Snap Bean (*Phaseolus vulgaris* 'Hi-style') Root rot*; Fusarium solani* f. sp. *phaseoli*	W.W. Kirk[a], S. Snapp[b], R.L Schafer[a] and D. Berry[a] [a] Department of Plant Pathology [b] Departments of Crop and Soil Science/Horticulture Michigan State University East Lansing, MI 48824

Evaluation of soil treatments for snap bean root rot control, 2002.

Snap beans cv. Hi-style were planted at the South West Michigan Research and Extension Center, Benton Harbor, MI (SWMREC) on 2 Jul into three-row by 25-ft plots (30-in. row spacing, 5-in. between seeds) replicated four times in a randomized complete block design. The trial site was fertilized, prior to planting, with a 34:31:0 mix and received sulfur 5lb/ A and zinc 2.2lb/A. Plots were irrigated weekly as necessary. Weeds were controlled with Dual 2 Magnum 0.87 pt/ A, Poast Plus 1.5 pt/A, Reflex 8 oz/A, and Basigran 14 oz/A at both sites. All plots were inoculated at planting on 2 Jul (SWMREC) by spraying the conidial suspension of *F. solani* f. sp. *phaseoli* over the seed at planting at 10 p.s.i CO_2 pressure and at a rate of about 1 fl. oz of inoculum solution/ft^2 trial area. In furrow applications of fungicides were made over the seed at planting, applied with a single nozzle R&D spray boom delivering 5 gal/A (40 p.s.i.) and using one XR11003VS nozzle per row. Percent emergence was calculated as percent of maximum possible emergence in 3 x 20 ft rows (estimated maximum = 180). Relative rate of emergence was calculated as Relative Area Under the Emergence Progress Curve (RAUEPC) estimated from planting until 95% emergence [35 days after planting (DAP)] in untreated control (max = 100). Two destructive harvests to assess root rot severity were made; H1 = Harvest 1, sampled on 4 Aug at SWMREC (32 DAP); H2 = Harvest 2, sampled on 13 Sep at SWMREC (72 DAP). Root rot index was calculated by counting the number of roots from a sample of 10 plants falling onto class 0 = no visible root rot; 1 = 1 - 10% girdling of tap root; 2 = 11 - 20% girdling of tap root; 3 = 21 - 50% girdling of tap root; 4 = 51 - 100% girdling of tap root. The number in each class was multiplied by the class number and summed. The sum was multiplied by a constant to express as a percentage. Indices of 0 - 50 cover the range 0 - 20% girdling; 51 - 75 cover the range 21 - 50% girdling and > 75 cover the range 50 - 100% girdling. A repeated measures analysis was used to determine a significant interaction, and when positive, a two-way ANOVA was carried out on the Root Rot index between the same treatments at both harvest dates. Ten feet of each of the inner rows were harvested and sampled on 13 Sep at SWMREC (both 72 DAP). The total bean yield per treatment was recorded. *Fusarium solani* f. sp. *phaseoli* was re-isolated from root samples taken at both harvests.

Fusarium root rot developed at the SWMREC site and by 72 days after planting (DAP) had reached an index of >70 in the untreated control. No treatments were significantly different from each other in terms of final plant stand or relative rate of emergence. No treatments were significantly different from each other as measured by root rot index at the first harvest (32 DAP) but at the second harvest (72 DAP) all treatments had a significantly lower root rot index value than the untreated control. The root rot index increased significantly between harvests 1 and 2 in all treatments. Maxim ST (treatment 9) had the lowest root rot index (40.6), significantly lower than treatments with an index of > 48.8 (treatments 1, 2, 3, 4, 5, 12 and 14). Treatment 7 had a significantly lower root rot index than treatments with an index >53.1 (treatments 4, 5, 12 and 14) but was not significantly different from any other treatment. There was no significant difference in yield among treatments. Root rot index was therefore not correlated with yield. Phytotoxicity was not noted in any of the treatments.

Soil treatment and rate/1000 ft row (IF) Seed treatment and rate/100 lb (ST) Foliar application rate/A (F)			Emergence (%)[z]		RAUEPC[y]		Root rot index[x]				Yield of marketable pods[w](lb/A)	
							H1[v]		H2[v]			
1	Quadris 2SC 0.8pt.....	IF[u]	98.8	a[t]	31.0	a	16.9	a	51.3	bcde*[s]	1056	a
2	BAS500 00F 2.09EC 0.77pt.....	IF	98.8	a	31.5	a	13.8	a	48.8	bcde*	1104	a
3	Gem 4EC 0.8 pt.....	IF	96.3	a	30.7	a	16.9	a	52.5	bcde	1023	a
4	Bravo ZN 6SC 1.5pt.....	IF	96.3	a	30.7	a	21.3	a	55.0	bc	981	a
5	Omega 5SC 0.42pt.....	IF	98.1	a	30.4	a	17.5	a	53.1	bcd	969	a
6	Benlate 50WDG 1.0 lb.....	IF	97.5	a	31.4	a	24.4	a	46.9	def	972	a
7	Rival 0.25 pt.....	ST	100.0	a	31.5	a	12.5	a	42.5	ef	984	a
8	Thiram 0.33 pt.....	ST	98.8	a	32.1	a	23.8	a	43.8	def	1077	a
9	Maxim 0.01 pt.....	ST	97.5	a	31.3	a	25.6	a	40.6	f	996	a
10	Kodiak 0.008 lb.....	ST	96.3	a	31.0	a	20.6	a	48.8	bcdef	987	a
11	Captan 0.188 pt.....	ST	99.4	a	31.7	a	30.6	a	46.9	cdef	1029	a
12	Headsup 0.002 lb.....	ST	100.0	a	32.3	a	23.8	a	57.5	b	984	a
13	**Headsup 0.002 lb Headsup 0.021 lb.....**	**STF**	**96.3**	**a**	**30.6**	**a**	**25.6**	**a**	**48.1**	**bcdef**	**1014**	**a**
14	Headsup 0.021 lb.....	F	98.8	a	32.0	a	26.9	a	56.9	bc	1026	a
15	untreated.....	ST	96.9	a	31.0	a	30.0	a	78.8	a	1008	a
	SEM[r] P=0.05		1.31		0.49		5.18				97.24	

[z] Percent emergence calculated as percent of maximum possible emergence in 3 x 20 ft rows (estimated maximum = 180).

[y] Relative rate of emergence calculated as Relative Area Under the Emergence Progress Curve from planting until 95% emergence [35 days after planting (DAP)] in untreated control (max = 100).

[x] Root rot index calculated by counting the number of roots from a sample of 10 plants falling onto class 0 = no visible root rot; 1 = 1 - 10% girdling of tap root; 2 = 11 - 20% girdling of tap root; 3 = 21 - 50% girdling of tap root; 4 = 51 - 100% girdling of tap root. The number in each class is multiplied by the class number and summed. The sum is multiplied by a constant to express as a percentage. Indices of 0 - 50 cover the range 0 - 20% girdling; 51 - 75 cover the range 21 - 50% girdling and > 75 cover the range 50 - 100% girdling.

[w] Fresh weight of pods that did not pass through a 2-gauge mesh.

[v] H1 = Harvest 1, sampled on 4 Aug at SWMREC (32 DAP) and ; H2 = Harvest 2, sampled on 13 Sep at SWMREC (72 DAP).

[u] Fungicides were applied in-furrow (IF) at planting at a rate of 5 gal/A (40 p.s.i.) applied at a rate using the conversion factor: Band rate per acre = [Band width (inches)/Row spacing (inches)] * Broadcast Rate per Acre; or as seed treatments (ST), rate expressed as product per 100 lb seed.

[t] Values within a column followed by the same letter are not significantly different at P = 0.05 (Tukey Multiple Comparison).

[s] Letters followed by a "*" indicate that the root rot index significantly increased within the same treatment between harvests 1 and 2. A repeated measures analysis was used to determine a significant interaction and when positive a two-way ANOVA was carried out on the Root Rot index between the same treatments at both harvest dates.

[r] Standard error of the least squares mean (reported if treatment means not significantly different at P = 0.05).