

Evaluation of in-furrow applied fungicides to control *Rhizoctonia* damping-off and root rot in snap beans, Hancock, WI, 2024.

A trial to evaluate the effectiveness of in-furrow applied fungicides to control *Rhizoctonia* damping-off 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, 'Huntington' 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 regionally sourced isolate of *Rhizoctonia solani* 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 lbs of autoclaved rye berries per container. Rye berries were incubated on the benchtop for 14 days prior to field inoculation. At the time of planting, 100 grams of inoculated rye was placed in-furrow over the seed in the 2 center rows of each plot prior. 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 hand closed after fungicide treatment and inoculation. Emergence data was recorded on 19 Jun (13 days post-planting DPP), and 3 Jul (27 DPP) by counting the number of emerged plants in the two center rows. The number of plants exhibiting symptoms of damping off were also recorded on 3 Jul. On 15 Aug, ten feet from the two center rows were machine harvested and weighed. Ten roots samples were collected prior to harvest and evaluate 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 4.45 in. of irrigation (12 applications) to supplement 11.23 in. of natural precipitation.

Weather conditions during this trial were typical for the region. No phytotoxicity was observed with any of the fungicide programs throughout the duration of the trial. Disease pressure was very high and every plant sampled had some root rot present (100% incidence, data not shown). Emergence, yield, root weight (data not shown), and number of plants lost to damping off were not significant compared to the inoculated control, but most treatments numerically reduced loss to damping off and increased yield. All fungicide treatments significantly reduced root rot when compared to both the non-inoculated and inoculated controls. Velum Prime, Ridomil Gold + Quadris, Propulse + Quadris, Propulse (6 fl oz), Propulse (8 fl oz) and Howler EVO were the treatments that had the greatest reduction in root rot.

Treatment and rate	Application Timing^y	Emergence (%)	Plants lost to Damping Off	Root Rot Disease Rating (0-5)	Yield (ton/A)
Non-treated, non-inoculated Control	NA	83.9	5.5	2.9 j	0.81
Inoculated Control	NA	65.9	14.0	2.8 i	1.14
Ridomil Gold SL 0.42 fl oz/1000rf	IFAP	71.8	5.3	2.1 f-h	1.22
Ridomil Gold SL 0.42 fl oz/1000rf + Quadris 2.018 SC 0.8 fl oz/1000rf	IFAP	73.0	1.8	1.7 a-d	1.70
Quadris 2.018 SC 0.8 fl oz/1000rf	IFAP	71.4	6.8	1.9 d-f	1.56
Velum Prime 0.45 fl oz/1000rf	IFAP	64.5	5.3	1.4 a	1.49
Miravis Prime 0.65 fl oz/100rf	IFAP	74.8	16.3	1.6 a-c	1.37
Provysol 3.34 SC 0.28 fl oz/1000rf	IFAP	68.0	8.5	1.9 c-f	1.56
Provysol 3.34 SC 0.28 fl oz/1000rf + Ridomil Gold SL 0.42 fl oz/1000rf	IFAP	71.3	2.5	2.0 e-g	1.09
Propulse 400 SC 10.0 fl oz/A + Ridomil Gold SL 0.42 fl oz/1000rf	IFAP	68.3	3.8	1.5 ab	1.13
Propulse 400 SC 6.0 fl oz/A	IFAP	79.5	5.5	1.6 a-d	1.47
Propulse 400 SC 8.0 fl oz/A	IFAP	71.6	7.5	1.6 a-c	1.17
Propulse 400 SC 10.0 fl oz/A	IFAP	73.3	8.0	2.3 h	1.27
Proline 0.192 fl oz/1000rf	IFAP	68.9	14.3	2.3 gh	1.07
Howler EVO 1.25 lb/A	IFAP	65.0	8.5	1.7 a-e	1.23
Theia 1.5 lb/A	IFAP	68.2	10.8	1.8 b-f	1.11

^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.