provided by USDA - ARS - NWISR

SUGAR BEET (Beta vulgaris)

Rhizomania; *Beet necrotic yellow vein virus* Storage rot; *Athelia*-like sp., *Botrytis cinerea*, and *Penicillium* spp.

C. A. Strausbaugh, USDA-ARS NWISRL, 3793 N. 3600 E., Kimberly, ID 83341 and A. Fenwick, USDA-ARS Sugar Beet Res. Unit, Crops Res. Lab, 1701 Centre Ave., Ft. Collins, CO 80526

Ft. Collins sugar beet germplasm evaluated for rhizomania and storage rot resistance in Idaho, 2017.

Forty-two sugar beet (*Beta vulgaris* L.) lines from the USDA-ARS Ft. Collins sugar beet program and five check cultivars were screened for resistance to *Beet necrotic yellow vein virus* (BNYVV), the causal agent of rhizomania, and to storage rot. The rhizomania evaluation was conducted at the USDA-ARS North Farm in Kimberly, ID which has Portneuf silt loam soil and had been in barley in 2016. In the spring the field was plowed and fertilized (90 lb N and 110 lb P_2O_5/A) and roller harrowed on 11 Apr 17. The germplasm was planted (density of 142,560 seeds/A) on 4 May. The plots were one row 10-ft long with 22-in. row spacing and arranged in a randomized complete block design with 6 replicates. The crop was managed according to standard cultural practices for southern Idaho. Plant populations were thinned manually to 47,500 plants/A on 3 Jun. The trial relied on endemic field inoculum for rhizomania and storage rot development. The plots were rated for foliar symptom (percentage of plants with yellow, stunted, upright leaves) development on 21 Aug. The plants were mechanically topped and hand harvested on 11 Oct. At harvest, eight roots per plots were rated for symptom development using a scale of 0 to 9 (0 = healthy and 9 = dead; Plant Disease 93:632-638), with disease index (DI) treated as a continuous variable. At harvest, eight roots per plot were also placed in a mesh-onion bag and placed in an indoor commercial storage facility (temperature set point 34°F) in Paul, ID on 11 Oct. On 18 Feb 18, after 132 days in storage, the roots were evaluated for the percentage of root surface area covered by fungal growth or rot. Data were analyzed in SAS (Ver. 9.4) using the general linear models procedure (Proc GLM), and Fisher's protected least significant difference ($\alpha = 0.05$) was used for mean comparisons.

Rhizomania symptom development was uniform and other disease problems were not evident in the plot area. The BNYVV susceptible check plots (Check 1 and RB) had 97 to 100% foliar symptoms and high root disease severity ratings. The three resistant checks (2, 3, and 4) had 0 to 6% foliar symptoms and low root ratings. Based on root ratings, all entries except entry 20151043PF had some level of resistance since they were all better than the susceptible checks. However, 20141018 was the only entry that performed well for all variables. 20161023PF also had a good root rating, but had considerable foliar symptoms. 20151044PFHO and 20151046PFHO had no foliar symptoms and very little storage rot, so the poor root rating may be related to inherently poor root shape and not a lack of BNYVV resistance. Twenty-six of the entries had resistance to fungal rots in storage, because they were not different from 20161014HO and Check 3. Some entries may serve as a starting point for identifying additional sources of resistance to BNYVV and storage rots.

Patrix				RZ foliar rating	
Check 4 BTSSALCHK3 (R:RE) = R:2 resistant check 27 g.j 6 q.s 17 t Check 3 BTSSALCHK3 (R:RE) = R:2 resistant check 12 lo 0 s 21 st Check 2 BTSSALCHK3 (R:RE) = R:2 resistant check 12 lo 0 s 21 st 20141018 201210361 (IPC907 × IC709-2) & 9931 x (C790-15mx × IC706) 16 jo 12 o-8 26 st 20161029EP 20111018x, (2325 LISR Giant Poly (PISSSE6) × SucroseMMJ) 41 be 49 e-8 27 q.s 20161029EP 20111019x; (2325 ax [20011035M) (WB8S3 × SucroseMMJ) 12 lo 9 p.s 30 p.r 20161029EP 20111019x; (2325 ax [20011035M) (WB8S3 × SucroseMMJ) 12 lo 9 p.s 30 p.r 20161019PF FC220-2; 20121037PF&MS (FC220-1 - inc. 20051030 RbcR 11 lo 20 n.s 32 p.r 20151010 20121018B10-x - Bulk increase of roots selected for RbcR 13 lo 20 n.s 33 lo 20151014H01 20061005H0 & 20061005H01; 03-124 PC123 derivative and CMS 11 lo 38 g.o 33 l-q 20151014H01 20061005H0 & 20061005H01; 03-124 PC123 derivative and CMS 11 lo 38 g.o 33 l-q			Root rot in	(% susceptible	RZ root
Check 3	Entry ^z	Description	storage (%) ^y	plants)	rating ^x
Check 3 BTSSALCHK3 (RR2R) = R21 = R21 + R22 resistant check 34 e-g 3 rs 23 st 20141018 20121036; [FC907 × FC709-2) & 9931] x [C790-15cm x FC1036] 16 jo 12 e-s 26 rs 20141018 20121036; [FC907 × FC709-2) & 9931] x [C790-15cm x FC1036] 16 jo 12 e-s 26 rs 201610220FF 20111019-x; (Z325a x [20011045MS (WB833 × SucroseMMJ)) 12 lo 9 p-s 30 p-r 201610192FF 2011019-x; (Z325a x [20011045MS (WB833 × SucroseMMJ)) 12 lo 9 p-s 30 p-r 201610192FF PC220-2; 20121037FF8kmS; (C220-1 in 2.0051030) RhzcR 11 lo 20 n-s 32 n-r 20151020 20101013-xx; B.I. Roots selected at El. in 2010 & 2011 16 jo 22 n-s 32 n-r 20151020 20121018HO-x Bulk increase of roots selected for RhzcR 13 lo 20 n-s 33 l-q 2016101410 20121018HO-x Bulk increase of roots selected for RhzcR 13 lo 20 n-s 33 l-q 2016101410 20101013-xx; B.I. Zd5x6x (S611 x SucroseMM) 25 g-k 29 l-q 33 l-q 2016101410 20101018HO-1877021018HO 9 n-o 18 n-s 34 l-p <t< th=""><th>Check 4</th><th>BTSSALCHK4 $(Rz1Rz1) = Rz1$ resistant check</th><th>27 g-j</th><th>6 q-s</th><th>17 t</th></t<>	Check 4	BTSSALCHK4 $(Rz1Rz1) = Rz1$ resistant check	27 g-j	6 q-s	17 t
20141018	Check 3				21 st
20161023PF 20111018-x, (Z325x µLSR Giant Poly (PIS5886) × SucroseMMJ)	Check 2	BTSSALCHK2 $(Rz2Rz2) = Rz2$ resistant check	34 e-g	3 rs	23 st
20161026PF 20111019-x; (7225an x 20011045MS (WBRS3 x SucroseMM)	20141018	20121036; [(FC907 × FC709-2) & 9931] x [C790-15cms × FC1036]	16 j-o	12 o-s	26 rs
20161026PF 20111019-x; (27358a x 20011045MS (WB853 x SucroseMM)) 12 lo 9 p-s 30 p-t 20101012 C790-156mx RXM-CK-8; (PC712 x 9931)F3 14 k-o 28 j-r 32 o-r 20141019PF PC220-2; 20121037PF&MS (PC220-1 - inc. 20051030) RhzcR 11 lo 20 n-s 32 n-r 20151020 20101013-xs; Bl. Roots selected at El. in 2010 & 2011 16 j-o 22 ms 32 n-r 20151020 20101013-xs; Bl. Roots selected at El. in 2010 & 2011 16 j-o 22 ms 33 n-p 33 m-p 20151017 20121018HO-x = Bulk increase of roots selected for RhzcR 13 lo 20 n-s 33 l-q 20161014HO 20061005HO 20061005HO 20061005HO 20061005HO 20061005HO 20061005HO 20061005HO 20121018HO-x = Bulk increase of roots selected for RhzcR 13 lo 20 n-s 33 l-q 20161014HO 20061005HO 20061005HO 20121018HO 18 promptomers 8 no 40 e-l 34 l-p 20161004HO 20121018HO 20121018HO 18 promptomers 8 no 49 e-l 34 l-p 20161004HO 20121018HO 20121018HO 20312018HO	20161023PF	20111018-x, (Z325 × [LSR Giant Poly (PI535826) × SucroseMM])	44 b-e	49 e-k	27 q-s
20141019PF FC220-2; 20121037PF&MS FC220-1 - inc. 20051030) RhzcR	20161026PF	20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)])	12 l-o	9 p-s	
20141019PF FC220-2; 20121037PF&MS FC220-1 - inc. 20051030) RhzcR	20101012	C790-15cms x RZM-CR-% (FC712 × 9931)F3	14 k-o	28 j-r	32 o-r
20151020	20141019PF		11 l-o		32 n-r
20061005HOI 03-124 CMS equivalent 17 j·n 33 h·p 33 n·q 20151017 20121018HO·x - Bulk increase of roots selected for RhzcR 13 i-o 20 n·s 33 i·q 20151014 20061005HO & 20061005HO; 03-124 FC123 derivative and CMS 11 i-o 38 g·o 33 i·q 20151042 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 25 g·k 29 i·q 33 i·q 20161004HO 20121018HO : 20121018HO (387)F20121018HO 9 m·o 18 n·s 34 i·p 20161004HO 20121018HO : 20121018HO; 1987P20121018HO 9 m·o 18 n·s 34 i·p 20161004HO 20121018HO : 2014 20141018HO; 03 F701014-22; sib 20151017 12 i·o 55 c·h 34 i·p 20161030HO 20121018HO · 2014 20141018HO; 03 FC1014-22; sib 20151017 12 i·o 55 c·h 34 i·p 20161030HO 20121018HO · 20061005HO; 03-124 FC123 derivative and CMS 5 o 29 i·q 35 i·p 20161014HO 20061005HO & 20061005HO; 03-124 FC123 derivative and CMS 5 o 29 i·q 35 i·p 20161014HO 20081005HO & 20061005HO; 03-124 FC123 derivative and CMS 5 o 29 i·q 35 i·p 20161029HO 20121018HO · x & 20121018HO; 03-FC1014-22 10 i·o 33 i·o 36 i·p 20161030PHO 20121018HO-x & 20121018HO; 03-FC1014-22 10 i·o 33 i·o 36 i·p 20161030PHO 20121018HO-x & 20121018HO; 38-FC1014-22 10 i·o 33 i·o 36 i·p 20161030PHO 20121018HO · x & 20121018HO; 38-FC1014-22 10 i·o 33 i·o 36 i·p 20161030PHO 20121018HO; x & 2	20151020	20101013-xs; B.I. Roots selected at EL in 2010 & 2011	16 j-o	22 m-s	32 n-r
20151017			-		33 m-q
20151042 20101013-xx; B.1. Z325aa × (BGRC 45511 × SucroseMM) 25 g.k 29 i-q 33 l-q 20161004HO 20121018HO-119pf & 20121018HO-187pf20121018HO 9 m-o 18 n-s 34 l-p 20161004HO1 20121018HO 2014 EL & Kimberly (CT) high performers 8 no 49 e-l 34 l-p 20161030HO1 20121018HO 2014 EL & Kimberly (CT) high performers 8 no 49 e-l 34 l-p 20161030HO1 20121018HO 20121018HO1; 03-FC1014-22; sib 20151017 12 l-o 55 e-h 34 k-p 20151038PF 20071005H2 -2325CMS (Salinas % sucrose) × 20011037 36 d-g 72 b-e 35 k-p 20161014HO 20061005HO & 20061005HOI; 03-FC1014-22; sib 20151017 14 k-o 22 m-s 35 k-p 20131011 20081016PF (Best FC LSR × Best EL LSR) × CR011 F3 14 k-o 22 m-s 35 k-p 20121013PF FC221 11 l-o 39 f-n 36 k-p 20141004 FC221 11 l-o 39 f-n 36 k-p 20161029HO1 20121018HO × & 20121018HOI; 03-FC1014-22 10 l-o 33 h-p 36 j-p 20161030PFHO 20121018HO × & 20121018HOI; 03-FC1014-22 (In sel FC201) 9 m-o 52 e-j 37 i-o 20161017 20141020; Increase F3 of CN12-446 × FC708 [SBCN × RhzeRLSR] 8 no 39 f-n 37 i-o 20161017 20141020; Increase F3 of CN12-446 × FC708 [SBCN × RhzeRLSR] 8 no 39 f-n 37 i-o 20151016 20111024-x, [FC907*FC709-2) & 99311 × [C790-15cms × FC1036] 10 l-o 33 h-p 37 i-o 20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 201510125PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)) 26 g-k 63 c-f 39 h-n 20161025PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)) 26 g-k 63 c-f 39 h-n 20161025PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)) 19 i-n 54 e-h 41 g-k 20111028 20091028ms; CLR family (BGRC 45511 × SucroseMM) 19 i-n 54 e-h 41 g-k 20161024PF 201101015HO1-x20131012MS 20011045MS (WB853 × SucroseMM) 21 h-1 23 l-s 45 e-h 20161024PF 201101045MS (WB853 × SucroseMM) 21 h-1 23 l-s 45			13 l-o		
20151042 20101013-xx; B.1. Z325aa × (BGRC 45511 × SucroseMM) 25 g.k 29 i-q 33 l-q 20161004HO 20121018HO-119pf & 20121018HO-187pf20121018HO 9 m-o 18 n-s 34 l-p 20161004HO1 20121018HO 2014 EL & Kimberly (CT) high performers 8 no 49 e-l 34 l-p 20161030HO1 20121018HO 2014 EL & Kimberly (CT) high performers 8 no 49 e-l 34 l-p 20161030HO1 20121018HO 20121018HO1; 03-FC1014-22; sib 20151017 12 l-o 55 e-h 34 k-p 20151038PF 20071005H2 -2325CMS (Salinas % sucrose) × 20011037 36 d-g 72 b-e 35 k-p 20161014HO 20061005HO & 20061005HOI; 03-FC1014-22; sib 20151017 14 k-o 22 m-s 35 k-p 20131011 20081016PF (Best FC LSR × Best EL LSR) × CR011 F3 14 k-o 22 m-s 35 k-p 20121013PF FC221 11 l-o 39 f-n 36 k-p 20141004 FC221 11 l-o 39 f-n 36 k-p 20161029HO1 20121018HO × & 20121018HOI; 03-FC1014-22 10 l-o 33 h-p 36 j-p 20161030PFHO 20121018HO × & 20121018HOI; 03-FC1014-22 (In sel FC201) 9 m-o 52 e-j 37 i-o 20161017 20141020; Increase F3 of CN12-446 × FC708 [SBCN × RhzeRLSR] 8 no 39 f-n 37 i-o 20161017 20141020; Increase F3 of CN12-446 × FC708 [SBCN × RhzeRLSR] 8 no 39 f-n 37 i-o 20151016 20111024-x, [FC907*FC709-2) & 99311 × [C790-15cms × FC1036] 10 l-o 33 h-p 37 i-o 20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 201510125PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)) 26 g-k 63 c-f 39 h-n 20161025PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)) 26 g-k 63 c-f 39 h-n 20161025PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)) 19 i-n 54 e-h 41 g-k 20111028 20091028ms; CLR family (BGRC 45511 × SucroseMM) 19 i-n 54 e-h 41 g-k 20161024PF 201101015HO1-x20131012MS 20011045MS (WB853 × SucroseMM) 21 h-1 23 l-s 45 e-h 20161024PF 201101045MS (WB853 × SucroseMM) 21 h-1 23 l-s 45	20161014HO1	20061005HO & 20061005HO1; 03-124 FC123 derivative and CMS	11 l-o	38 g-o	33 1-a
20161004HO			25 g-k		
20161004HO1 20121018HO1 - 2014 EL.& Kimberty (CT) high performers					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			8 no	49 e-l	
201510138PF 20071005H2 - Z325CMS (Salinas % sucrose) × 20011037 36 d·g 72 b·e 35 k·p 20161014HO 20061005HO & 20061005HO (; 3-124 FC123 derivative and CMS 5 o 29 i·q 35 k·p 20131011 20081016PF (Best FC LSR × Best EL LSR) × CR011 F3 14 k·o 52 e·j 35 k·p 20121013PF FC221-1 11 b·o 39 f·n 36 k·p 20121019HO FC221 11 l·o 39 f·n 36 k·p 20161029HO 20121018HO-x & 20121018HO1; 03-FC1014-22 10 l·o 33 h·p 36 j·p 20161029HO 20121018HO-x & 20121018HO1; 03-FC1014-22 10 l·o 33 h·p 36 j·p 20161030PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 9 m·o 52 e·j 37 i·o 20161030PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 9 m·o 52 e·j 37 i·o 20161030PFHO 20141020; Increase F3 of CN12-446 × FC708 [SBCN × RbxcR/LSR] 8 no 39 f·n 37 i·o 20101010 C790-15cms × 05-FC1018 [RZM-CR-% (C931 × FC709-2)F3] 31 f·h 48 e·l 37 i·o 20121018HO 2011024-x [(FC907×FC709-2) & 9931] × [C7709-15cms × FC1036] 10 l·o 33 h·p 37 i·o 20121012HO FC302 = 03-FC1014-22 (half sib selection within FC201) - sel in 6R 20 h·m 77 a·e 38 h·o 20151014 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l·o 25 k·s 38 h·o 20161025PF 20111019-x; (C325ax (20011045MS (WB853 × SucroseMM))) 26 g·k 63 c·f 39 h·n 20161025PF 20111019-x; (C325ax (20011045MS (WB853 × SucroseMM))) 26 g·k 63 c·f 39 h·n 20161025PF 20111040 × 20121018HO × 20121018HO1; 03-FC1014-22 (hs sel FC201) 8 no 47 e·m 40 h·h 20161029PFHO 20121018HO × 20121018HO1; 03-FC1014-22 (hs sel FC201) 8 no 47 e·m 40 h·h 40			12 l-o	55 e-h	
20161014HO 20061005HO & 20061005HOI; 03-124 FC123 derivative and CMS 5 o 29 i-q 35 k-p 20131011 20081016PF (Best FC LSR × Best EL LSR) × CR011 F3 14 k-o 52 e-j 35 k-p 20121013PF FC221-1 14 k-o 52 e-j 35 k-p 20141004 FC221 11 l-o 39 f-n 36 k-p 20141004 FC221 11 l-o 39 f-n 36 k-p 20161029HOI 20121018HO-x & 20121018HOI; 03-FC1014-22 10 l-o 33 h-p 36 j-p 20161030PFHO 20121018HO-x & 20121018HOI; 03-FC1014-22 10 l-o 27 k-r 36 j-p 20161030PFHO 20121018HO-x & 20121018HOI; 03-FC1014-22 (hs sel FC201) 9 m-o 52 e-j 37 i-o 20161030PFHO 20121018HO-x & 20121018HOI; 03-FC1014-22 (hs sel FC201) 9 m-o 52 e-j 37 i-o 20161017 20141020; Increase F3 of CN12-446 × FC708 [SBCN × RhzcR/LSR] 8 no 39 f-n 37 i-o 20161017 20141020; Increase F3 of CN12-446 × FC708 [SBCN × RhzcR/LSR] 8 no 39 f-n 37 i-o 20151016 20111024-x, [GFC907×FC709-2) & 9931] × [G790-15cms × FC1036] 10 l-o 33 h-p 37 i-o 20121012HO FC302 = 03-FC1014-22 (half sib selection within FC201) - sel in 6R 20 h-m 77 a-e 38 h-o 20121014HO 2012109HO & HO1 - Increase 03-FC1019HO & HO1 10 l-o 25 k-s 38 h-o 20161025PF 20111019-x; (Z325aa × [20011045MS (WB853 × SucroseMM)]) 26 g-k 63 c-f 39 h-n 20061005HO 3-124 FC123 derivative 12 l-o 39 f-n 40 h-m 20161029PFHO 20121018HO1 × 201					
20131011 20081016PF (Best FC LSR × Best EL LSR) × CR011 F3					
20121013PF FC221-1 14 k-0 52 e-j 35 k-p 20141004 FC221 11 l-0 39 f-n 36 k-p 20161029HO1 20121018HO-x & 20121018HO1; 03-FC1014-22 10 l-0 33 h-p 36 j-p 20111031 20071003H2; LSR ((BGRC 45511) × Sucrose) × Z325aa 12 l-0 27 k-r 36 j-p 20161030PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 9 m-o 52 e-j 37 i-o 20161017 2014102; Increase F3 of C 1012-446 × FC708 (SBCN × RhzeRLSR) 8 no 39 f-n 37 i-o 20161017 2014102; Increase F3 of C 1012-446 × FC708 (SBCN × RhzeRLSR) 8 no 39 f-n 37 i-o 20151016 20111024-x, [(FC907×FC709-2) & 9931] × [(C790-15cms × FC1036] 10 l-o 33 h-p 37 i-o 20151016 20111024-x, [(FC907×FC709-2) & 9931] × [(C790-15cms × FC1036] 10 l-o 33 h-p 37 i-o 20151014 20 can 20 sel con 20 se		,			
20141004 FC221		,		52 e-i	
20161029HO1 20121018HO-x & 20121018HO1; 03-FC1014-22 10 l-o 33 h-p 36 j-p 20111031 20071003H2; LSR { [BGRC 45511) × Sucrose} × Z325aa 12 l-o 27 k-r 36 j-p 20161030PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 9 m-o 52 e-j 37 i-o 20161030PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 9 m-o 52 e-j 37 i-o 20161017 20141020; Increase F3 of CN12-446 × FC708 { [SBCN × RhzcRLSR] 8 no 39 f-n 37 i-o 20101010 C790-15cms × 05-FC1018 { [RZM-CR-% (C931 × FC709-2)F3] 31 f-h 48 e-l 37 i-o 20151016 20111024-x, [(FC907*FC709-2) & 9931] × [C790-15cms × FC1036] 10 l-o 33 h-p 37 i-o 20121012HO FC302 = 03-FC1014-22 (half sib selection within FC201) - sel in 6R 20 h-m 77 a-e 38 h-o 20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 20151049F 20111019-x; (Z325aa × [20011045MS (WB853 × SucroseMM)]) 26 g-k 63 c-f 39 h-n 20061005HO 03-124 FC123 derivative 12 l-o 39 f-n 40 h-m 20161029PFHO 20121018HO-x & 20121018HO; 03-FC1014-22 (hs sel FC201) 8 no 47 e-m 40 h-1 20111028 20091028ms; CLR family (BGRC 45511 × SucroseMM) 19 i-n 54 e-h 41 g-k 20161028PF 20121014-x; (Blk Inc 05-FC1023m(iso)]2005A020], half sibs of FC301 11 l-o 23 l-s 41 g-k 20151044PFHO 20121015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20151044PFHO 20101015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20151044PFHO 2011019HO-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 2011019HO-xs; Bl from 07-FC124-425 15 k-o 8 p-s 47 d-g 20161024PF 20110104HO-xs; Bl from 07-FC124-425 15 k-o 8 p-s 47 d-g 20161024PF 2011016HO1-xs/20101016HO1-xs					
20111031 20071003H2; LSR {(BGRC 45511) × Sucrose} × Z325aa 12 l-o 27 k-r 36 j-p 20161030PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 9 m-o 52 e-j 37 i-o 20161017 20141020; Increase F3 of CN12-446 × FC708 [SBCN × RhzcRLSR] 8 no 39 f-n 37 i-o 20101010 C790-15cms × 05-FC1018 [RZM-CR-% (C931 × FC709-2)F3] 31 f-h 48 e-l 37 i-o 20151016 20111024-x, [(FC907x-FC709-2) & 9931] × [C790-15cms × FC1036] 10 l-o 33 h-p 37 i-o 20121012HO FC302 = 03-FC1014-22 (half sib selection within FC201) - sel in 6R 20 h-m 77 a-e 38 h-o 20121014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 20161025PF 20111019-x; (Z325aa × [20011045MS (WB853 × SucroseMM)]) 26 g-k 63 c-f 39 h-n 20061005HO 03-124 FC123 derivative 12 l-o 39 f-n 40 h-m 20161029PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 8 no 47 e-m 40 h-1 20111028 20091028ms; CLR family (BGRC 45511 × SucroseMM) 19 i-n 54 e-h 41 g-k 20151044PFHO 20121014-x; (Blk Inc 05-FC1023m(iso)[2005A020], half sibs of FC301 11 l-o 23 l-s 41 g-k 20151044PFHO 20101015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20151044PFHO 20101015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-1 23 l-s 45 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-1 23 l-s 45 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-1 23 l-s 45 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-1 23 l-s 45 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-1 23 l-s 45 e-h 20161024PF 20110104HO-x; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20161024PF 20110104HO-x; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20161024PF 20101016HO1-x; S020101016HO-x; CMD1016HO1-x; S020101016HO1-x; S02010104HO-x; BI from 07-FC124-425 15 k-o 8 p-s					
20161030PFHO 20121018HO-x & 20121018HOI; 03-FC1014-22 (hs sel FC201) 9 m-o 52 e-j 37 i-o 20161017 20141020; Increase F3 of CN12-446 x FC708 [SBCN x RbzcR/LSR] 8 no 39 f-n 37 i-o 20101010 C790-15cms x 05-FC1018 [RZM-CR-x (C931 x FC709-2)F3] 31 f-h 48 e-l 37 i-o 20151016 20111024-x; [(FC907xFC709-2) & 9931] x [C790-15cms x FC1036] 10 l-o 33 h-p 37 i-o 20121012HO FC302 = 03-FC1014-22 (half sib selection within FC201) - sel in 6R 20 h-m 77 a-e 38 h-o 20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 20161025PF 20111019-x; (Z325aa x [20011045MS (WB853 x SucroseMM)]) 26 g-k 63 c-f 39 h-n 20061005HO 03-124 FC123 derivative 12 l-o 39 f-n 40 h-m 20161029PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 8 no 47 e-m 40 h-l 20111028 20091028ms; CLR familiy (BGRC 45511 x SucroseMM) 19 i-n 54 e-h 41 g-k 20161028PF 20121014-x; (Bik Inc 05-FC1023m(iso)[2005A020], half sibs of FC301 11 l-o 23 l-s 41 g-k 20111030 Increase 5 highest CLR families 20071004HO-xs; LSRMM w/Fargo 40 c-f 97 ab 42 f-j 20151044PFHO 2010105HO1-x/20131012MS 14 k-o 0 s 43 e-i 20131012PF 07-FC1015-403 - Combine mod. CR, Rz1, CTR, with mm, T-O, %S 29 f-i 30 h-q 44 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 x SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 20111049-x; (Z325aa x [20011045MS (WB853 x SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 2011019-x; (Z325aa x [20011045MS (WB853 x SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 2011019-x; (Z325aa x [20011045MS (WB853 x SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 20110139MS/PF Z325x BGRC 28938 55 ab 53 e-i 47 d-g 20161024PF 20161037x; (20161045MS (WB853 x SucroseMM)] 20 l-i 20 l-i 20 l-i 20 l					
20161017 20141020; Increase F3 of CN12-446 × FC708 [SBCN × RhzcR/LSR] 8 no 39 f-n 37 i-o 20101010 C790-15cms × 05-FC1018 [RZM-CR-% (C931 × FC709-2)F3] 31 f-h 48 e-l 37 i-o 20151016 20111024-x, [(FC907×FC709-2) & 9931] × [C790-15cms × FC1036] 10 l-o 33 h-p 37 i-o 20121012HO FC302 = 03-FC1014-22 (half sib selection within FC201) - sel in 6R 20 h-m 77 a-e 38 h-o 20121012HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 10 l-o 25 k-s 38 h-o 20161025PF 20111019-x; (Z325aa × [20011045MS (WB853 × SucroseMM)]) 26 g-k 63 c-f 39 h-n 20061005HO 03-124 FC123 derivative 12 l-o 39 f-n 40 h-m 20161029PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 8 no 47 e-m 40 h-l 20111028 20091028ms; CLR family (BGRC 45511 × SucroseMM) 19 i-n 54 e-h 41 g-k 20111028 20091028ms; CLR family (BGRC 45511 × SucroseMM) 19 i-n 54 e-h 41 g-k 20111030 Increase 5 highest CLR families 20071004HO-xs; LSRMM w/Fargo 40 c-f 97 ab 42 f-j 20151044PFHO 20101015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20131012PF 07-FC1015-403 - Combine mod. CR, Rz1, CTR, with mm, T-O, %S 29 f-i 30 h-q 44 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161027PF 20101014HO-xs; Bl from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 2010106HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20151043PF 2014103-x; Bl. L325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc 5			9 m-o		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$					
20151014HO 20121019HO & HO1 - Increase 03-FC1015HO & HO1 101-0 25 k-s 38 h-o 20161025PF 20111019-x; (Z325aa × [20011045MS (WB853 × SucroseMM)]) 26 g-k 63 c-f 39 h-n 20061005HO 03-124 FC123 derivative 12 l-o 39 f-n 40 h-m 20161029PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 8 no 47 e-m 40 h-l 20161028PF 20121014-x; (BIk Inc 05-FC1023m(iso)[2005A020], half sibs of FC301 11 l-o 23 l-s 41 g-k 20111030 Increase 5 highest CLR families 20071004HO-xs; LSRMM w/Fargo 40 c-f 97 ab 42 f-j 20151044PFHO 20101015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20151024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161027PF 20110103MS/PF Z325 × BGRC28938 55 ab 53 e-i 47 d-g 20161027PF 20101014HO-xs; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151043PF 20101015HO1-xs/20101016HO-x; kimberly sel CTR 12 l-o 0 s 52 cd 2016104PF 20141035; 2012055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzzz) = susceptible commercial red beet cultivar ND 100 a 75 a P > F ^w Check 1 BTSSALCHK1 (rzzz) = susceptible commercial red beet cultivar ND 100 a 75 a P > F ^w Check 1 BTSSALCHK1 (rzzz) = susceptible commercial red beet cultivar ND 100 a 75 a P > F ^w Check 1 Check 1 Check 1 Check 1 Check 2 check 2 check 2 check 2 check 2 check 2 check 3 check 2 check 2 check 2 check 2 check 3 check 2 check 2 check 3 check 2 check 2 check 3 check 2					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		· · · · · · · · · · · · · · · · · · ·			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			26 g-k		
20161029PFHO 20121018HO-x & 20121018HO1; 03-FC1014-22 (hs sel FC201) 8 no 47 e-m 40 h-l 20111028 20091028ms; CLR family (BGRC 45511 × SucroseMM) 19 i-n 54 e-h 41 g-k 20161028PF 20121014-x; (Blk Inc 05-FC1023m(iso)[2005A020], half sibs of FC301 11 l-o 23 l-s 41 g-k 20111030 Increase 5 highest CLR families 20071004HO-xs; LSRMM w/Fargo 40 c-f 97 ab 42 f-j 20151044PFHO 20101015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20131012PF 07-FC1015-403 - Combine mod. CR, Rz1, CTR, with mm, T-O, %S 29 f-i 30 h-q 44 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 2016103PF 20111039MS/PF Z325 × BGRC28938 55 ab 53 e-i 47 d-g 2016102PF 20101014HO-xs; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 17 j-n 89 ab 49 de					
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$					
20161028PF 20121014-x; (Blk Inc 05-FC1023m(iso)[2005A020], half sibs of FC301 11 1-0 23 1-s 41 g-k 20111030 Increase 5 highest CLR families 20071004HO-xs; LSRMM w/Fargo 40 c-f 97 ab 42 f-j 20151044PFHO 20101015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20131012PF 07-FC1015-403 - Combine mod. CR, Rz1, CTR, with mm, T-O, %S 29 f-i 30 h-q 44 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161003PF 20111039MS/PF Z325 × BGRC28938 55 ab 53 e-i 47 d-g 20161027PF 20101014HO-xs; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20151043PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 57 bc <td></td> <td></td> <td></td> <td></td> <td></td>					
20111030 Increase 5 highest CLR families 20071004HO-xs; LSRMM w/Fargo 40 c-f 97 ab 42 f-j 20151044PFHO 20101015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20131012PF 07-FC1015-403 - Combine mod. CR, Rz1, CTR, with mm, T-O, %S 29 f-i 30 h-q 44 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161003PF 20111039MS/PF Z325 × BGRC28938 55 ab 53 e-i 47 d-g 20161027PF 20101014HO-xs; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20151043PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc					
20151044PFHO 20101015HO1-x/20131012MS 14 k-o 0 s 43 e-i 20131012PF 07-FC1015-403 - Combine mod. CR, Rz1, CTR, with mm, T-O, %S 29 f-i 30 h-q 44 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161003PF 20111039MS/PF Z325 × BGRC28938 55 ab 53 e-i 47 d-g 20161027PF 20101014HO-xs; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20161016PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzrz) = susceptible check 47 b-d 97 ab 62 b RB <td< td=""><td></td><td>7.</td><td></td><td></td><td></td></td<>		7.			
20131012PF 07-FC1015-403 - Combine mod. CR, Rz1, CTR, with mm, T-O, %S 29 f-i 30 h-q 44 e-h 20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161003PF 20111039MS/PF Z325 × BGRC28938 55 ab 53 e-i 47 d-g 20161027PF 20101014HO-xs; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20161016PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzrz) = susceptible check 47 b-d 97 ab 62 b RB Detroit Dark Red, susceptible commercial red beet cultivar ND 100 a 75 a					
20161024PF 20111019-x; (Z325aa x [20011045MS (WB853 × SucroseMM)]) 21 h-l 23 l-s 45 e-h 20161003PF 20111039MS/PF Z325 × BGRC28938 55 ab 53 e-i 47 d-g 20161027PF 20101014HO-xs; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20151043PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzrz) = susceptible check 47 b-d 97 ab 62 b RB Detroit Dark Red, susceptible commercial red beet cultivar ND 100 a 75 a					
20161003PF 20111039MS/PF Z325 × BGRC28938 55 ab 53 e-i 47 d-g 20161027PF 20101014HO-xs; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20151043PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzrz) = susceptible check 47 b-d 97 ab 62 b RB Detroit Dark Red, susceptible commercial red beet cultivar ND 100 a 75 a $P > F^{\text{w}}$ <0.0001					
20161027PF 20101014HO-xs; BI from 07-FC124-425 15 k-o 8 p-s 47 d-g 20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20161016PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzrz) = susceptible check 47 b-d 97 ab 62 b RB Detroit Dark Red, susceptible commercial red beet cultivar ND 100 a 75 a $P > F^{\text{w}}$ <0.0001					
20141022PF Bulk 0931 & 9933 × BCN Resistant, Iranian sugarbeet landrace 34 e-g 22 m-s 48 d-f 1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20161016PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzrz) = susceptible check 47 b-d 97 ab 62 b RB Detroit Dark Red, susceptible commercial red beet cultivar ND 100 a 75 a $P > F^{\text{w}}$ <0.0001					
1997A050 FC607, LSR/CTR, easy bolting, O-type, 2X, mm, self-sterile 17 j-n 89 ab 49 de 20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 l-o 0 s 52 cd 20161016PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzrz) = susceptible check 47 b-d 97 ab 62 b RB Detroit Dark Red, susceptible commercial red beet cultivar ND 100 a 75 a $P > F^{w}$ <0.0001		· · · · · · · · · · · · · · · · · · ·			
20151046PFHO 20101016HO1-xs/20101016HO-x; Kimberly sel CTR 12 1-0 0 s 52 cd 20161016PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzrz) = susceptible check 47 b-d 97 ab 62 b RB Detroit Dark Red, susceptible commercial red beet cultivar ND 100 a 75 a $P > F^{\text{w}}$ <0.0001					
20161016PF 20141035; 20121055; 20081012PF-23, -29 - LSRsel Bvm × S%MM pop 62 a 60 c-g 52 cd 20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 (rzrz) = susceptible check 47 b-d 97 ab 62 b RB Detroit Dark Red, susceptible commercial red beet cultivar ND 100 a 75 a $P > F^{w}$ <0.0001			J		
20151043PF 20101013-xs; B.I. Z325aa × (BGRC 45511 × SucroseMM) 48 bc 85 a-c 57 bc Check 1 BTSSALCHK1 ($rzrz$) = susceptible check 47 b-d 97 ab 62 b RB Detroit Dark Red, susceptible commercial red beet cultivar ND 100 a 75 a $P > F^{w}$ <th< td=""><td></td><td></td><td></td><td></td><td></td></th<>					
Check 1BTSSALCHK1 ($rzrz$) = susceptible check47 b-d97 ab62 bRBDetroit Dark Red, susceptible commercial red beet cultivarND100 a75 a $P > F^{w}$ <0.0001 <0.0001 <0.0001					
RBDetroit Dark Red, susceptible commercial red beet cultivarND100 a75 a $P > F^{W}$ <0.0001 <0.0001 <0.0001					
$P > F^{w}$ < 0.0001 < 0.0001 < 0.0001					
		2011 On 2 airs real, susceptione commercial real octi cultival			

^z All lines were *Beta vulgaris* subsp. *vulgaris*. Five commercial cultivars were included as checks (bold).

^y Root rot in storage = the percent of root surface area covered by fungal growth or rot. Fungal growth was dominated by an *Athelia*-like basidiomycete (Mycologia 104:70-78), *Botrytis cinerea*, *Penicillium expansum*, and *Penicillium cellarum*.

Ten roots per plot were evaluated using a scale of 0-9 (0 = healthy and 9 = dead; Plant Disease 92:581-587). Root rating = a disease severity index value for each plot established using the following formula: [((A)0+(B)1+(C)2+(D)3+(E)4+(F)5+(G)6+(H)7+(I)8+(J)9)/90]100, where A-J are the number of plants in categories 0-9, respectively.

w P > F was the probability associated with the F value. LSD = Fisher's protected least significant difference value ($\alpha = 0.05$). Within a column, means followed by the same letter did not differ significantly based on Fisher's protected LSD. ND = no data.