seed was planted on April 9 to 11 with cone-seeders mounted on a John Deere model 71 flexi-planter equipped with disc openers. On April 15, trials were corrugated, and Counter 15G was applied in a band over the row at 6 oz/1000 ft of row. The sugar beet trials were furrow-irrigated to furnish moisture for uniform seedling emergence. On April 29 herbicides Progress at 0.25 lb ai/acre, Stinger at 0.05 lb ai/acre, and Poast at 0.10 lb ai/acre were applied by a broadcast spray. The sugar beets were hand-thinned May 19 to 22; spacing between plants was approximately 7 inches. On June 6 Poast at 1.5 pt/acre was applied. The

crop was sidedressed with 245 lb N/acre as urea because of very low preplant soil nitrate and ammonium on May 30.

Treflan at 1 pint/acre plus Eptam at 3 pint/acre were applied for weed control June 10 and incorporated with sinner weeders. Beets were mechanically cultivated for the last time on June 16. Powdery mildew was controlled with 60 lb/acre of sulfur dust on July 27, Bayleton at 1 lb/acre on July 31 following a rain storm, then 60 lbs/acre of powdered sulfur on August 28, all applied by air.

Sugar beets from the commercial cultivars were harvested October 13 and 14, and those from the experimental trial were harvested October 7 to 10. The foliage was removed by a flail beater, and the crowns were clipped with rotating scalping knives. The roots from the two center rows of each four-row plot were dug with a single-row, wheel-type lifter harvester, and all roots in each 23 feet of row were weighed and corrected by tare to calculate root yields. A sample of eight beets was taken from each of the harvested rows and analyzed by Amalgamated Sugar Company for percent sucrose, pulp nitrate nitrogen, and conductivity. The percent extraction was calculated using an empirical formula that used percent sucrose and conductivity readings as factors.

Variety differences were calculated using ANOVA and protected least significant differences at the 5 percent level, LSD (0.05). Performance was compared with the established commercial varieties HM WS PM9, HM WS91, Beta 8422, and ACH 211.

Results

Cultivar performance was analyzed statistically and ranked by recoverable sugar within each company's entries (Tables 1 and 2). Yields of estimated recoverable sugar from commercial cultivars ranged from a high of 13,545 lb/acre of sugar to a low of 10,578 lb/acre of sugar, with a variety mean of 12,247 lb/acre of sugar. Among the top yielding cultivars were HM PM 21, HM Owyhee, HM Oasis, Beta 8450, and Beta 8118 (Table 1).

The experimental lines were planted in a field with generally lower productivity than the commercial cultivars, but with no history of sugar beet production. Beet tonnage ranged up to 58.67 ton/acre. The experimental lines were harvested first, perhaps contributing to the sucrose percentage of 15.79 compared to 16.57 for the commercial cultivars. Yield of recoverable sugar from the experimental lines ranged from 14,816 lb/acre of sugar to a low of 11,052 lb/acre of sugar, with an entry mean of 12,731 lb/acre of sugar. Among the top yielding lines were the Betaseed lines 5KG 6906, 5KG 6908, and 5KG 6907 (Table 2).

Table 1. Root yields, sugar yields and root quality data from sugar beet lines entered as commercial lines at the Malheur Experiment Station, Oregon State University, Ontario, 1997.

Company	Variety	Yield	Sucrose	Nitrate	Conductivity	Extraction	Recoverable sugar
		ton/acre	%	ppm	mmho	%	lb/acre
Hilleshog Mono-Hy	HM PM 21	45.3	17.18	97	0.6	87	13,545.
	HM Owyhee	45.33	17.12	152	0.64	86.5	13,425.
	HM Oasis	45.21	16.87	126	0.64	86.4	13,187.
	HM Canyon	44.78	16.66	185	0.74	85.1	12,695.
	HM Emblem	43	16.98	128	0.62	86.6	12,647.
	HM WS62	44.13	16.44	155	0.68	85.7	12,439.
	HM WSPM9	44.72	16.2	150	0.68	85.7	12,411.
	HM Sierra	42.57	16.89	154	0.68	85.9	12,350.
	HM 9155	44.9	16.26	172	0.78	84.5	12,341.
	HM WS91	41.92	16.56	184	0.74	85	11,825.
	HM RZ 72	42.75	16.26	196	0.76	84.7	11,767.
Betaseed	Beta 8450	45.18	17.1	222	0.78	84.6	13,061.
	Beta 8118	45.14	16.93	160	0.73	85.2	13,022.
	Beta 8468	44.22	16.76	134	0.75	84.9	12,588.
	Beta 8757	43.83	16.85	177	0.76	84.9	12,540.
	Beta 8422	42.87	16.75	180	0.76	84.8	12,176.
	Beta 4035 R	43.18	15.66	206	0.79	84.2	11,386.
American Crystal	ACH 203	42.32	16.58	167	0.73	85.2	11,965.
	ACH 211	40.24	17.01	134	0.61	86.8	11,883.
Holly	Rival	40.51	16.13	195	0.76	84.7	11,067.
	Rhizoguard CT	40.15	15.93	180	0.72	85.2	10,909.
	SS-781R	40.33	15.68	167	0.83	83.7	10,578.
Seedex	SX 1505	42.32	16.33	153	0.67	85.9	11,881.
Mean		43.26	16.57	164	0.72	85.4	12,248
LSD (0.05)		1.50	0.47	39	0.05	0.7	578

Table 2. Root yields, sugar yields, and root quality data from sugar beet lines entered as experimental lines at the Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1997.

Company	Variety	Root yield	Sugar content	Conductivity	Root NO3-N	Estimated recoverable		
		ton/acre	%		ppm	Extraction %	sugar lb/acre	
Hilleshog Mono-Hy	HM 2929	51.06	15.32	0.71	211	85.1	13,318	
	HM 2928	47.51	16.28	0.68	180	85.7	13,259	
	HM 2979	50.08	15.6	0.84	262	83.5	13,023	
	HM 2926	47.44	16.07	0.72	207	85.1	12,986	
	HM WS PM9	48.86	15.53	0.76	194	84.6	12,819	
	HM 2977	49.5	15.09	0.76	243	84.4	12,616	
	HM WS91	46.37	15.97	0.82	221	83.9	12,425	
	HM 2978	47.54	14.98	0.96	358	81.7	11,635	
	HM Pillar	40.18	16.65	0.71	196	85.4	11,427	
	HM RZ20	41.25	15.76	0.72	219	85	11,052	
Betaseed	5KG 6906	58.67	15.1	0.82	240	83.6	14,816	
	5KG 6908	57.04	15.03	0.86	284	83.1	14,241	
	5KG 6907	56.49	15.01	0.83	233	83.5	14,152	
	4KG 5996	48.55	16.59	0.78	190	84.5	13,607	
	3BG 6111	50.39	15.91	0.83	211	83.7	13,417	
	Beta 8348	51.55	15.37	0.83	298	83.6	13,223	
	5CG 7347	46.03	16.48	0.74	135	85.1	12,903	
	4KG 5983	44.65	16.75	0.77	154	84.7	12,684	
	5CG 7292	46.52	15.88	0.8	171	84.1	12,423	
	5CG 7382	46.98	15.55	0.79	189	84.1	12,293	
		Beta 8422	46.09	15.84	0.86	206	83.3	12,167
	American Crystal	ACH 9622	52.72	15.49	0.82	185	83.7	13,669
ACH 9623		50.02	15.69	0.74	183	84.8	13,288	
ACH 9707		45.02	16.31	0.7	183	85.6	12,550	
ACH 211		43.73	16.34	0.7	189	85.5	12,212	
ACH 9706		42.26	16.6	0.69	221	85.6	12,002	
Seedex	SX1511	44.62	15.91	0.77	160	84.5	11,981	
	SX1509	46.03	15.43	0.85	233	83.3	11,823	
Holly	97HX724	50.02	15.99	0.81	250	84	13,424	
	97HX705	50.7	15.06	0.89	278	82.7	12,633	
	Rizor	44.93	15.82	0.88	252	83.1	11,808	
	97HX704	43.46	15.76	0.8	204	84	11,524	
	Mean	48.01	15.79	0.79	217	84.2	12,731	
	LSD (0.05)	2.15	0.54	0.06	64	0.8	671	