SUGAR BEET (*Beta vulgaris*)
Rhizoctonia root rot; *Rhizoctonia solani*

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Rhizoctonia root rot resistance in experimental sugar beet cultivars in Twin Falls County, ID, 2012.

Twenty-six experimental sugar beet cultivars along with a non-inoculated check (cultivar B-5) were evaluated for Rhizoctonia root rot resistance at USDA North Farm in Kimberly, ID using three different *Rhizoctonia solani* AG-2-2 IIIB strains. The field had been in barley the previous year, has Portneuf silt loam soil, and was disked and plowed in fall 2011. Fertilizer (90 lb N/A + 110 lb P_2O_5/A) was applied and incorporated with a roller harrow on 16 Apr. The field trial was planted on 24 Apr. The plots were planted to a density of 142,560 seeds/A, and thinned to 47,520 plants/A on 4 Jun. Plots were single rows (22 in-row spacing) and 10 ft long. The experimental design was a randomized complete block design with six replications. The crop was managed according to standard cultural practices including the use of glyphosate for weed control. The plants were inoculated with one of three *R. solani* AG-2-2 IIIB strains (F517, F521, and F551; characterized in Can. J. Pl. Pathol. 33:210-226) grown on sterile barley kernels. The ground barley inoculum was applied to the crown area at the eight-leaf growth stage at a rate of 0.6 g per plant. On the 21 Aug, the first ten roots in each row were mechanically lifted and the number of dead plants and the percentage of discolored root surface area were determined. The mean value from these ten roots served as the experimental unit for that plot in data analysis. The data were analyzed using the Proc GLM procedure in SAS and mean comparisons were conducted using Fisher's protected least significant difference ($\alpha = 0.05$). Spearman's rank correlation coefficient was used to compare cultivar rankings. Thirty isolations (ten per strain) from roots selected at random were conducted on potato dextrose agar to confirm the presence of *R. solani*.

Rhizoctonia root rot developed well with the warm growing conditions and other disease problems were not evident. In the isolations, *R. solani* and/or *Leuconostoc mesenteroides* was isolated from all 30 roots. *Leuconostoc* frequently invades the root tissue shortly after Rhizoctonia root rot gets started making it difficult to always isolate *R. solani*. Although only *R. solani* was inoculated, it is quite obvious from the isolations that the Rhizoctonia-bacterial root rot complex was active in these roots. Based on surface rot and the number of dead plants, all *R. solani* strains were pathogenic, none of the cultivars were completely resistant, and differences between cultivars were significant ($P \leq 0.0004$) with all three strains. Although all strains were pathogenic, a few cultivar-strain combinations resulted in no dead plants. Based on Spearman's rank correlation coefficient, there was always a significant relationship ($P \leq 0.0279$) when comparing cultivar rankings across all three strains regardless of disease variable. With eight out of the 15 rank comparisons, there was a very good relationship (r ranged from 0.6709 to 0.7851; $P \leq 0.0001$). Cultivars 12SYN003, 12SYN004, and 12MAR001performed well across all strains and variables and should be promoted for planting in areas prone to Rhizoctonia root rot.

Cultivar[y]	F517[x]		F521		F551	
	Dead	Root rot (%)	Dead	Root rot (%)	Dead	Root rot (%)
HM123367	5.0 a	93 a	2.8 a-d	66 b-e	5.2 a	92 a
12SYN001	4.0 ab	87 ab	3.7 a	63 b-f	4.3 a-d	91 ab
B-48	3.8 a-c	87 ab	1.7 b-h	53 c-g	4.7 ab	91 ab
12SYN002	2.8 b-e	85 a-c	2.2 a-g	88 a	4.3 a-d	88 a-c
HM126457	3.0 a-d	75 a-f	3.2 ab	74 ab	4.0 a-f	88 a-c
C-36	2.8 b-e	70 b-g	0.7 g-i	64 b-f	2.5 c-h	88 a-c
SV016	1.8 c-g	70 b-g	3.2 ab	63 b-f	4.5 a-c	85 a-c
SV014	2.5 b-f	83 a-d	1.5 c-i	60 b-g	3.2 a-h	85 a-c
SX021	2.5 b-f	67 c-h	1.3 d-i	62 b-f	3.8 a-g	84 a-c
M124896	0.5 fg	63 e-h	2.3 a-f	60 b-g	4.0 a-f	83 a-d
C-35	1.2 d-g	80 a-e	0.5 hi	47 e-g	2.5 c-h	82 a-d
SV017	2.0 b-g	66 d-h	0.5 hi	58 b-g	2.7 b-h	82 a-d
C-34	0.8 e-g	58 f-h	0.7 g-i	45 fg	2.7 b-h	81 a-d
M125594	0.2 g	72 b-g	1.8 b-h	62 b-f	2.8 b-h	81 a-d
HM124268	1.8 c-g	74 b-f	3.2 ab	72 a-c	2.8 b-h	79 a-d
HM126648	0.0 g	55 g-i	3.0 a-c	75 ab	2.5 c-h	78 a-d
B-49	0.8 e-g	68 b-h	0.7 g-i	54 c-g	1.2 hi	76 a-d
SX022	1.2 d-g	72 b-g	0.7 g-i	49 d-g	2.8 b-h	76 a-d
HM125891	2.0 b-g	59 f-h	2.5 a-e	67 b-d	4.2 a-e	76 a-d
SV015	1.0 d-g	68 c-h	0.8 f-i	49 d-g	2.2 e-h	75 b-d
SX023	2.5 b-f	78 a-e	0.8 f-i	63 b-f	3.2 a-h	73 cd
B-50	2.0 b-g	67 d-h	0.5 hi	50 d-g	3.0 b-h	67 de
SX018	1.5 d-g	50 h-j	0.3 hi	42 g	1.8 g-i	66 de
12SYN003	0.0 g	32 j	0.5 hi	57 b-g	1.2 hi	52 ef
12MAR001	0.5 fg	32 j	0.8 f-i	48 d-g	2.0 f-i	51 ef
12SYN004	1.5 d-g	40 ij	1.0 e-i	50 d-g	2.3 d-h	48 f
Non-inoculated check	0.0 g	0 k	0.0 i	0 h	0.0 i	0 g
Overall mean	1.8	65	1.5	57	3.0	75
$P > F$[z]	0.0004	<0.0001	<0.0001	<0.0001	0.0004	<0.0001
LSD	2.2	19	1.5	20	2.1	17

[x] F517, F521, and F551 are three *Rhizoctonia solani* AG-2-2 IIIB strains that have been characterized previously (Can. J. Pl. Pathol. 33:210-226). Root rot = the percentage of root surface area with black rot. Dead = the number of dead plants in a row.

[y] For more information on coded cultivars, contact the following companies: B = Betaseed Inc., C = ACH Seeds Inc., HH = Holly Hybrids, HM or SYN = Hilleshog, M or Mar = Maribo, SV = SESVanderHave, and SX = Seedex. Non-inoculated check = the non-inoculated check was cultivar B-5.

[z] $P > F$ was the probability associated with the F value. Means within a column followed by the same letter did not differ significantly based on Fisher's protected least significant difference (LSD; $\alpha = 0.05$).