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

S. A. Jordan, J. M. Hammel, and A.J. Gevens
Department of Plant Pathology
University of Wisconsin-Madison
Madison, WI 53706

Evaluation of foliar fungicides for control of potato early blight in Wisconsin, 2019.

A field trial was conducted at the University of Wisconsin Agricultural Research Station in Hancock, WI to evaluate 28 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 29 Apr. Seed pieces were allowed to heal prior to planting on 6 May by maintaining cut seed at 55°F under 98% relative humidity. No seed treatments were applied unless noted. 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. Vine emergence of the 2 center rows of each plot was counted 32 days after planting on 7 Sep. Fungicide treatments were initiated on 10 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: 17 Jul, 24 Jul, 31 Jul, 7 Aug, 14 Aug, 21 Aug, 28 Aug, 4 Sep, and 11 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 inoculated but relied on natural inocula for disease establishment. Early blight severity across 20 ft of the two center rows was rated on 1 Jul, 12 Jul, 24 Jul, 14 Aug, 30 Aug, and 10 Sep using the Horsfall-Barratt rating scale (0-11 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 Diquat E 1.5 pt/acre followed by a second application on 23 Sep. Tubers from the center 2 rows of each 4-row plot were harvested and graded on 2 Oct. Total precipitation in Hancock during the potato production season was 26.33 in. Supplemental irrigation was applied 37 times during the potato production season for an additional 14.95 in. All data were analyzed using ANOVA (α=0.05) and Fisher's LSD at α=0.05 (SAS Version 9.2).

Treatment Number, Treatment, and Rate/A		Application Timing[z]	Emergence (%)		Marketable Yield (cwt/A)[y]		Culls Weight (cwt/A)		RAUDPC[x]	
1	Non-treated Control	NA	95.6%	bc[w]	366.8	a	10.1	a-d	0.554	h
2	Bravo WS 65SC 1.5 pt	1,2,4,8								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	3,6								
	Endura 70WG 3.5 oz + Bravo WS 65SC 1.5 pt	5,7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	96.9%	bc	406.1	ab	13.7	a-e	0.467	e-g
3	Maxim MZ 0.5D 0.5 lb/cwt	Seed Trt								
	Bravo WS 65SC 1.5 pt	1,2,4,8								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	3,6								
	Endura 70WG 3.5 oz + Bravo WS 65SC 1.5 pt	5,7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	96.9%	bc	427.6	a-d	16.1	a-f	0.453	d-g
4	Emesto Silver 118FS 0.31 fl oz/cwt	Seed Trt								
	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Bravo WS 65SC 1.5 pt	1,3,5,7,9								
	Dithane DF75 2 lb	2								
	Scala 5SC 7.0 fl oz + Dithane DF75 2 lb	4,8,10								
	Luna Tranquility (Luna T) 4.16SC 11.2 fl oz + Dithane DF75 2 lb	6	97.5%	bc	427.1	a-d	20.0	b-g	0.453	d-g
5	Emesto Silver 118FS 0.31 fl oz/cwt	Seed Trt								
	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Serenade ASO 0.962 qt	1,2								
	Reason 500SC 5.5 fl oz + Movento 240SC 2.5 fl oz + MSO EC 0.5% v/v	3,5								
	Luna T 4.16SC 11.2 fl oz	4								
	Luna T 4.16SC 11.2 fl oz + Bravo WS 65SC 1.5 pt	6								
	Scala 5SC 7.0 fl oz + Bravo WS 65SC 1.5 pt	7,9								
	Bravo WS 65SC 1.5 pt	8,10	93.8%	bc	511.3	f	14.2	a-f	0.388	a-d
6	Emesto Silver 118FS 0.31 fl oz/cwt	Seed Trt								
	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Echo Zn 4.17L 2 pt	5								
	Luna T 4.16SC 11.2 fl oz + Echo Zn 4.17L 1.12 pt	6								
	Luna T 4.16SC 11.2 fl oz + Echo Zn 4.17L 2 pt	8								
	Scala 5SC 7.0 fl oz + Echo Zn 4.17L 2.5 pt	10	94.4%	bc	503.2	ef	12.0	a-e	0.364	a-c
7	Emesto Silver 118FS 0.31 fl oz/cwt	Seed Trt								
	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								

Treatment Number, Treatment, and Rate/A		Application Timing[z]	Emergence (%)		Marketable Yield (cwt/A)[y]		Culls Weight (cwt/A)		RAUDPC[x]	
	Echo Zn 4.17L 2 pt	4, 8								
	Luna T 4.16SC 11.2 fl oz + Dithane DF75 2 lb	6								
	Scala 5SC 7.0 fl oz + Echo Zn 4.17L 2.5 pt	10	96.3%	bc	485.2	d-f	23.8	e-g	0.352	ab
	Emesto Silver 118FS 0.31 fl oz/cwt	Seed Trt								
	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Bravo WS 65SC 1.5 pt	1,3								
8	Dithane DF75 2 lb	2								
	Scala 5SC 7.0 fl oz + Dithane DF75 2 lb	4,8,10								
	Propulse 400SC 8.55 fl oz + Bravo WS 65SC 1.5 pt +NIS	5,7,9								
	Luna T 4.16SC 11.2 fl oz + Dithane DF75 2 lb	6	96.9%	bc	497.9	ef	29.2	g	0.329	a
	Emesto Silver 118FS 0.31 fl oz/cwt	Seed Trt								
	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Bravo WS 65SC 1.5 pt	1,3								
9	Dithane DF75 2 lb	2								
	Scala 5SC 7.0 fl oz + Dithane DF75 2 lb	4,8,10								
	Propulse 400SC 10.26 fl oz + Bravo WS 65SC 1.5 pt +NIS	5,7,9								
	Luna T 4.16SC 11.2 fl oz + Dithane DF75 2 lb	6	97.5%	bc	469.7	b-f	21.2	c-g	0.425	b-f
	Emesto Silver 118FS 0.31 fl oz/cwt	Seed Trt								
	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Bravo WS 65SC 1.5 pt	1,3								
10	Dithane DF75 2 lb	2								
	Scala 5SC 7.0 fl oz + Dithane DF75 2 lb	4,8,10								
	Delaro 325SC 11.7 fl oz + Bravo WS 65SC 1.5 pt +NIS	5,7,9								
	Luna T 4.16SC 11.2 fl oz + Dithane DF75 2 lb	6	93.1%	bc	453.6	b-f	23.1	d-g	0.439	c-g
	CruiserMaxx Vibrance Potato (0.5 fl oz/cwt)	Seed Trt								
11	Miravis Prime 3.33SC 11.0 fl oz	1,2								
	Bravo WS 65SC 1.5 pt	3,4								
	Revus Top 48.3SC 5.5 fl oz	5	70.0%	a	433.5	b-d	26.9	fg	0.408	b-e
	Emesto Silver 118FS 0.31 fl oz/cwt	Seed Trt								
12	Luna T 4.16SC 11.2 fl oz	1,2								
	Bravo WS 65SC 1.5 pt	3-5	91.9%	bc	440.2	b-e	21.3	c-g	0.438	c-g
13	Bravo WS 65SC 1.5 pt	1,2,4,8								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	3,6								

	Treatment Number, Treatment, and Rate/A	Application Timing[z]	Emergence (%)		Marketable Yield (cwt/A)[y]		Culls Weight (cwt/A)		RAUDPC[x]	
	Endura 70WG 3.5 oz + Bravo WS 65SC 1.5 pt	5,7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	95.6%	bc	484.8	d-f	15.7	a-f	0.446	d-g
14	LifeGard 4.5 fl oz/100 gal water	1								
	Bravo WS 65SC 1.5 pt	2,4,8								
	Priaxor 4.17SC 4.5 fl oz + LifeGard 4.5 fl oz/100 gal water	3								
	Endura 70WG 3.5 oz + LifeGard 4.5 fl oz/100 gal water	5,7								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	6								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	94.4%	bc	478.5	d-f	6.1	a	0.479	e-h
15	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow	95.0%	bc	453.7	b-f	8.6	a-c	0.479	e-h
16	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Bravo WS 65SC 1.5 pt	2,4-10								
	Luna T 4.16SC 11.2 fl oz + Bravo WS 65SC 1.5 pt	1,3	92.5%	bc	498.6	ef	7.6	ab	0.426	b-f
17	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Bravo WS 65SC 1.5 pt	4 6-10								
	Luna T 4.16SC 11.2 fl oz + Bravo WS 65SC 1.5 pt	3,5	93.8%	bc	474.8	c-f	6.5	a	0.465	d-g
18	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Bravo WS 65SC 1.5 pt	6,8-10								
	Luna T 4.16SC 11.2 fl oz + Bravo WS 65SC 1.5 pt	5,7	98.1%	c	446.8	b-e	12.8	a-e	0.508	gh
19	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Bravo WS 65SC 1.5 pt	6,8,10								
	Luna T 4.16SC 11.2 fl oz + Bravo WS 65SC 1.5 pt	7, 9	90.0%	bc	450.1	b-f	5.3	a	0.483	e-h
20	Velum Prime 0.45 fl oz/1000 ft row	In-Furrow								
	Bravo WS 65SC 1.5 pt	8,10								
	Luna T 4.16SC 11.2 fl oz + Bravo WS 65SC 1.5 pt	7,9	97.5%	bc	443.9	be	8.4	a-c	0.503	f-h
21	Bravo WS 65SC 1.5 pt	1,2,4,8								
	Revysol 7500EF + Bravo WS 65SC 1.5 pt + Dyne-Amic 0.05%v/v	3,6								
	Endura 70WG 3.5 oz + Bravo WS 65SC 1.5 pt	5,7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	91.9%	bc	475.8	d-f	11.6	a-e	0.408	a-e
22	Bravo WS 65SC 1.5 pt	1,2,8								
	Revysol 7500EF 10.0 fl oz + Bravo WS 65SC 1.5 pt + Dyne-Amic 0.05%v/v	3,6								
	Endura 70WG 3.5 oz + Bravo WS 65SC 1.5 pt	5,7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	96.3%	bc	455.1	b-f	11.8	a-e	0.448	d-g
23	Bravo WS 65SC 1.5 pt	1,2,4,8								

Treatment Number, Treatment, and Rate/A		Application Timing[z]	Emergence (%)		Marketable Yield (cwt/A)[y]		Culls Weight (cwt/A)		RAUDPC[x]	
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	3,6								
	Revysol 7500EF 10.0 fl oz + Bravo WS 65SC 1.5 pt + Dyne-Amic 0.05%v/v	5,7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	95.6%	bc	489.6	d-f	10.0	a-c	0.430	b-g
	Bravo WS 65SC 1.5 pt	1,2,4								
24	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	3,6								
	Revysol 7500EF 10.0 fl oz + Bravo WS 65SC 1.5 pt + Dyne-Amic 0.05%v/v	5,7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	95.6%	bc	461.9	b-f	10.4	a-d	0.433	c-g
	Bravo WS 65SC 1.5 pt	1,2,4,8								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	3								
25	Revysol 7500EF 10.0 fl oz + Bravo WS 65SC 1.5 pt + Dyne-Amic 0.05%v/v	6								
	Endura 70WG 3.5 oz + Bravo WS 65SC 1.5 pt	5,7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	98.8%	c	410.9	a-c	6.1	a	0.459	d-g
	Bravo WS 65SC 1.5 pt	1,2,4,8								
	Revysol 7500EF 10.0 fl oz + Bravo WS 65SC 1.5 pt + Dyne-Amic 0.05%v/v	3								
26	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	6								
	Endura 70WG 3.5 oz + Bravo WS 65SC 1.5 pt	5,7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	93.8%	bc	443.6	b-e	9.3	a-c	0.436	c-g
	Bravo WS 65SC 1.5 pt	1,2,4,8								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	3,6								
27	Revysol 7500EF 10.0 fl oz + Bravo WS 65SC 1.5 pt + Dyne-Amic 0.05%v/v	5								
	Endura 70WG 3.5 oz + Bravo WS 65SC 1.5 pt	7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	98.8%	c	451.3	b-f	15.2	a-f	0.425	b-f
	Bravo WS 65SC 1.5 pt	1,2,4,8								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 65SC 1.5 pt	3,6								
28	Endura 70WG 3.5 oz + Bravo WS 65SC 1.5 pt	5								
	Revysol 7500EF 10.0 fl oz + Bravo WS 65SC 1.5 pt + Dyne-Amic 0.05%v/v	7								
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	96.3%	bc	447.4	b-f	13.5	a-e	0.457	d-g

[z] Fungicide application dates: 1=10 Jul, 2 = 17 Jul, 3= 24 Jul, 4 = 31 Jul, 5 = 7 Aug, 6 = 14 Aug, 7 = 21 Aug, 8 = 28 Aug, 9 = 4 Sep, 10 = 11 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.