

Evaluation of foliar fungicides for control of potato early blight in Wisconsin, 2024.

A field trial was conducted at the University of Wisconsin Agricultural Research Station in Hancock, WI to evaluate 32 season-long fungicide programs for control of early blight on potato. Seed pieces, approximately 2 oz in size, were mechanically cut from US#1 'Russet Burbank' seed tubers 7 days prior to planting. Seed pieces were allowed to heal before planting on 30 Apr by maintaining cut seed at 55°F under 98% relative humidity. 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 the treatment rows, drive rows for pesticide application equipment were placed adjacent to the plots. Fertility, insect, and weed management were accomplished using standard industry practices for the region. In-furrow treatments were applied over the top of seed pieces in open furrows in a 12-in. 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 9.5 L water/1,000 row feet at 30 psi. At-hilling applications were applied directly over freshly hilled plots on 15 May using a CO₂-pressurized backpack sprayer with a 4-nozzle spray boom with 19 in. spacing between standard flat fan spray nozzles (Tee Jet 8002VS) at a rate of 35 gal/A at 40 psi. Foliar fungicide treatments were initiated on 3 Jul after the P-day value (generated from a crop physiological model used for early blight prediction and fungicide initiation) reached 300. Subsequent applications were applied on a weekly basis to all four rows of each plot on the following dates: 10 Jul, 17 Jul, 24 Jul, 31 Jul, 7 Aug, 14 Aug, 21 Aug, 28 Aug, 4 Sep, for a total of ten fungicide applications. Treatments were applied with a plot sprayer consisting of a tractor-mounted boom pressurized with an air compressor using TeeJet Hollow Disc Cone D3-23 nozzles (16 nozzles at 8-in. spacing). Fungicides were applied at a rate equivalent to 35-gal water/A at 40 psi. Plots were not artificially inoculated but relied on natural inocula from soil and plant residues from the surrounding concentrated potato production region for disease establishment. Early blight severity across 20 ft of the two center rows was visually determined on 4 Jul, 16 Jul, 2 Aug, 12 Aug, 28 Aug, and 6 Sep using the Horsfall-Barratt rating scale (0 to 11 rating with 0=no disease, 11=100% disease severity). The Area Under the Disease Progress Curve (AUDPC) was determined by trapezoidal integration and then converted into Relative AUDPC (RAUDPC), i.e. percentage of the maximum possible AUDPC for the whole period of the experiment. Vines were killed on 16 Sep with an application of the desiccant Diquat E 1.5 pt/acre. Tubers from the center two rows of each 4-row plot were harvested and graded on 4 Oct. Total precipitation in Hancock during the potato production season was 21.93 in. Supplemental irrigation was applied 29 times for an additional 11.35 inches of water. All data were analyzed using ANOVA ($\alpha=0.05$) and Fisher's LSD at $\alpha=0.05$ (SAS Version 9.2).

Disease onset was typical, but progressed slower than normal due to drier weather in July and August. There were no significant differences across programs for total plot yield, B size (range between 1.5 and 2.25 in diameter), C size (range less than 1.5 in. in diameter), and cull weight (data not shown). There were no significant differences in marketable yield (A size tubers, greater than 2.25 in in diameter), but data is presented. There were 20 programs that had significantly lower RAUDPC than the non-treated control program (3, 8, 23, 11, 26, 31, 4, 7, 9, 25, 28, 30, 32, 21, 6, 27, 10, 12, 2, and 17). No phytotoxicity was observed with any of the fungicide programs throughout the duration of the trial.

Program number, treatment, and rate/A		Application Timing ^z	Marketable Yield (cwt/A) ^y	RAUDPC ^x	
1	Untreated Control	NA	313.4	0.483	e ^w
2	Bravo WS 720SC 1.5 pt	1,2,4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,6			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	392.8	0.423	a-d
3	Topguard EQ 4.29 SC 28 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	1,2,4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,6			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	353.9	0.371	a
4	Topguard EQ 4.29 SC 28 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,6			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	401.6	0.385	a-c
5	Luna Tranquility 4.16 SC 11.2 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	1,2,4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,6			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	367.0	0.441	c-e
6	Luna Tranquility 4.16 SC 11.2 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,6			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	346.7	0.409	a-c
7	Miravis Prime 3.33SC 11.4 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	1,2,4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,6			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	400.4	0.391	a-c
8	Miravis Prime 3.33SC 11.4 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,6			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	398.5	0.382	ab
9	Bravo WS 720SC 1.5 pt	1,2,4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	6			
	Endura Pro 2.5 SC 18.5 oz + Bravo WS 720SC 1.5 pt	3,5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	377.8	0.397	a-c
10	Bravo WS 720SC 1.5 pt	1,2,4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	6,7			
	Endura Pro 2.5 SC 18.5 oz + Bravo WS 720SC 1.5 pt	3,5			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	377.3	0.414	a-c
11	Bravo WS 720SC 1.5 pt	1,2,4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,6			
	Endura Pro 2.5 SC 18.5 oz + Bravo WS 720SC 1.5 pt	5,7			

	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	366.6	0.383	a-c
12	Reason 500SC 5.5 fl oz + GWN 9790 8.2 fl oz	1-10	364.5	0.422	a-d
13	GWN 14504 0.45 lb	1-10	332.1	0.478	de
14	GWN 14504 0.67 lb	1-10	309.0	0.478	de
15	Zing! 4.9SC 34 fl oz	1-10	346.4	0.439	b-e
16	Luna Tranquility 4.16 SC 11.2 fl oz	1-10	344.7	0.426	a-e
17	Velum Prime 6.5 fl oz	In-furrow			
	Bravo WS 720SC 1.5 pt	45667	392.3	0.423	a-d
18	Experimental 1 13 fl oz	In-Furrow			
	Bravo WS 720SC 1.5 pt	45726	356.9	0.428	a-e
19	Elatus 45WG 6.4 oz	In-furrow			
	Bravo WS 720SC 1.5 pt	45726	367.7	0.441	b-e
20	Quadris 2.018 SC 0.8 fl oz/1000 rw ft	In-furrow			
	Bravo WS 720SC 1.5 pt	45726	361.3	0.428	a-e
21	Velum Prime 6.5 fl oz + Elatus 45WG 6.4 oz	In-furrow			
	Bravo WS 720SC 1.5 pt	45726	378.8	0.408	a-c
22	Bravo WS 720SC 1.5 pt	1,3,6,8-10			
	Luna Tranquility 4.16 SC 11.2 fl oz + Bravo WS 6SC 1.5 pt	2,4	345.6	0.442	c-e
23	Bravo WS 6SC 1.5 pt	1,3,6,8-10			
	Experimental #2 23.8 fl oz + Bravo WS 6SC 1.5 pt	2,4	418.1	0.383	a-c
23	Bravo WS 6SC 1.5 pt	1,3,6,8-10			
	DFO + PYM 500 SC 23.9 fl oz + Bravo WS 6SC 1.5 pt	2,4	398.1	0.427	a-e
24	Bravo WS 6SC 1.5 pt	1,3,6,8-10			
	Luna Pro 3.34 SC 10.0 fl oz + Bravo WS 6SC 1.5 pt	2,4	385.7	0.398	a-c
25	Bravo WS 6SC 1.5 pt	1,3,6,8-10			
	Miravis Prime 3.33SC 10.0 fl oz + Bravo WS 6SC 1.5 pt	2,4	398.8	0.384	a-c
26	Bravo WS 6SC 1.5 pt	1,3,6,8-10			
	Endura 70WG 5.5 oz + Provysol 3.34 SC 4 fl oz + Bravo 1.5 pt	2,4	384.6	0.409	a-c
27	Delaro 325SC 6 oz	1			
	Bravo WS 6SC 1.5 pt	2,3,5,6-10			
	Luna Tranquility 4.16 SC 11.2 fl oz + Bravo WS 6SC 1.5 pt	4	374.7	0.403	a-c
28	Bravo WS 720SC 1.5 pt	1,3,5,7,8			
	Proline 480 SC 4.3 fl oz + Bravo WS 720SC 1.0 pt	2,4,6			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	347.0	0.440	b-e
29	Bravo WS 720SC 1.5 pt	1-10			
30	Bravo WS 720SC 1.5 pt	2,4,8			
	Provysol 3.34 SC 2.5 fl oz + Bravo WS 720SC 1.5 pt	1,3,5,7			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	6			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	375.0	0.403	a-c
31	Bravo WS 720SC 1.5 pt	1,2,4,8			
	Provysol 3.34 SC 5.0 fl oz + Bravo WS 720SC 1.5 pt	3,6			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	368.2	0.385	a-c
32	Bravo WS 720SC 1.5 pt	1,2,4,8			
	Provysol 3.34 SC 5.0 fl oz + Bravo WS 720SC 1.5 pt	5,7			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	3,6			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	394.2	0.407	a-c

^zIn-furrow applications occurred at planting. Hilling applications occurred on 15 May. Fungicide application dates: 1 = 3 Jul, 2 = 10 Jul, 3 = 17 Jul, 4 = 24 Jul, 5 = 31 Jul, 6 = 7 Aug, 7 = 14 Aug, 8 = 21 Aug, 9 = 28 Aug, 10 = 4 Sep.

^yMarketable yield refers to weight of Size A potato tubers of a size range ≥ 2.5 in diameter measured in hundredweight or 100 lb per acre or cwt/A.

^xRAUDPC= Relative Area Under the Disease Progress Curve determined by trapezoidal integration and then converted into Relative AUDPC (RAUDPC).

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