

Evaluation of at-plant treatments for control of Rhizoctonia diseases of potato in Wisconsin, 2016.

Potatoes were planted on 4 May at the University of Wisconsin Hancock Agricultural Research Station in central WI to evaluate seed- and in-furrow- applied fungicides for the control of Rhizoctonia diseases of potato, including seedling damping-off and tuber black scurf. In preparation for planting, US#1 seed tubers were cut into approximately 2 oz pieces on 25 Apr. Seed pieces were allowed to heal for 9 days at 13°C with 95% relative humidity and good airflow for suberization. A randomized complete block design with four replications was used for the trial and treatment plots consisted of four, 20-ft-long rows spaced 36 in. apart with 12 in. spacing in the row. To minimize soil compaction and damage to plants in rows used for foliar and yield evaluations, drive rows for pesticide application equipment were placed adjacent to plots. Seed treatments were applied to tubers within 24 hours of planting using a 1.06 qt Solo Hand Pump Sprayer at a rate equivalent to 3.70 L water/ton seed. In-furrow treatments were applied over the top of seed pieces in open furrows in a 12 inch band using a plot sprayer consisting of a tractor-mounted boom, pressurized with an air compressor, using TeeJet Twin Jet Flat Spray Tip nozzles TJ-60 11003VS. In-furrow applied fungicides were applied at a rate equivalent to 9.50 L water/1000 row feet at 30 psi. Fertility, insect, and weed management was accomplished using standard commercial practices for the region. Plots relied upon natural inocula for disease establishment. Seed emergence data were collected on 1 Jun from 20 linear feet of each of the center two rows of each plot (% seed emergence = number of emerged vines /maximum possible emerged vines (48)*100). Precipitation in Hancock during the potato production season was 27.5 in. Supplemental irrigation was applied 40 times during the potato production season for an additional 15.4 in. Vines were killed with two desiccant treatments of Diquat+non-ionic surfactant applied on 15 Sep and 22 Sep. Plots were harvested and graded on 3 Oct. At harvest, tubers from the center two, 20-ft long rows of each 4-row plot were graded for size and yield. Twenty tubers were randomly selected from each plot after washing and visually evaluated for symptoms of black scurf (% incidence= number of symptomatic tubers/20*100). All data were analyzed using ANOVA ($\alpha=0.05$) and Fisher's LSD at $\alpha=0.05$ (SAS Version 9.2).

Disease pressure was moderate to low in this trial. Black scurf incidence on tubers at the time of harvest was low with 12 treatments, all seed-applied, resulting in significantly less disease than the non-treated control (Treatments 4, 6, 10, 12-15, 25-28, and 30). Six treatments (2, 3, 8, 19, 31, and 32) resulted in weights of Size B potato tubers that were greater than the non-treated control. Just four treatments (2, 5, 16, and 23) resulted in Marketable Yields that were significantly greater than the non-treated control; one of the treatments (28) resulted in a yield that was significantly lower than the non-treated control. Percent Emergence was significantly less than the non-treated control in only two of the treatments, 14 and 17. There did not appear to be a relationship between reduced emergence and reduced yield.

Treatment Number	Treatment and rate ^z	Application Type ^y	Emergence (%)	Marketable Yield ^w (cwt)	Size Bs ^v (cwt)	Black Scurf Incidence (%)
1	Non-treated Control	-	87.3 c-i ^x	418.9 b-i	26.9 a-f	13.8 c-f
2	Double Nickel LC 1.7 fl oz	In Furrow	79.8 a-h	520.8 l	41.2 j-k	7.5 a-e
3	Quadris 2.018 SC 0.6 fl oz	In Furrow	74.5 a-c	481.5 i-l	43.1 k	5.0 a-d
4	CruiserMaxx Potato Exreme .31 fl oz	Seed Treatment	79.5 a-h	425.8 b-j	21.0 a	0.0 a
5	Regalia 5SC 4 fl oz/1000 rf	In Furrow	74.0 a-b	517.3 k-l	26.7 a-f	21.3 f
6	Maxim MZ 7.5DP 0.5 lb	Seed Treatment	75.3 a-d	388.6 a-f	29.3 a-i	0.0 a
7	Elatus 45 WG 0.34 fl oz	In Furrow	79.5 a-h	469.0 g-l	38.8 i-k	3.8 a-c
8	Elatus 45 WG 0.5 fl oz	In Furrow	87.8 d-i	478.1 h-l	31.9 b-j	5.0 a-d
9	A9765 600FS 0.128 fl oz	Seed Treatment	81.0 a-i	386.6 a-e	28.7 a-h	5.0 a-d
10	A22059 312.28FS 0.5 fl oz	Seed Treatment	88.8 e-i	437.2 c-j	23.0 a-c	1.3 a
11	A18232 435.7FS 0.308 fl oz	Seed Treatment	77.8 a-g	437.6 c-j	20.8 a	5.0 a-d
12	A20588 345.11FS 0.5 fl oz	Seed Treatment	89.3 f-i	473.0 g-l	29.2 a-i	0.0 a
13	A9765 600FS 0.128 fl oz	Seed Treatment				
	+ A20699 117.43FS 0.31 fl oz	Seed Treatment	80.5 a-i	419.3 b-i	22.3 a-c	0.0 a
14	Emesto Silver 118 FS 0.31 fl oz	Seed Treatment				
	+ Nubark Mancozeb 6D 1.0 lb	Seed Treatment				
	+ Serenade ASO 2.2 fl oz	In Furrow	72.0 a	450.2 d-l	24.5 a-e	0.0 a
15	Emesto Silver 118 FS 0.31 fl oz	Seed Treatment				
	+ Nubark Mancozeb 6D 1.0 lb	Seed Treatment				
	Serenade ASO 2.2 fl oz	In Furrow				
	+ Velum Prime 0.45 fl oz	In Furrow	92.8 i	397.3 a-g	22.8 a-c	2.5 ab
16	Emesto Silver 118 FS 0.31 fl oz	Seed Treatment				
	+ Nubark Mancozeb 6D 1.0 lb	Seed Treatment				
	Serenade Soil 4.4 fl oz	In Furrow				
	+ Quadris 2.018 SC 0.6 fl oz	In Furrow	86.5 b-i	495.9 j-l	23.7 a-c	5.0 a-d
17	Emesto Silver 118 FS 0.31 fl oz	Seed Treatment				
	+ Nubark Mancozeb 6D 1.0 lb	Seed Treatment				
	+ Reason 500SC 0.15 fl oz	Seed Treatment	72.0 a	371.4 a-c	27.1 a-g	5.0 a-d
18	AMV4555 0.7 fl oz	In Furrow	78.3 a-g	465.0 f-l	35.3 f-k	15.0 d-f
19	AMV4555 1.4 fl oz	In Furrow	90.3 g-i	476.3 h-l	37.1 g-k	10.0 a-e
20	AMV4555 2.1 fl oz	In Furrow	81.0 a-i	473.5 g-l	32.4 c-j	8.8 a-e
21	Blocker 4F 10.4 fl oz	In Furrow	82.3 a-i	434.0 c-j	36.7 f-k	8.8 a-e
22	Blocker 4F 5.2 fl oz	In Furrow				
	+ AMV4555 0.7 fl oz	In Furrow	86.5 b-i	448.1 d-l	35.3 f-k	7.5 a-e
23	Headline 0.8 fl oz	In Furrow	86.5 b-i	498.0 j-l	34.3 d-k	13.8 c-f
24	Quadris 2.018 SC 0.8 fl oz	In Furrow	81.0 a-i	455.7 e-l	34.4 e-k	7.5 a-e

25	Moncoat MZ 1.0 lb	Seed Treatment	79.3 a-g	370.8 a-c	21.1 a	1.3 a
26	Convoy 40 SC 0.51 fl oz + Firbark 0.5 lb	Seed Treatment	77.3 a-f	352.0 a-b	24.3 a-d	1.3 a
		Seed Treatment				
27	Convoy 40 SC 0.51 fl oz + NAI-9003 7.56 g ai + Firbark 0.5 lb	Seed Treatment	92.3 h-i	401.7 a-h	28.9 a-i	2.5 ab
		Seed Treatment				
		Seed Treatment				
28	Convoy 40 SC 0.51 fl oz + NAI-9003 11.34 g ai + Firbark 0.5 lb	Seed Treatment	80.3 a-i	342.4 a	24.4 a-e	1.3 a
		Seed Treatment				
		Seed Treatment				
29	Convoy 40 SC 0.51 fl oz + NAI-9003 17.01 g ai + Firbark 0.5 lb	Seed Treatment	87.8 d-i	378.0 a-d	22.3 a-b	5.0 a-d
		Seed Treatment				
		Seed Treatment				
30	Maxim 4FS 0.08 fl oz + Firbark 0.5 lb	Seed Treatment	83.8 a-i	430.7 c-j	28.5 a-h	0.0 a
		Seed Treatment				
31	HSC Organics 3 fl oz	In Furrow	81.0 a-i	466.7 g-l	41.5 j-k	17.5 e-f
32	HSC Organics 3 fl oz	In Furrow + 1 week drench	76.0 a-e	443.8 c-k	38.0 h-k	12.5 b-f

^zTreatment rates applied in-furrow are given per 1000 row ft. Seed treatment rates are given per 100 lb seed.

^ySeed treatments and in-furrow treatments were applied at the time of 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.

^wMarketable yield refers to weight of Size A potato tubers of a size range ≥ 2.5 in diameter in units of cwt=100 lb.

^vSize B potato tubers are of a size range between 1.5 and 2.25 in diameter.