POTATO (*Solanum tuberosum* 'Russet Burbank')
Early blight; *Alternaria solani*

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Evaluation of foliar fungicides for control of potato early blight in Wisconsin, 2023.

A field trial was conducted at the University of Wisconsin Agricultural Research Station in Hancock, WI to evaluate 53 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 on 24 Apr. Seed pieces were allowed to heal prior to planting on 28 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 22 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 5 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: 12 Jul, 19 Jul, 26 Jul, 2 Aug, 9 Aug, 16 Aug, 23 Aug, 30 Aug, and 6 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 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 23 Jun, 30 Jun, 13 Jul, 25 Jul, 8 Aug, 28 Aug, 1 Sep, and 8 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 18 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 10.31 in. Supplemental irrigation was applied 52 times during the potato production season for an additional 22.4 in. All data were analyzed using ANOVA (α=0.05) and Fisher's LSD at α=0.05 (SAS Version 9.2).

Disease onset was typical, but June and July were hotter and drier than normal, leading to slower disease development as the season progressed. 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 9 programs that had significantly lower RAUDPC than the non-treated control program (11, 16, 7, 10, 15, 12, 8, 46, 29). 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	537.7	0.351	g-n[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	615.3	0.334	c-n
3	Companion Maxx 8.0 oz + NIS 0.1% v/v	1-10	515.1	0.379	l-n
4	Companion Maxx 16.0 oz + NIS 0.1% v/v	1-10	587.4	0.352	g-n
5	Bravo WS 720SC 1.5 pt + Companion Maxx 8.0 oz + NIS 0.1% v/v	1,2,4,8			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt + Companion Maxx 8.0 oz + NIS 0.1% v/v	3,6			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt + Companion Maxx 8.0 oz + NIS 0.1% v/v	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz + Companion Maxx 8.0 oz + NIS 0.1% v/v	9,10	589.1	0.353	g-n
6	Companion Maxx 8.0 oz + NIS 0.1% v/v	1,3,5,7,9			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	2,4,8			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	6			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	10	574.7	0.337	d-n
7	BAS 76201F 18.5 fl oz + Dyne-Amic 0.6% v/v	1,2			
	Bravo WS 720SC 1.5 pt + Dyne-Amic 0.6% v/v	3-10	588.4	0.273	a-c
8	Miravis Prime 3.33SC 11.4 fl oz + Dyne-Amic 0.6% v/v	1,2			
	Bravo WS 720SC 1.5 pt + Dyne-Amic 0.6% v/v	3-10	625.1	0.284	a-e
9	Luna Tranquility 4.16 SC 11.2 fl oz + Dyne-Amic 0.6% v/v	1,2			
	Bravo WS 720SC 1.5 pt + Dyne-Amic 0.6% v/v	3-10	576.7	0.311	b-k
10	Luna Pro 3.34 SC 10.0 fl oz + Dyne-Amic 0.6% v/v	1,2			
	Bravo WS 720SC 1.5 pt + Dyne-Amic 0.6% v/v	3-10	580.6	0.281	a-d
11	Endura 70 WG 5.5 oz + Dyne-Amic 0.6% v/v	1,2			
	Bravo WS 720SC 1.5 pt + Dyne-Amic 0.6% v/v	3-10	603.4	0.249	a
12	Provysol 3.34 SC 5.0 fl oz + Omega 500F 8.0 fl oz + Dyne-Amic 0.6% v/v	1,2			
	Bravo WS 720SC 1.5 pt + Dyne-Amic 0.6% v/v	3-10	620.8	0.284	a-e
13	Bravo WS 720SC 1.5 pt	1,3,5,7,8			
	Proline 480 SC 4.3 fl oz	2,4,6			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	559.6	0.308	a-j
14	Bravo WS 720SC 1.5 pt	1,3,5,7,8			
	Proline 480 SC 4.3 fl oz + Arius 250 2.08 SC 6.4 fl oz	2,4,6			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	556.0	0.293	a-g
15	Bravo WS 720SC 1.5 pt	1,3,5,7,8			

	Proline 480 SC 4.3 fl oz + Arius 250 2.08 SC 9.1 fl oz	2,4,6			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	603.8	0.281	a-d
	Bravo WS 720SC 1.5 pt	1,3,5,7,8			
16	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	568.4	0.264	ab
	Luna Tranquility 4.16 SC 11.2 fl oz + Dyne-Amic 0.375% v/v	1,3,6			
17	Howler EVO 2.5 lb + Dyne-Amic 0.375% v/v	2,5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	551.2	0.311	b-k
	Luna Tranquility 4.16 SC 11.2 fl oz + Dyne-Amic 0.375% v/v	1,3,6			
18	Howler EVO 1.25 lb + Dyne-Amic 0.375% v/v	2,5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	592.0	0.326	c-m
	Luna Tranquility 4.16 SC 11.2 fl oz + Dyne-Amic 0.375% v/v	1,3,6			
19	Theia 1.5 lb + Dyne-Amic 0.375% v/v	2,5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	559.0	0.304	a-i
20	Vertisan 1.67 SC 16.1 fl oz + NIS 0.25% v/v	1-10	559.4	0.304	a-i
21	Vertisan 1.67 SC 19.8 fl oz + NIS 0.25% v/v	1-10	564.1	0.298	a-h
22	Curzate 60 DF 3.33 oz + Vertisan 1.67 SC 16.1 fl oz + NIS 0.25% v/v	1-10	574.5	0.326	c-m
23	Curzate 60 DF 3.33 oz + Vertisan 1.67 SC 19.8 fl oz + NIS 0.25% v/v	1-10	522.8	0.367	j-n
24	Tanos DF 8.0 oz + NIS 0.25% v/v	1-10	530.4	0.305	a-i
25	Luna Tranquility 4.16 SC 11.2 fl oz + NIS 0.25% v/v	1-10	587.4	0.322	b-l
26	Miravis Prime 3.33SC 11.4 fl oz + NIS 0.25% v/v	1-10	579.4	0.322	b-l
	Bravo WS 720SC 1.5 pt	1			
27	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9	552.7	0.308	a-j
	Bravo WS 720SC 1.5 pt	1			
	LifeGard 4.5 oz/100 gal water	2,4,6,8,10			
28	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,			
	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9	536.2	0.337	d-n
	LifeGard 4.5 oz/100 gal water + Bravo WS 720SC 1.5 pt	1			
	Bravo WS 720SC 1.5 pt	2,4,8			
29	LifeGard 4.5 oz/100 gal water + Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	3,			
	LifeGard 4.5 oz/100 gal water + Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	5,7			
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt	6			
___	Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt	9			

	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	10	571.5	0.287	a-f
30	Zing! 4.9SC 34 fl oz	1-10	539.3	0.329	c-m
31	GWN 10616 2.6 pt	1-10	509.4	0.384	mn
32	GWN 10616 3.7 pt	1-10	506.8	0.370	k-n
33	GWN 14504 0.45 lb	1-10	536.9	0.347	f-n
34	GWN 14504 0.67 lb	1-10	545.6	0.353	g-n
35	Reason 500SC 2.75 fl oz + GWN 9790 8.2 fl oz	1-10	517.6	0.392	n
36	Reason 500SC 2.75 fl oz + GWN 9790 10.8 fl oz	1-10	545.7	0.359	h-n
37	Reason 500SC 5.5 fl oz + GWN 9790 8.2 fl oz	1-10	551.0	0.331	c-n
38	Reason 500SC 5.5 fl oz + GWN 9790 10.8 fl oz	1-10	553.9	0.325	c-m
39	Echo Zn 4.17 SC 34 fl oz	1,3,4,6,8-10			
	PSP1 Biostimulant 5.5 fl oz	2,5,7	567.9	0.336	d-n
40	Echo Zn 4.17 SC 34 fl oz	1,3,4,6,8-10			
	PSP1 Biostimulant 5.5 fl oz	2,7			
	Regev 5.0EC 7.0 fl oz + Dithane DF75 2 lb	5	609.0	0.310	b-j
41	Echo Zn 4.17 SC 34 fl oz	1,3,4,6,8-10			
	PSP1 Biostimulant 5.5 fl oz	2,5			
	Regev 5.0EC 7.0 fl oz + Dithane DF75 2 lb	7	538.8	0.344	e-n
42	Echo Zn 4.17 SC 34 fl oz	1,3,4,8-10			
	PSP1 Biostimulant 5.5 fl oz	2,6			
	Regev 5.0EC 7.0 fl oz + Dithane DF75 2 lb	5,7	537.3	0.356	h-n
43	Echo Zn 4.17 SC 34 fl oz	1,3,4,6,8-10			
	PSP1 Biostimulant 5.5 fl oz	2,6			
	Regev 5.0EC 7.0 fl oz + Dithane DF75 2 lb	5,7	483.8	0.356	h-n
44	Echo Zn 4.17 SC 34 fl oz	1,3,4,6,8-10	497.7	0.361	i-n
45	Echo Zn 4.17 SC 34 fl oz	1,3,4,6,8-10			
	PSP1 Biostimulant 5.5 fl oz	2,5			
	Revus Top 4.16 SC 7.0 fl oz + Dithane DF75 2 lb	7	571.2	0.344	e-n
46	Echo Zn 4.17 SC 34 fl oz	1,3,4,6,8-10			
	Quadris 2.018 SC 9.0 fl oz + Dithane DF75 2 lb	2			
	Luna Tranquility 4.16 SC 11.2 fl oz	5			
	Revus Top 4.16 SC 7.0 fl oz + Dithane DF75 2 lb	7	568.0	0.285	a-e
47	Echo Zn 4.17 SC 34 fl oz	1,3,4,6,8-10			
	Quadris 2.018 SC 9.0 fl oz + Dithane DF75 2 lb	2			
	Luna Tranquility 4.16 SC 11.2 fl oz	5			
	Regev 5.0EC 7.0 fl oz + Dithane DF75 2 lb	7	554.8	0.301	a-i

	Topguard EQ 4.29 SC 28 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	1,2,4,8			
48	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	605.0	0.295	a-g
	Topguard EQ 4.29 SC 28 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	4,8			
49	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	532.7	0.304	a-i
	Luna Tranquility 4.16 SC 11.2 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	1,2,4,8			
50	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	584.7	0.314	b-k
	Luna Tranquility 4.16 SC 11.2 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	4,8			
51	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	520.5	0.351	g-n
	Miravis Prime 3.33SC 11.4 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	1,2,4,8			
52	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	586.7	0.321	b-l
	Miravis Prime 3.33SC 11.4 fl oz	Hilling			
	Bravo WS 720SC 1.5 pt	4,8			
53	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	585.6	0.294	a-g

[z]In-furrow applications occurred at planting. Hilling applications occurred on 22 May. Fungicide application dates: 1 = 5 Jul, 2 = 12 Jul, 3 = 19 Jul, 4 = 26 Jul, 5 = 2 Aug, 6 = 9 Aug, 7 = 16 Aug, 8 = 23 Aug, 9 = 30 Aug, 10 = 6 Sep.

[y]Marketable 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.

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

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