

Evaluation of foliar fungicides for control of potato early blight in Wisconsin, 2020.

A field trial was conducted at the University of Wisconsin Agricultural Research Station in Hancock, WI to evaluate 21 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 27 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. Fungicide treatments were initiated on 8 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: 15, 22, 29, Jul; 5, 12, 19, 26 Aug; and 2, 9 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 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, 7 Jul, 21 Jul, 5 Aug, 21 Aug, and 18 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 21 Sep with an application of Diquat E 1.5 pt/acre. Tubers from the center two rows of each 4-row plot were harvested and graded on 5 Oct. Total precipitation in Hancock during the potato production season was 18.02 in. Supplemental irrigation was applied 42 times during the potato production season for an additional 15.7 in. All data were analyzed using ANOVA ($\alpha=0.05$) and Fisher's LSD at $\alpha=0.05$ (SAS Version 9.2).

The growing season was highly conducive to foliar early blight in the trial year. All programs significantly reduced foliar early blight when compared to the non-treated control. The program (Treatment 15) that included 2 applications of Provysol had the lowest RAUDPC of all fungicide programs. All fungicide programs had total plot yield (data not shown) and marketable yield greater than the non-treated control, but no significant differences across treatments. Nine programs Treatments 2-8, 16, and 17 had significantly fewer B size tubers than the non-treated control. Treatments 4-7, 14-17 had significantly fewer C size tubers than the non-treated control. There were no significant differences across programs for cull weight (data not shown).

Program number, treatment, and rate/A		Application timing ^z	Marketable Yield (cwt/A) ^y	Bs Weight (cwt/A) ^x	Cs Weight (cwt/A) ^w	RAUDPC ^v	
1	Non-treated Control	NA	454.9	54.7 f-h ^u	11.2 ef	0.440	h
	Bravo WS 6SC 1.5 pt	1,2,4,8					
2	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 DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	524.6	41.9 a-e	9.0 a-f	0.348	d-g
	Maxim MZ 0.5D 0.5 lb/cwt	Seed trt					
	Bravo WS 6SC 1.5 pt	1,2,4,8					
3	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 DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	546.5	35.5 a-c	8.3 a-e	0.270	ab
	Maxim MZ 0.5D 0.5 lb/cwt	Seed trt					
	Minuet 24 oz/A	In-furrow					
4	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 1.5 pt	5,7					
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	497.1	37.6 a-d	6.3 a	0.280	a-c
	Emesto Silver 118FS 0.31 fl oz/cwt + Nubark Mancozeb 1.0 lb/cwt	Seed trt					
	Serenade ASO 2 qt	In-furrow					
	Flint Extra 4.05SE 3.0 fl oz + Serenade ASO 2 qt	1,3					
5	Dithane DF75 2 lb	2					
	Echo Zn 4.17L 2 pt	4,6,8,9					
	Luna T 4.16SC 11.2 fl oz + Dithane DF75 2 lb	5					
	Scala 5SC 7.0 fl oz + Dithane DF75 2 lb	7					
	Echo Zn 4.17L 2.12 pt + Dithane DF75 2 lb	10	529.5	36.4 a-c	6.9 ab	0.320	a-f
	Emesto Silver 118FS 0.31 fl oz/cwt + Nubark Mancozeb 1.0 lb/cwt	Seed trt					
	Serenade ASO 2 qt	In-furrow					
	Flint Extra 4.05SE 3.0 fl oz + Serenade ASO 2 qt	1,3					
6	Dithane DF75 2 lb	2					
	Echo Zn 4.17L 2 pt	4,6,8,9					
	Luna T 4.16SC 11.2 fl oz + Dithane DF75 2 lb	5					
	Scala 5SC 7.0 fl oz + Dithane DF75 2 lb	7					
	Echo Zn 4.17L 2 pt + Dithane DF75 2 lb	10	521.8	34.8 ab	7.3 a-d	0.286	a-c

7	Emesto Silver 118FS 0.31 fl oz/cwt + Nubark Mancozeb 1.0 lb/cwt	Seed trt							
	Serenade ASO 2 qt	In-furrow							
	Flint Extra 4.05SE 3.0 fl oz	1,3							
	Dithane DF75 2 lb	2,10							
	Echo Zn 4.17L 2 pt	4,6,8,9							
	Luna T 4.16SC 11.2 fl oz + Dithane DF75 2 lb	5							
	Scala 5SC 7.0 fl oz + Dithane DF75 2 lb	7							
	Bravo WS 6SC 1.5 pt	1,3	542.9	32.2	a	6.6	ab	0.296	a-d
8	Emesto Silver 118FS 0.31 fl oz/cwt + Nubark Mancozeb 1.0 lb/cwt	Seed trt							
	Dithane DF75 2 lb	1-10	506.7	36.4	a-c	7.9	a-e	0.304	a-e
	Miravis Prime 3.33SC 11.4 fl oz + Dithane DF75 2 lb	1							
	Bravo WS 6SC 1.5 pt	2,4,6,8							
9	Omega 500F 8.0 fl oz + Bravo WS 6SC 1.5 pt	3							
	Miravis Prime 3.33SC 11.4 fl oz + Bravo WS 6SC 1.5 pt	5							
	Revus Top 48.3SC 5.5 fl oz + Bravo WS 6SC 1.5 pt	7							
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	524.3	43.5	a-f	7.9	a-e	0.325	b-g
	Howler 5.5 oz	In-furrow							
10	Howler 5 lb	1,3,5,7,9							
	Bravo WS 6SC 1.5 pt	2,4,6,8,10	460.2	44.9	b-g	11.1	ef	0.332	c-g
	Bravo WS 6SC 1.5 pt	1,2,4,8							
11	Miravis Prime 3.33SC 11.4 fl oz + Bravo WS 6SC 1.5 pt	3,6							
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7							
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	504.3	50.0	e-h	10.6	d-f	0.323	a-g
	Bravo WS 6SC 1.5 pt	1,2,4,8							
12	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	3,6							
	Miravis Prime 3.33SC 11.4 fl oz + Bravo WS 6SC 1.5 pt	5,7							
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	0,10	517.8	48.5	d-h	9.6	b-f	0.329	c-g
	Bravo WS 6SC 1.5 pt	1,2,4,8							
	Miravis Prime 3.33SC 11.4 fl oz + Bravo WS 6SC 1.5 pt	3							
13	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 DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	533.8	46.5	c-h	8.8	a-f	0.316	a-f

14	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							
	Miravis Prime 3.33SC 11.4 fl oz + Bravo WS 6SC 1.5 pt	5							
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	7							
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	555.0	44.6	b-g	7.1	a-c	0.307	a-e
15	Bravo WS 6SC 1.5 pt	1,2,4,8							
	Provsol 3.34SC 5.0 fl oz + Bravo WS 6SC 1.5 pt	3,6							
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7							
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	549.0	45.0	b-g	6.0	a	0.268	a
16	Reason 500SC 5.5 fl oz	1							
	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							
17	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	545.2	39.6	a-e	7.2	a-c	0.290	a-c
	Reason 500SC 8.2 fl oz	1							
	Bravo WS 6SC 1.5 pt	2,4,8							
	Priaxor 4.17SC 4.5 fl oz + Bravo WS 6SC 1.5 pt	3,6							
18	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7							
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	520.2	39.8	a-e	6.3	ab	0.307	a-e
	Reason 500SC 8.2 fl oz + Gavel 75DF 1.0 lb	1							
	Bravo WS 6SC 1.5 pt	2,4,8							
19	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 DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	498.2	57.3	h	10.3	c-f	0.358	e-g
	Gavel 75DF 1.5 lb	1							
20	Bravo WS 6SC 1.5 pt	1,2,4,8							
	Reason 500SC 5.5 fl oz + Gavel 75DF 2.0 lb	3,6							
	Endura 70WG 3.5 oz + Bravo WS 6SC 1.5 pt	5,7							
	Dithane DF75 2 lb + Super Tin 80WP 2.5 oz	9,10	519.9	50.2	e-h	8.5	a-f	0.377	g

21	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	514.5	55.6	gh	8.5	a-f	0.368 fg

^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, and 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 Size B potato tubers are of a size range between 1.5 and 2.25 in diameter.

^w Size C potato tubers are of a size range less than 1.5 in. in diameter.

^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.