

Evaluation of foliar fungicides for control of potato early blight in Wisconsin, 2016.

A field trial was conducted at the University of Wisconsin Agricultural Research Station in Hancock, WI to evaluate 34 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 25 Apr. Seed pieces were allowed to heal prior to planting on 29 Apr. 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 6 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: 13 Jul, 20 Jul, 27 Jul, 3 Aug, 10 Aug, 17 Aug, 24 Aug, 31 Aug, and 7 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 25 Jul, 5 Aug, 18 Aug, and 2 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. Vine kill was initiated 15 Sep with an application of Diquat E 1.5 pt/acre followed by a second application on 22 Sep. Tubers from the center 2 rows of each 4-row plot were harvested and graded on 3 Oct. A subset of 12 tubers from each plot was tested for specific gravity at time of grading. Total precipitation in Hancock during the potato production season was 28.2 in. Supplemental irrigation was applied 40 times during the potato production season for an additional 15.4 in. All data were analyzed using ANOVA ($\alpha=0.05$) and Fisher's LSD at $\alpha=0.05$ (SAS Version 9.2).

Early blight disease pressure was moderate in this field trial, with onset of disease beginning in the middle of the month of July and progress taking off later in the month of August than typical for the production region. Seventeen of the 34 treatments resulted in RAUDPC values significantly less than that of the non-treated control. Of these 17, the best 5 treatments for significantly limiting disease as indicated by low RAUDPC values were Treatments 3, 4, 12, 14, and 18. Each of these 5 treatments included an application of fungicide at each of the 10 weekly calendar spray dates and the treatments included multiple combined and/or alternated modes of fungicide activity. Three treatments resulted in significantly greater weight of culls than the untreated control (Treatments 3, 4, and 34). There were no significant differences in weight of Bs than the untreated control. While numerically, 23 of the treatments increased Marketable Yield when compared to the non-treated control, 2 treatments resulted in significantly greater Marketable Yield: Treatment 6 (Dithane 75DF 2 lb 1-10) and Treatment 13 (Bravo WS 6SC 1.0 pt alternated with A20259 200SC 11.4 fl oz).

Treatment Number, Treatment, and Rate/A		Application Timing ^z	Marketable Yield (cwt/A) ^y		Size Bs (cwt) ^x		Culls (cwt) ^w		RAUDPC ^v	
1	Non-treated Control	NA	456.8	a-f ^u	34.3	a-f	25.0	a-d	0.414	g-h
2	Luna Tranquility 4.16SC 1.0 fl oz/1000 ft row	In Furrow	462.0	a-f	43.0	e-f	31.9	c-f	0.345	b-f
3	Luna Tranquility 4.16SC 1.0 fl oz/1000 ft row	In Furrow	470.6	b-f	34.8	a-f	48.0	g	0.278	a
	Bravo WS 6SC 1.5 pt	1,2,4,8								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	3,6								
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5pt	5,7								
4	Dithane 75DF 2 lb + Super Tin 80WP 2.5 oz	9,10	404.4	a	31.1	a-c	47.6	f-g	0.302	a-c
	Moncoat MZ 7.5 DP 12.0 oz/cwt seed	At Plant								
	Bravo WS 6SC 1.5 pt	1,2,4,8								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	3,6								
5	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7	497.1	d-h	32.5	a-d	15.0	a-b	0.366	c-h
	Dithane 75DF 2.0 lb + Super Tin 80WP 2.5 oz	9,10								
	Champ WG 4.0 lb	1-10								
	Dithane 75DF 2 lb	1-10								
6	Bravo WS 6SC 1.5 pt	1-10	536.1	g-h	31.2	a-c	19.0	a-c	0.340	a-f
	Bravo WS 6SC 1.5 pt	1-10								
	Quadris 2.08SC 6 fl oz	1,3,5								
	Bravo WS 6SC 1.5 pt	2,4,6,7-10								
7	Bravo WS 6SC 1.5 pt	1,3,5,7,9	520.5	f-h	35.4	a-f	11.5	a	0.362	c-h
	Dithane 75DF 2 lb	2,4,6,8,10								
	Bravo WS 6SC 1.5pt	1,2,4,8								
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	3,6								
8	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7	505.4	e-h	38.7	c-f	21.7	a-c	0.346	b-f
	Dithane 75DF 2.0 lb + Super Tin 80WP 2.5 oz	9,10								
	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10								
	A19649 200SC 4.28 fl oz	3,6,9								
9	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10	454.7	a-e	35.2	a-f	18.9	a-c	0.355	b-h
	A19649 200SC 5.13 fl oz	3,6,9								
	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10								
	A19649 200SC 5.13 fl oz	3,6,9								
10	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10	503.6	e-h	34.0	a-f	22.9	a-c	0.318	a-d
	A20259 200SC 11.4 fl oz	3,6,9								
	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10								
	A20259 200SC 11.4 fl oz	3,6,9								
11	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10	538.1	h	34.9	a-f	17.1	a-c	0.327	a-e
	A20259 200SC 13.7 fl oz	3,6,9								
	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10								
	A20259 200SC 13.7 fl oz	3,6,9								
12	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10	488.5	c-h	32.1	a-d	26.3	a-d	0.321	a-d
	A20560 400SC 6.84 fl oz	3,6,9								
	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10								
	A20560 400SC 6.84 fl oz	3,6,9								
13	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10	462.8	a-f	35.2	a-f	19.4	a-c	0.355	b-h
	A20560 400SC 6.84 fl oz	3,6,9								
	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10								
	A20560 400SC 6.84 fl oz	3,6,9								

16	Bravo WS 6SC 1.0 pt	1,2,4,5,7,8,10								
	Luna Tranquility 4.16SC 11.2 fl oz	3,6,9	445.0	a-e	36.4	a-f	18.1	a-c	0.342	a-f
17	Reason 500 6.9 fl oz + Dithane 75DF 2 lb	1								
	Echo Zn 4.17L 2.12 pt	2,4,6,8								
	Reason 500 5.5 fl oz + Dithane 75DF 2 lb	3								
	Luna Tranquility 4.16SC 11.2 fl oz + Dithane 75DF 2 lb	5								
	Scala 5SC 7.0 fl oz + Dithane 2 lb	7								
	Dithane 75DF 2 lb + Super Tin 80WP 2.5 oz	9,10	448.3	a-e	35.7	a-f	21.5	a-c	0.333	a-f
18	Velum Prime 6.5 fl oz/1000 ft row	In-Furrow								
	Reason 500 6.9 fl oz + Dithane 75DF 2 lb	1								
	Serenade ASO 2 qt	2								
	Reason 500 6.9 fl oz	3								
	Luna Tranquility 4.16SC 11.2 fl oz + Serenade ASO 2 qt	4,6,8								
	Scala 5SC 7.0 fl oz + Serenade ASO 2 qt	5,7,9								
19	Dithane 75DF 2 lb + Previcur 1.2 pt	10	473.7	b-h	31.8	a-d	22.9	a-c	0.314	a-d
	Velum Prime 6.5 fl oz/1000 ft row	In-Furrow								
	Reason 500 6.9 fl oz + Dithane 75DF 2 lb	1								
	Serenade ASO 2 qt	2								
	Reason 500 6.9 fl oz	3								
	Luna Tranquility 4.16SC 11.2 fl oz + Serenade ASO 2 qt	4,6,8								
20	Scala 5SC 7.0 fl oz + Echo Zn 4.17L 2.2 pt	5,7,9								
	Dithane 75DF 2 lb + Previcur Flex 6SL 1.2 pt	10	484.1	b-h	26.5	a	31.9	c-f	0.341	a-f
	Velum Prime 6.5 fl oz/1000 ft row	In-Furrow								
	Reason 500 6.9 fl oz + Dithane 75DF 2 lb	1								
	Echo Zn 4.17L 2.12 pt	2,4,6,8								
	Reason 500 5.5 fl oz + Dithane 75DF 2 lb	3								
21	Luna Tranquility 4.16SC 11.2 fl oz + Dithane 75DF 2 lb	5								
	Scala 5SC 7.0 fl oz + Dithane 2 lb	7								
	Dithane 75DF 2 lb + Super Tin 80WP 2.5 oz	9								
	Dithane 75DF 2 lb + Previcur 1.2 pt	10	472.2	b-g	27.7	a-b	20.8	a-c	0.326	a-e
	Luna Tranquility 4.16SC 11.0 fl oz	1,5								
	Gowan 10126 SC 32 fl oz	2,3,6,7								
	Gavel 75DF 2 lb	4,8	509.3	e-h	26.1	a	25.4	a-d	0.349	b-g

22	Luna Tranquility 4.16SC 11.0 fl oz	1,5							
	Gowan 10126 SC 32 fl oz	2,6							
	Gavel 75DF 2 lb	3,4,7,8	472.4	b-g	37.8	b-f	22.5	a-c	0.371 d-h
23	Luna Tranquility 4.16SC 11.0 fl oz	1,5							
	Gowan 10126 SC 34 fl oz	2,3,6,7							
	Gavel 75DF 2 lb	4,8	489.4	c-h	31.3	a-c	21.1	a-c	0.328 a-f
24	Luna Tranquility 4.16SC 11.0 fl oz	1,5							
	Gowan 10126 SC 34 fl oz	2,6							
	Gavel 75DF 2 lb	3,4,7,8	436.6	a-d	27.7	a-b	23.9	a-c	0.369 d-h
25	Champ WG 4 lb	1-10	454.2	a-e	42.2	d-f	14.8	a-b	0.369 d-h
26	Cueva 2gal/50gal	1-10	429.2	a-c	41.9	d-f	12.8	a-b	0.390 e-h
27	Double Nickel LC 4.5 pt	1-10	435.3	a-d	44.2	f	14.6	a-b	0.414 g-h
28	Bravo WS 6SC 1.5 pt	2,4,8							
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	3,6							
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7							
	Dithane 75DF 2 lb + Super Tin 80WP 2.5 oz	9,10	492.8	c-h	32.1	a-d	19.3	a-c	0.328 a-f
29	Bravo WS 6SC 1.5 pt	4,8							
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	3,6							
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7							
	Dithane 75DF 2 lb + Super Tin 80WP 2.5 oz	9,10	468.4	a-f	34.0	a-f	17.8	a-c	0.379 d-h
30	Bravo WS 6SC 1.5 pt	4,8							
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	6							
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7							
	Dithane 75DF 2 lb + Super Tin 80WP 2.5 oz	9,10	423.1	a-b	27.5	a-b	28.4	b-e	0.393 f-h
31	Bravo WS 6SC 1.5 pt	8							
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	6							
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7							
	Dithane 75DF 2 lb + Super Tin 80WP 2.5 oz	9,10	455.7	a-f	28.7	a-c	19.6	a-c	0.415 h
32	Bravo WS 6SC 1.5 pt	8							
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	6							
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	7							
	Dithane 75DF 2 lb + Super Tin 80WP 2.5 oz	9,10	506.6	e-h	30.2	a-c	40.6	d-g	0.328 a-f

33	CX-10250 4.5 oz/100gal	1-10	470.7	b-f	27.1	a	27.4	a-e	0.366	c-h
34	CX-10251 4.5 oz/100gal	1,3,5,7,9								
	Bravo WS 6SC 1.5 pt	2,4,6,8,10	493.9	c-h	28.0	a-b	43.0	e-g	0.325	a-e

^zFungicide application dates: 1=6 Jul, 2 = 13 Jul, 20= 15 Jul, 4 = 27 Jul, 5 = 3 Aug, 6 = 10 Aug, 7 = 17 Aug, 8 = 24 Aug, 9 = 31 Aug, 10 = 7 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.

^xSize B potato tubers are of a size range between 1.5 and 2.25 inch in diameter

^wCulls 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.

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

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