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, 2017.

A field trial was conducted at the University of Wisconsin Agricultural Research Station in Hancock, WI to evaluate 31 fungicide programs for control of early blight on potato. Seed pieces, approximately 2 oz in size, were cut mechanically from US#1 'Russet Burbank' seed tubers on 17 Apr. Seed pieces were allowed to heal prior to planting on 2 May. No seed treatments were applied unless noted in the table. 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. Fungicide treatments were initiated on 12 Jul after the P-day value (generated from a potato physiological growing degree day-based model used for early blight prediction and fungicide initiation) reached 300 units. Subsequent applications were applied on a weekly basis to all four rows of each plot on the following dates: 19 Jul, 26 Jul, 2 Aug, 9 Aug, 16 Aug, 23 Aug, 30 Aug, 6 Sep, and 13 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 dispersal of inocula for disease establishment. Early blight severity across 20 ft of the two center rows was rated on 21 Jun, 31 Jul, 17 Aug, and 29 Aug 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. Vine kill was initiated 14 Sep with an application of Diquat E 1.5 pt/acre followed by a second application on 21 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 22.3 in. Supplemental irrigation was applied 37 times during the potato production season for an additional 12.7 in. All data were analyzed using ANOVA (α=0.05) and Fisher's LSD at α=0.05 (SAS Version 9.2).

Early blight disease pressure was moderate in this field trial with uniform pressure across the field trial, with onset of disease beginning in the middle of the month of July with typical disease progression for the production region. Fifteen of the 31 treatments resulted in RAUDPC values significantly less than that of the non-treated control (Treatments 2-14, 23, and, 30). Eight of these 15 treatments included an application of Velum Prime 6.5 fl oz/1000 ft row in-furrow (Treatments 4-11). Fourteen of the 31 treatments had a significantly greater marketable yield than the non-treated control (Treatments 6, 17, 19-30). Generally, these treatments did not include a seed-applied or an in-furrow application at planting. Six of the 31 treatments had significantly reduced emergence when compared to the control (treatments 3, 11-14, and 16). Of these, all but treatment 16 (foliar applications of Champ WG) were seed-treated with Maxim MZ.

Treatment Number, Treatment, and Rate/A		Application Timing[z]	Emergence (%)		Marketable Yield (cwt/A)[y]		Size Bs (cwt)[z]		Culls (cwt)[w]		RAUDPC[v]	
1	Non-treated Control	NA	71.9	f-k[u]	456.1	d-g	30.5	e-h	24.6	ab	0.328	h-j
2	Bravo WS 6SC 1.5 pt Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	1,2,4,8 3,6 5,7 9,10	69.4	e-k	494.7	e-i	29.2	d-f	30.6	ab	0.189	ab
3	Maxim MZ 0.5D 0.5 lb/cwt Bravo WS 6SC 1.5 pt Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	Seed Trt 1,2,4,8 3,6 5,7 9,10	35.6	ab	375.5	a-c	17.0	ab	36.9	ab	0.152	a
4	Velum Prime 6.5 fl oz/1000 ft row	In-Furrow	59.4	d-f	429.9	c-f	22.1	a-d	31.1	ab	0.253	c-f
5	Velum Prime 6.5 fl oz/1000 ft row Bravo WS 6SC 1.5 pt Luna Tranquility 4.16SC 11.2 fl oz + Bravo WS 6SC 1.5 pt	In-Furrow 2,4-10 1,3	64.4	e-h	503.5	f-j	30.2	d-g	25.4	ab	0.190	ab
6	Velum Prime 6.5 fl oz/1000 ft row Bravo WS 6SC 1.5 pt Luna Tranquility 4.16SC 11.2 fl oz + Bravo WS 6SC	In-Furrow 4 6-10 3,5	75.6	g-k	547.4	i-n	30.0	d-g	17.1	a	0.196	a-c
7	Velum Prime 6.5 fl oz/1000 ft row Bravo WS 6SC 1.5 pt Luna Tranquility 4.16SC 11.2 fl oz + Bravo WS 6SC 1.5 pt	In-Furrow 6,8-10 5,7	68.8	e-j	494.4	e-i	32.9	e-i	26.5	ab	0.268	d-g
8	Velum Prime 6.5 fl oz/1000 ft row Serenade ASO 0.962 qt Serenade ASO 2 qt + Echo Zn 4.17SC 2 pt Echo Zn 4.17SC 2 pt Luna Tranquility 4.16SC 11.2 fl oz + Echo Zn 4.17SC 2 pt	In-Furrow 1 2 3, 5-10 4	74.4	f-k	526.8	g-l	29.5	d-f	25.3	ab	0.219	b-d
9	Velum Prime 6.5 fl oz/1000 ft row Echo Zn 4.17SC 2 pt	In-Furrow 4-10	62.5	d-g	462.6	d-h	31.0	e-h	33.0	ab	0.220	b-e
10	Emesto Silver 118FS 0.31 fl oz/cwt Velum Prime 6.5 fl oz/1000 ft row Serenade ASO 0.962 qt Reason 500SC 5.5 fl oz + Movento 240SC 2.5 fl oz + MSO EC 5% v/v Luna Tranquility 4.16SC 11.2 fl oz Luna Tranquility 4.16SC 11.2 fl oz + Echo Zn 4.17SC 2 pt Scala + Echo Zn 4.17SC 2 pt Echo Zn 4.17SC 2 pt	Seed Trt In-Furrow 1,2 3,5 4 6 7,9 8,10	60.0	d-g	418.0	b-e	24.9	b-e	36.5	ab	0.187	ab
11	Velum Prime 6.5 fl oz/1000 ft row Serenade ASO 0.962 qt Serenade ASO 2 qt + Echo Zn 4.17SC 2 pt Echo Zn 4.17SC 2 pt Luna Tranquility 4.16SC 11.2 fl oz + Echo Zn 4.17SC 2 pt Scala 5SC 7.0 fl oz + Echo Zn 4.17SC 2 pt	In-Furrow 1 2 3,6,8,10 4 5,7,9	54.4	c-e	405.4	b-d	27.2	c-f	43.9	b	0.187	ab
12	Maxim MZ 0.5D 0.5 lb/cwt Zing 4.9SC 24 fl oz	Seed Trt 1-10	30.6	a	318.0	a	14.0	a	29.4	ab	0.201	a-c

13	Maxim MZ 0.5D 0.5 lb/cwt Luna Tranquility 4.16SC 11.2 fl oz Zing 4.9SC 24 fl oz Endura 70WG 3.5 oz Gavel 75DF 2 lb	Seed Trt 1,4,7 2,5,8 3,6,9 10	42.5	a-c	426.8	c-f	19.7	a-c	37.4	ab	0.204	a-c
14	Maxim MZ 0.5D 0.5 lb/cwt Zing 4.9SC 36 fl oz	Seed Trt 1-10	38.1	ab	342.4	ab	18.0	ab	68.5	c	0.228	b-e
15	SPE120-ES 0.17 fl oz/cwt SPE120-ES 3 fl oz	Seed Trt 1,3,5,7,9	61.9	d-g	453.7	c-g	29.5	d-g	16.3	a	0.332	h-j
16	Champ WG 4lb	1-10	48.1	b-d	426.5	c-f	18.4	ab	30.3	ab	0.322	g-j
17	Cueva 2 gal/50 gal	1-10	85.0	k	564.6	i-n	43.1	j-l	17.8	a	0.351	ij
18	Double Nickel LC 4.5 pt	1-10	74.4	f-k	528.1	g-m	44.4	kl	19.6	a	0.351	ij
19	Dithane DF75 2 lb	1-10	71.3	f-k	606.5	l-n	41.2	jk	20.5	ab	0.296	f-i
20	Bravo WS 6SC 1.5 pt	1-10	71.3	f-k	583.1	j-n	35.2	f-j	22.0	ab	0.330	h-j
21	Quadris 2.08SC Bravo WS 6SC 1.5 pt	1,3,5 2,4,6,7-10	72.5	f-k	584.7	k-n	41.4	jk	28.1	ab	0.300	f-i
22	Bravo WS 6SC 1.5 pt Dithane DF75 2 lb	1,3,5,7,9 2,4,6,8,10	74.4	f-k	578.9	j-n	38.3	h-k	35.5	ab	0.289	f-h
23	ALB 4000 3.4 pt	1-10	75.6	g-k	614.4	n	37.6	g-k	18.2	a	0.250	c-f
24	ALB 4000 2.2 pt	1-10	81.3	i-k	584.7	k-n	45.7	kl	19.0	a	0.288	f-h
25	ALB 4000 1.01 pt	1-10	80.0	h-k	585.5	k-n	44.9	kl	23.5	ab	0.305	f-i
26	ALB 4000 0.29 pt	1-10	84.4	jk	583.9	k-n	40.5	i-k	16.5	a	0.319	g-j
27	Bravo WS 6SC 1.5 pt Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	8 6 7 9,10	83.1	i-k	557.4	i-n	50.1	l	16.6	a	0.372	j
28	LifeGard WG 4.5 oz/100 gal Bravo WS 6SC 1.5 pt	1,3,5,7,9 2,4,6,8,10	75.6	g-k	539.9	h-n	44.0	kl	23.5	ab	0.293	f-i
29	Serenade ASO 0.962 qt Reason 500SC 5.5 fl oz + Movento 240SC 2.5 fl oz + MSO EC 5% v/v Luna Tranquility 4.16SC 11.2 fl oz Luna Tranquility 4.16SC 11.2 fl oz + Echo Zn 4.17SC 2 pt Bayer 123 + Echo Zn 4.17SC 2 pt Echo Zn 4.17SC 2 pt	1,2 3,5 4 6 7,9 8,10	83.8	jk	608.1	mn	40.0	i-k	15.4	a	0.278	e-h
30	Serenade ASO 0.962 qt Serenade ASO 0.962 qt + Echo Zn 4.17SC 2 pt Echo Zn 4.17SC 2 pt Luna Tranquility 4.16SC 11.2 fl oz + Echo Zn 4.17SC 2 pt Bayer 123 SC 5.5 fl oz+ Echo Zn 4.17SC 2 pt	1 2 3,6,8 4 5,7,9	67.5	e-i	582.7	j-n	40.8	i-k	31.0	ab	0.252	c-f
31	GWN 9790 SC 6.4 fl oz	1-10	71.3	f-k	522.7	g-k	44.0	kl	21.4	ab	0.370	j

[z] Fungicide application dates: 1=12 Jul, 2 = 19 Jul, 3= 26 Jul, 4 = 2 Aug, 5 = 9 Aug, 6 = 16 Aug, 7 = 23 Aug, 8 = 30 Aug, 9 = 6 Sep, 10 = 13 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] Size B potato tubers are of a size range between 1.5 and 2.25 inch in diameter.

[w] Culls are misshapen, broken, or otherwise unsaleable tubers that are sorted away from Marketable Yield and B sized categories, measured in hundredweight per acre or cwt/A.

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

[u] 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.