SUGAR BEET (*Beta vulgaris*)
'pathogen unknown'

C. A. Strausbaugh and I. A. Eujayl, USDA-ARS NWISRL, 3793 N. 3600 E., Kimberly, ID 83341; Eugene Rearick, Amalgamated Research Inc., Twin Falls, ID 83301; and Paul Foote, Amalgamated Sugar Co., Paul, ID 83347

Sugar beet cultivars evaluated for storability in Idaho during the 2006/2007 storage season.

Thirty-two commercial sugar beet cultivars were grown in a commercial sprinkler-irrigated sugar beet field near Nampa, ID. The previous crop was corn. The plots were planted on 27 and 28 Mar 2006 to a density of 142,560 seeds/A, and thinned to 47,520 plants/A on 10 and 11 May. Plots were four rows (22-in. row spacing) wide and 34.5 ft long. The experimental design was a randomized complete block with four replications per cultivar. The crop was managed by the grower according to standard cultural practices. Eight roots per plot were hand dug from an outside row and topped on 12 Oct and placed into nylon mesh onion bags. The roots were then weighed and placed on top of an indoor commercial sugar beet storage pile in Paul, ID which was set to hold 36°F. The plants in the center two rows were mechanically topped and yield data was collected with a mechanical harvester on 17 Oct. The percent sugar at harvest was established based on two 8-beet samples submitted to the Amalgamated Tare Lab (determined percent sugar, conductivity, nitrates, and tare). On the 5 Mar 2007 (144 days since harvest), the roots were retrieved from storage and evaluated for root rot (percentage of root surface area covered with fungal growth or discolored), weight, and percent sugar (via gas chromatography). To establish percent reduction in sugar at harvest versus storage, only samples from the same plot were compared. Data were analyzed using the general linear models procedure (Proc GLM-SAS), and Fisher's protected least significant difference was used for mean comparisons.

The field trial was disease free except for a trace amount of curly top. Yields for this production area in 2006 and the plot area were both above average. Cultivars differed for root yield and estimated recoverable sugar (ERS) at harvest and for surface rot (isolations revealed a diversity of fungi) after being in storage. Cultivars coming out of storage did not differ for weight reduction. Sugar reduction ranged from 16 to 40% and ERS ranged from 13,300 to 8,449 lb/A after storage, but differences between cultivars could not be proven. With regression analysis, ERS after storage was best explained by surface rot ($r^2 = 0.32$, $P < 0.0001$) and to lesser extent with weight reduction ($r^2 = 0.24$, $P < 0.0001$), and nitrates ($r^2 = 0.11$, $P = 0.0001$), percent sugar ($r^2 = 0.05$, $P = 0.0088$), and conductivity ($r^2 = 0.04$, $P = 0.0150$) in roots at harvest. Given the ranges in ERS after storage, there would appear to be potential for improving storability in cultivars, but better selection criteria must be established. In order to establish better criteria, either more replications should be considered and/or conditions that allow for greater separation based on ERS after storage must be found.

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Cultivar [z]	Surface root rot (%)	Weight reduction (%)	Root yield (tons/A)	ERS at harvest (lb/A) [y]	Sugar reduction (%)	ERS after storage (lb/A)
B-28	8 f-i	3.8	57.7 d-f	15785 a	15.8	13300
B-26	17 c-i	3.2	53.3 g-l	14958 a-g	18.3	12221
C-2	23 b-i	5.4	58.2 c-f	14948 a-g	18.6	12204
SX005	7 g-i	5.0	57.4 d-f	15172 a-f	19.7	12204
SX006	34 a-f	4.5	51.4 j-n	14176 d-i	15.7	11935
B-31	14 d-i	3.3	55.0 f-h	15086 a-f	21.4	11783
HM070014	12 e-i	4.3	55.4 f-h	14941 a-h	21.4	11693
HH004	30 a-i	4.9	61.7 ab	15407 a-d	24.8	11554
SX004	6 hi	6.6	53.0 h-l	14090 e-i	19.6	11313
HM070011	30 a-i	4.5	53.4 g-l	14671 a-h	23.5	11213
HM070001	12 e-i	3.8	54.9 f-i	14381 b-i	21.9	11176
HH019	4 i	3.8	52.8 h-m	13236 i	16.5	11061
HM070012	39 a-e	5.2	49.9 l-n	14483 b-i	24.1	10976
SX002	16 c-i	5.4	48.6 n	13649 hi	19.2	10955
HH001	32 a-h	5.4	62.9 a	15317 a-e	29.5	10885
HM070021	15 d-h	6.5	54.7 f-j	14854 a-h	27.8	10673
HH002	33 a-g	5.4	50.3 k-n	14442 b-i	26.5	10585
HM070004	16 c-i	7.0	55.3 f-h	14369 b-i	26.8	10511
C-21	35 a-e	5.7	59.4 a-e	15373 a-e	32.2	10446
HM070018	42 a-c	5.6	52.0 h-n	14155 d-i	27.4	10285
HM070007	31 a-h	5.8	49.4 mn	13741 g-i	26.0	10166
SX001	22 b-i	5.5	55.5 f-h	14231 c-i	31.3	9747
HM070005	20 c-i	5.4	55.4 f-h	14714 a-h	34.4	9692
B-27	41 a-d	4.8	56.6 e-g	14578 a-h	34.0	9654
C-17	48 ab	4.9	57.7 d-f	14715 a-h	35.4	9558
B-32	22 b-i	5.7	59.0 b-e	15489 a-c	39.0	9491
HH005	30 a-i	3.5	61.5 a-c	15474 a-c	40.9	9250
B-16	51 a	5.5	57.7 d-f	15002 a-g	38.6	9136
B-30	56 a	6.3	60.6 a-d	15615 ab	42.2	9055
HH003	24 b-i	5.7	59.3 b-e	14318 c-i	37.2	8908
B-4	30 a-i	6.6	51.5 i-n	14752 a-h	42.4	8542
HM070015	37 a-e	6.7	53.7 g-k	13996 f-i	40.3	8449
P > *F*	0.0067	0.5391	<0.0001	0.0212	0.1340	0.2817
LSD ($P \leq 0.05$)	27	NS	3.5	1296	NS	NS

[z] For more information on coded cultivars contact the respective companies: B = Betaseed, C = ACH Seeds Inc., HH = Holly Hybrids, HM = Hilleshog, and SX = Seedex.

[y] ERS = estimated recoverable sugar at harvest was based on tonnage, nitrates, conductivity, tare, and percent sucrose. ERS after storage also accounted for percent reduction in sugar. Sugar reduction (%) = (1-(((% $\text{Sugar}_{\text{storage sample}}$ – 1.395) x $\text{Weight}_{\text{storage sample}}$)/(% $\text{Sugar}_{\text{harvest sample}}$ x $\text{Weight}_{\text{harvest sample}}$))) x 100. *P* > *F* was the probability associated with the F value. LSD = Fisher's protected least significant difference value. Within each parameter, means followed by the same letter did not differ significantly based on Fisher's protected least significant difference. NS = not significant.