

Evaluation of fungicides to control Fusarium crown and root rot in snap beans, Hancock, WI, 2023.

A trial to evaluate the effectiveness of in-furrow applied fungicides, with and without a seed treatment, to control Fusarium crown and root rot in snap bean was established on 6 Jun at the University of Wisconsin Hancock Agricultural Research Station located in central Wisconsin. The commercially available cultivar, 'Hystyle' was used. Plots were 20 ft long with four rows spaced 30 in. apart with a seeding rate of 6 seeds per ft. The trial consisted of four replications, and plots were arranged in a randomized complete block design. Fertility, insects, and weeds were managed during the growing season according to standard grower practices for the region. A single seed treatment was used in the trial and consisted of streptomycin sulfate (AS-50), thiram (480 DP), captan 4L ST, metalaxyl (Belmont 2.7 FS), fludioxonil (Maxim), ipconazole (Rancona 3.8 FS), and thiamethoxam (Cruiser 5FS). The seed treatment was commercially applied. A regionally-sourced isolate of *Fusarium solani* f.sp. *pisi* was used to inoculate the trial. Cultures of the pathogen were grown on clarified V8 agar for 1 week before inoculating sterile containers with 2 lb of autoclave disinfested rye berries per container. Rye berries were incubated on the benchtop for 21 days prior to field inoculation. At the time of planting, 100 g of inoculated rye was placed in-furrow over the seed in the 2 center rows of each plot. In-furrow fungicide applications were applied in a 6-inch band directly over the open furrow prior to inoculation using a CO₂-pressurized backpack sprayer with a single, standard flat fan spray nozzles (Tee Jet 8002VS) at a rate of 35 gal/A at 40 psi. Furrows were closed by hand after fungicide treatment and inoculation. Emergence data were recorded on 26 Jun by counting the number of emerged plants in the two center rows. On 15 Aug, ten feet from the two center rows were machine harvested and weighed. Ten roots samples were collected prior to harvest and evaluated for root rot using the following scale: 1 = 1-20% discoloration with individual lesions, 2 = 21-40% discoloration with coalesced lesions but tissues are firm with some reduction in root mass, 3 = 41-60% discoloration and root tissue lesions combined with considerable softening, 4 = 61-80% discoloration and internal pith tissues of roots affected, 5 = 81-100% discoloration, root softening and rotting along with heavy reduction in root mass. All data were analyzed using analysis of variance (ANOVA) at $\alpha=0.05$ and Fisher's least significant difference (LSD) at $\alpha=0.05$ (SAS Version 9.2). The trial received 13.3 in. of irrigation (30 applications) to supplement 11.01 in. of natural precipitation.

Weather conditions during this trial were warmer and drier than typical for the region. No phytotoxicity was observed with any of the fungicide programs throughout the duration of the trial. There were no significant differences among treatments for yield. Only one treatment, Velum Prime in furrow without the seed treatment, had a significant reduction in emergence when compared to the controls. No treatments had a significantly greater emergence than the inoculated control. Four treatments (all with no seed treatment), Ridomil Gold + Quadris, Quadris, Propulse 6 fl oz, and Propulse 10 fl oz, had a significant reduction in root rot disease rating when compared to the inoculated control. The presence of the seed treatment did not positively affect root rot management.

Treatment and rate	Application Timing^y	Emergence (%)	Root Rot Disease Rating (0-5)	Yield (ton/A)
Non-treated, non-inoculated Control	NA	78.95 b-g ^x	2.18 b-d	6.48
Inoculated Control	NA	80.33 b-h	2.38 d	5.28
Ridomil Gold SL 0.42 fl oz/1000 rf	IFAP	81.48 c-h	2.23 cd	5.98
Ridomil Gold SL 0.42 fl oz/1000 rf + Quadris 2.018 SC 0.8 fl oz/1000 rf	IFAP	78.33 b-g	1.93 a-c	7.45
Quadris 2.018 SC 0.8 fl oz/1000 rf	IFAP	80.53 b-h	1.93 a-c	6.63
Velum Prime 0.45 fl oz/1000 rf	IFAP	65.95 a	2.45 de	8.03
Proline 0.192 fl oz/1000 rf	IFAP	75.93 b-d	2.28 cd	6.78
Propulse 400 SC 6.0 fl oz/A	IFAP	86.25 gh	1.78 ab	8.30
Propulse 400 SC 8.0 fl oz/A	IFAP	72.43 ab	2.33 cd	8.20
Propulse 400 SC 10.0 fl oz/A	IFAP	74.25 a-c	1.68 a	10.15
Minuet 12.0 fl oz/A	IFAP	76.88 b-c	2.38 d	6.98
XSK03 8.5 fl oz/A	IFAP	76.13 b-d	2.45 de	6.75
Howler EVO 2.5 lb/A	IFAP	81.18 b-h	2.20 cd	6.40
Howler EVO 1.25 lb/A	IFAP	78.23 b-g	2.43 de	8.18
Theia 1.5 lb/A	IFAP	77.20 b-f	2.83 e-g	7.75
Seed Treatment (Sd Trt) with no inoculum	IFAP	85.73 f-h	3.60 j	3.98
Sd Trt with inoculum	IFAP	85.53 e-h	2.55 d-f	5.18
Ridomil Gold SL 0.42 fl oz/1000 rf + Sd Trt	IFAP	88.85 h	3.38 ij	4.70
Ridomil Gold SL 0.42 fl oz/1000 rf + Quadris 0.8 fl oz/1000 rf + Sd Trt	IFAP	84.18 d-h	3.28 h-j	3.28
Quadris 2.018 SC 0.8 fl oz/1000 rf + Sd Trt	IFAP	85.65 e-h	3.13 g-i	4.83
Velum Prime 0.45 fl oz/1000 rf + Sd Trt	IFAP	85.03 e-h	3.15 g-i	4.53
Proline 0.192 fl oz /1000 rf + Sd Trt	IFAP	80.13 b-h	3.25 h-j	4.60
Propulse 400 SC 10.0 fl oz/A + Sd Trt	IFAP	88.35 h	2.93 f-h	4.63
Propulse 400 SC 10.0 fl oz/A + Ridomil Gold SL 0.42 fl oz/1000 rf + Sd Trt	IFAP	87.93 h	3.30 h-j	5.43

^zTreatment rates applied in-furrow are given per 1,000 row ft or per acre.

^yIn-furrow treatments were applied at the time of planting. The seed treatment was commercially applied prior to planting.

^xColumn numbers followed by the same letter are not significantly different at P=0.05 as determined by Fisher's Least Significant Difference (LSD) test.