SUGAR BEET (*Beta vulgaris* spp *vulgaris*)
   Rhizoctonia root rot; *Rhizoctonia solani* AG 2-2

Panella, L. and L. E. Hanson, USDA-ARS, Sugarbeet Research Unit, Crops Research Lab, 1701 Centre Ave.; Fort Collins, CO 80526-2083

PUBLICLY RELEASED SUGAR BEET GERMPLASM EVALUATED FOR RESISTANCE TO RHIZOCTONIA ROOT ROT, 2000: Thirty-seven sugar beet germplasm released over the past 30 years, or under development by the USDA-ARS Sugar Beet Research Unit located in Fort Collins, CO were evaluated for resistance to Rhizoctonia root rot. Plots were arranged in a randomized complete block design with five replications. One-row plots, 4.5 m long, with a between-row spacing of 56 cm and an in-row spacing of 20 to 25 cm were planted at Windsor, CO, on 16 May. Inoculation with dry, ground, barley-grain inoculum of *Rhizoctonia solani* AG 2-2 isolate R-9 was performed on 12 Jul. Immediately after inoculation, a cultivation was performed to throw soil onto the beet crowns. The field was hand thinned and irrigated as necessary. Beets were harvested 31 Jul through 2 Aug. Each root was rated for rot on a scale of 0 (no damage) to 7 (dead). Analyses of variance (PROC ANOVA - SAS) were performed on disease indices (DIs), percent healthy roots (undamaged classes 0 and 1 combined), and percentage of roots in classes 0 through 3 (those most likely to be harvested and taken to the factory). Percentages were transformed using arcsin-square root to normalize the data for analyses ("AP 0-1" and "AP 0-3" in the accompanying table). Both percentages and transformations are given in the table.

We had unusually high temperatures in the summer of 2000 which, combined with a high inoculum load, contributed to a severe root rot epidemic. The *Rhizoctonia* epidemic progressed very quickly, becoming severe by the end of July. Differences in DIs among entries were highly significant ($P < 0.001$). The resistant and highly resistant checks were developed and released in 1976 and 1983, respectively. A number of germplasm performed as well as these but none significantly better than FC705-1.

Germplasm	Seed Source	Year Released - Crop Science (CS) Reference - Comments	DI	% 0-1*	% 0-3*	AP 0-1*	AP 0-3*
FC701	931024	1968 -- PI 590660	3.7	0	36	0.0	33.4
FC701-4	761068H	1976 – PI 590663	3.2	3	60	4.2	50.8
FC701-5	721056	experimental – 6 cycles of selection from GW 674-56C	3.4	12	49	10.2	47.3
FC701-6	801059H	1983 -- PI 590756	3.1	11	56	11.8	46.1
FC702-2	991016	1968 Sugar Beet Research 1968:A3	3.6	6	49	10.8	44.5
FC702	681009-0	1968 -- PI 590662	4.1	0	33	0.0	30.0
FC702-6	811055H	1981 -- PI 590703	3.1	16	58	12.7	52.7
FC703	751080H	1976 – PI 590656	3.8	3	39	4.9	38.3
FC704	931021	1978 -- PI 590659 CS 19:934-935	3.3	5	63	8.4	53.4
FC705-1	831083	1983 – PI 590754	3.1	13	69	16.3	59.8
FC705	781066H	1978 – PI 590660	3.3	3	63	4.2	52.6
FC708	831085HO	1980 – PI 590845	3.5	2	57	3.7	49.2
FC709	891026H	1987 – PI 518643	2.2	25	98	29.4	86.5
FC709-2	921024	1999 – PI 599668	2.8	11	81	15.1	70.1
FC710	891033	1990 – PI 542971	3.5	2	54	3.7	47.8
FC710(4X)	971017	experimental -- FC710 colchicine doubled	3.6	0	32	0.0	30.7
FC711	821087	1982 – PI 590729	3.5	0	53	0.0	46.9
FC712	881032H	1985 – PI 590766	3.7	5	42	6.0	37.4
FC712(4X)	971018	experimental -- FC 712 colchicine doubled	3.0	6	69	9.3	60.2
FC715	911026HO	1992 – PI 574625	4.3	2	33	3.5	34.4
FC716	971019	1992 – PI 574627	3.1	9	63	13.0	55.6
FC717	911031	1992 – PI 574628	4.3	0	19	0.0	20.3
FC718	911032	1992 – PI 574629	3.0	2	78	3.3	65.9
FC719	911037	1992 – PI 574630	2.8	9	69	15.3	57.4
FC720-1	961015	experimental -- C718/(C718/FC708)	4.0	3	36	4.6	36.1
FC722-1	961010HO	experimental -- C718/FC708	4.2	0	25	0.0	26.1
FC722CMS	961010HO1	experimental -- C718/FC708 CMS	4.2	0	19	0.0	17.2
FC723	951016HO	experimental -- EL44/FC708 mm	4.1	2	28	3.5	31.3
FC723CMS	951016HO1	experimental -- EL44/FC708 CMS	4.3	0	33	0.0	30.2
FC724-1	961014	experimental -- FC702/LSR-CTR	3.1	5	67	6.0	61.7
FC725	921008	1995 – PI 591314	3.3	4	60	5.5	51.6
FC726	931010	1995 – PI 591315	2.7	19	79	22.1	66.2
FC727	951017	1999 – PI 599669	3.7	4	45	7.4	42.8
FC728	921025	1995 – PI 591316	3.4	6	54	10.9	48.1
FC729	921019	FC712/A4, 3 cycles Rhizoc, MM	3.5	6	55	8.7	50.8
FC801	991015	1971 – W6 17140 F4, FC 901 (LSR-CTR) x SP 631001-0	3.9	0	45	0.0	44.7
FC907-1	971020	experimental -- FC607/FC701 BC4	4.8	0	11	0.0	16.8
	931017	Susceptible Check - (FC901/C817)	5.5	0	3	0.0	5.9
		LSD$_{P=0.05}$	0.95			13.30	25.90

* DI = Disease Index on a scale of 0 (no damage) to 7 (plant death), % 0-1= percent healthy roots, % 0-3 those roots most likely to be harvested and taken to the factory. AP is the arcsin-square root transformation of percentages to normalize the data for analyses.