SUGAR BEET (*Beta vulgaris*)
    Rhizomania; *Beet necrotic yellow vein virus*
    Storage rot; *Athelia* sp., *Botrytis* sp., and
          Penicillium sp.

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Experimental sugar beet cultivars evaluated for rhizomania resistance and storability in Idaho, 2010.

Twenty-seven experimental sugar beet cultivars and five commercial check cultivars were evaluated in a sprinkler-irrigated sugar beet field near Kimberly, ID where sugar beet were grown in 2009. The field trial was conducted in a field that contained Portneuf silt loam soil and relied on natural infection for rhizomania development. The plots were planted on 26 Apr 10 to a density of 142,560 seeds/A, and thinned to 47,520 plants/A on 12 Jun. Plots were four rows (22-in. row spacing) and 24 ft long. The experimental design was a randomized complete block design with four replications per cultivar. The crop was managed according to standard cultural practices. The plants were mechanically topped and the center two rows were collected with a mechanical harvester on 18-19 Oct. At harvest the roots were evaluated for rhizomania (Rz rating) using a scale of 0-9 (0 = healthy and 9 = dead). The percent sucrose at harvest was established based on two eight-root samples from each plot. The samples were submitted to the Amalgamated Tare Lab (determined percent sucrose, conductivity, nitrates, and tare). At harvest, eight roots per plot were also placed in a mesh onion bag, weighed, and placed in an indoor commercial sugar beet storage facility in Paul, ID on 19 Oct set to hold 35°F. On 7 Feb 11 roots were retrieved after 112 days in storage and evaluated for weight, percentage of surface area covered by rot or microbial growth, and percent sucrose (via gas chromatography). Only samples from the same plots were compared, when establishing percent reduction in sucrose at harvest versus storage. Data were analyzed in SAS (Ver. 9.2) using the generalized linear mixed models procedure (Proc GLIMMIX), and least squares means ($\alpha = 0.05$) were used for mean comparisons.

Root rots and other disease problems other than rhizomania were not evident in the plot area. Rhizomania was uniform based on foliar and root symptoms. There were significant differences among cultivars for all variables, except surface root rot. B-103 was susceptible to rhizomania as expected, but C-31 had a higher foliar reading than expected. Root yield averaged 33.3 tons/A which was higher than Idaho's average of 31.0 tons/A (USDA-National Ag. Stat. Service). By the end of the storage season, weight loss ranged from 6.0 to 11.4% and sucrose losses ranged from 19 to 33%. Thus, improving storability in sugar beet cultivars to reduce sucrose losses could have considerable economic benefit.

Cultivar [z]	Rhizomania rating [y]		Surface root rot (%) [x]	Weight red. (%) [w]	Root yield (tons/A)	ERS at harvest (lb/A) [v]	Sucrose red. (%) [u]	ERS after storage (lb/A)
	Foliar	Root						
B-7	3 c-f	2.6 d-j	5	7.1 f-h	35.6 a-c	11,130 ab	23 e-g	8,594 a
HM118593	0 f	2.9 b	6	11.4 a	40.6 a	11,576 a	28 a-e	8,280 ab
SV011	1 ef	2.7 b-h	5	9.0 b-e	35.1 a-c	10,471 a-c	23 d-g	8,072 a-c
B-100	4 c-f	2.6 d-k	4	9.2 b-e	34.9 a-e	10,474 a-c	27 a-f	7,699 a-d
HM116624	4 c-f	2.5 f-k	9	7.0 gh	37.5 ab	10,445 a-c	28 a-f	7,531 a-e
B-42	0 f	2.4 i-k	12	8.7 b-g	33.6 b-e	9,810 a-e	23 d-g	7,515 a-e
SV010	2 c-f	2.4 i-k	4	7.5 e-h	33.1 b-e	9,625 b-e	22 fg	7,506 a-e
HM111010	3 c-f	2.7 b-g	3	8.8 b-g	35.7 a-c	9,594 b-e	22 fg	7,501 a-e
C-30	0 f	2.4 k	6	7.9 d-g	35.0 a-e	9,856 a-e	24 d-g	7,463 a-e
SX015	4 c-f	2.5 h-k	20	7.4 e-h	34.9 a-e	10,298 a-c	28 a-f	7,395 a-e
SV006	1 d-f	2.4 k	5	8.8 b-g	35.0 a-e	10,148 a-d	28 a-f	7,340 a-e
HM119757	4 c-f	2.5 h-k	1	6.0 h	32.2 b-e	9,009 c-e	19 g	7,308 a-e
B-43	3 c-f	2.4 i-k	15	9.2 b-e	37.0 a-c	10,582 a-c	32 ab	7,216 b-e
HM113545	2 c-f	2.5 g-k	7	7.9 d-g	33.0 b-e	9,504 b-e	24 d-g	7,191 b-e
SX016	1 d-f	2.4 jk	14	7.1 f-h	33.7 b-e	9,801 a-e	27 a-f	7,154 b-e
HM113371	4 c-f	2.9 b	2	8.7 b-g	31.6 c-e	9,326 b-e	24 d-g	7,062 b-e
HM118711	2 c-f	2.6 c-i	11	9.8 a-c	34.6 b-e	9,782 a-e	28 a-f	7,019 b-e
B-44	1 d-f	2.4 k	10	8.4 c-g	35.0 a-e	10,086 a-e	31 a-c	6,949 b-e
SX013	6 c	2.4 jk	8	8.2 c-g	30.7 c-e	9,225 c-e	25 b-g	6,932 b-e
B-110	1 ef	2.9 b	5	8.6 b-g	30.8 c-e	9,187 c-e	25 c-g	6,931 b-e
HM103425	1 c-f	2.8 b-d	6	7.8 d-h	32.1 b-e	9,218 c-e	25 b-f	6,919 b-e
HM113468	2 c-f	2.8 bc	4	7.5 e-h	32.4 b-e	9,158 c-e	25 c-g	6,918 b-e
HH015	5 cd	2.8 b-e	9	8.2 c-g	33.4 b-e	9,478 b-e	27 a-f	6,904 c-e
HM070006	0 f	2.4 jk	2	10.4 ab	31.3 c-e	9,043 c-e	25 c-g	6,788 c-e
C-12	1 c-f	2.4 jk	6	8.9 b-f	35.3 a-d	9,522 b-e	29 a-d	6,671 de
HM116520	0 ef	2.5 g-k	12	9.2 b-e	35.4 a-d	9,866 a-e	33 a	6,601 de
HM113569	4 c-f	2.5 e-k	10	7.4 e-h	34.9 a-e	9,724 b-e	31 ab	6,565 de
SX017	5 c-e	2.7 b-h	6	7.6 d-h	31.1 c-e	9,025 c-e	29 a-e	6,420 de
C-31	41 b	2.9 bc	3	9.1 b-e	31.5 c-e	8,758 c-e	27 a-f	6,382 de
HM119174	0 f	2.5 h-k	6	6.9 gh	29.4 e	8,412 de	25 c-g	6,331 de
HM114241	2 c-f	2.7 b-f	2	7.9 c-g	29.8 de	8,287 e	24 d-g	6,315 e
B-103	99 a	3.8 a	3	9.5 b-d	20.4 f	6,006 f	26 b-f	4,444 f
Overall mean	6.4	2.6	7	8.3	33.3	9,576	26	7,060
$P > F$ [t]	<0.0001	<0.0001	0.0957	0.0001	0.0002	0.0020	0.0088	0.0023

[z] For more information on coded cultivars contact the respective companies: B = Betaseed Inc., C = ACH Seeds Inc., HH = Holly Hybrids, HM = Hilleshog, SV = SESVanderHave, and SX = Seedex. B-7, C-12, HM070006, and HH015 were included as commercial check cultivars (bold). B-103 was included as a rhizomania susceptible check cultivar (bold).

[y] Foliar = percentage of plants with foliar rhizomania symptoms, Root = roots were evaluated for rhizomania using a scale of 0-9 (0 = healthy, 9 = dead; Plant Dis. 92:581-587) at harvest.

[x] Surface root rot = percentage of root surface area discolored by rot and fungal growth.

[w] Weight reduction = difference in weight from harvest to end of storage.

[v] ERS = estimated recoverable sucrose was calculated as extraction x 0.01 x gross sucrose and extraction = 250 + [1255.2 x (conductivity - 15000) x (percent sucrose - 6185)]/(percent sucrose x [98.66 - (7.845 x conductivity)]).

[u]   Sucrose reduction (%) = $(1-(((\% Sucrose_{storage\ sample} - 1.395)$ x $Weight_{storage\ sample})/(\% Sucrose_{harvest\ sample}$ x $Weight_{harvest\ sample}))) $ x 100.

[t] $P > F$ was the probability associated with the F value. Within each variable, means followed by the same letter did not differ significantly based on least squares means ($\alpha = 0.05$).