

POTATO (*Solanum tuberosum* 'FL1879')
Potato late blight; *Phytophthora infestans*

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Evaluation of fungicide programs for potato late blight control: set B 2007.

Potatoes (cut seed, treated with Maxim FS at 0.16 fl oz/cwt) were planted at the Michigan State University Muck Soils Experimental Station, Bath, MI on 25 May into two-row by 25-ft plots (34-in row spacing), separated by a five-foot unplanted row and replicated four times in a randomized complete block design. Plots were irrigated as needed with sprinklers and were hilled immediately before sprays began. All rows were inoculated (3.4 fl oz/25-ft row) with a zoospore suspension of *Phytophthora infestans* [US8 biotype (insensitive to mefenoxam, A2 mating type)] at 10^4 spores/fl oz on 27 Jul. All fungicides in this trial were applied on a 7-day interval from 5 Jul to 22 Aug (8 applications) with an ATV rear-mounted R&D spray boom calibrated to deliver 25 gal/A (80 p.s.i.) using three XR11003VS nozzles per row. Weeds were controlled by hilling and with Dual 8E (2 pt/A on 25 May), Basagran (2 pt/A on 28 Jun and 11 Jul) and Poast (1.5 pt/A on 11 Jul). Insects were controlled with Admire 2F (20 fl oz/A at planting and on 28 Jun), Sevin 80S (1.25 lb/A on 11 and 25 Jul), Thiodan 3EC (2.33 pt/A on 1 and 21 Aug) and Pounce 3.2EC (8 oz/A on 11 Jul). Plots were rated visually for percentage foliar area affected by late blight on 30 Jul; 15, 22, 29 Aug and 5 Sep [14 days after final application (DAFA), 40 days after inoculation (DAI)] when there was about 100% foliar infection in the untreated plots. The relative area under the disease progress curve was calculated for each treatment from date of inoculation, 30 Jul to 5 Sep, a period of 36 days. Vines were killed with Reglone 2EC (1 pt/A on 6 Sep). Plots (2 x 25-ft row) were harvested on 17 Sep and individual treatments were weighed and graded. Samples of 50 tubers per plot were stored after harvest in the dark 50°F and incidence of tuber late blight was evaluated after 40 days. Meteorological variables were measured with a Campbell weather station located at the farm, latitude 42.8269 and longitude -84.365deg. Maximum, minimum and average daily air temperature (°F) were 88.0, 39.6 and 64.9 and 0-d with maximum temperature >90°F (May); 91.3, 36.1 and 66.6 and 2-d with maximum temperature >90°F (Jun); 95.2, 37.7 and 67.0 and 4-d with maximum temperature >90°F (Jul); 93.4, 36.3 and 68.7 and 4-d with maximum temperature >90°F (Aug); 90.0, 34.1 and 63.4 and 1-d with maximum temperature >90°F (Sep). Maximum, minimum and average daily soil temperature (°F) were 75.1, 53.1 and 65.8 (May); 82.1, 53.2 and 68.2 (Jun); 83.1, 53.7 and 65.3 (Jul); 80.5, 54.5 and 67.1 (Aug); 77.1, 51.3 and 66.4 (Sep). Maximum, minimum and average soil moisture (% of field capacity) were 79.0, 75.2 and 77.3 (May); 91.7, 77.2 and 81.3 (Jun); 82.1, 74.1 and 77.9 (Jul); 98.1, 75.4 and 80.7 (Aug); 76.2, 66.6 and 69.8 (Sep). Precipitation was 0.99 in. (May), 3.91 in. (Jun), 0.80 in. (Jul), 6.18 in. (Aug) and 1.09 in. (Sep). The total number of late blight disease severity values (DSV) over the disease development period was 62 using 90% ambient %RH as a base for DSV accumulation. Plots were irrigated to supplement precipitation to about 0.1 in./A/4 day period with overhead sprinkle irrigation.

Late blight developed steadily after inoculation and untreated controls reached 100% foliar infection by 5 Sep. Up to 40 DAI, all fungicide programs reduced foliar late blight significantly compared to the untreated control and up to 26 DAI were not significantly different from each other. On 29 Aug, 33 DAI, programs with 4.3 to 12.5%, 5.5 to 13.8% and 7.5 to 16.3% foliar late blight were not significantly different. On 5 Sep, 40 DAI, programs with 18.8 to 36.3%, 26.3 to 45.0%, 33.8 to 51.3% and 73.8% foliar late blight were not significantly different. All fungicide programs significantly reduced the average amount of foliar late blight over the season (RAUDPC, 0 to 40 DAI) compared to the untreated. Application programs with RAUDPC values from 3.0 to 6.4, 4.4 to 7.6, 4.7 to 8.1, 6.1 to 9.2 and 9.2 to 11.8 were not significantly different. There were no significant differences in marketable or total yield among treatments. There were no significant differences in the incidence of tuber late blight 60 days after harvest among treatments. Phytotoxicity was not noted in any of the treatments.

Treatment and rate/A	Foliar late blight (%)					Yield (cwt/A)		Tuber blight (%) ^w
	5 Aug 9 DAI ^z	22 Aug 26 DAI	29 Aug 33 DAI	5 Sep 40 DAI 5 DAFA ^y	RAUDPC Max = 100 ^x 0 - 40 DAI	US1	Total	
Revus Opti 3.67SC 2.5 pt + 0.125% NIS (A,B,C,D) ^y ; BravoWS 6SC 1.5 pt (E,F,G,H,I)	0.3b ^u	1.0b	5.5cd	18.8f	3.2f	350	421	0.6
Revus Top 4.17SC 5.5 fl oz + 0.125% NIS (A,B,C,D); BravoWS 6SC 1.5 pt (E,F,G,H,I)	1.0b	2.5b	12.5bcd	30.0def	6.1c-f	294	368	0.6
Revus Top 4.17SC 7.0 fl oz + 0.125% NIS (A,B,C,D); BravoWS 6SC 1.5 pt (E,F,G,H,I)	1.3b	3.5b	13.8bc	45.0cd	8.1cd	297	367	0.0
Quadris Opti 1.6 fl oz (A,C); Revus Top 4.17SC 5.5 fl oz + 0.125% NIS (B,D); BravoWS 6SC 1.5 pt (E,F,G,H,I)	2.0b	5.0b	13.8bc	51.3c	9.2bc	306	377	0.0
Forum 3.6SC 6 fl oz + Dithane RS 1.5 lb (A,B,D,F,H); Dithane RS 1.5 lb (C,E,G,I)	0.0b	1.5b	6.5cd	31.3c-f	4.6ef	333	415	0.6
Forum 3.6SC 6 fl oz + COC 8.0 fl oz (A,B,D,F,H); Dithane RS 1.5 lb (C,E,G,I)	0.0b	1.5b	8.3bcd	26.3def	4.4ef	311	377	0.6
Forum 3.6SC 6 fl oz + Dithane RS 1.5 lb + COC 8.0 fl oz (A,B,D,F,H); Dithane RS 1.5 lb + COC 8.0 fl oz (C,E,G,I)	0.0b	1.0b	7.5bcd	30.0def	4.6ef	323	388	0.6
MicroFlo Chlorothalonil 6SC 1.5 pt (A-I)	0.0b	1.3b	5.8cd	26.3def	3.9f	298	382	0.6
BravoWS 6SC 1.5 pt (A,C,E,F,G,H,I)								
Evito 4SC 3.8 fl oz + 0.125% NIS (B,D)	0.3b	2.5b	10.0bcd	40.0cde	6.4c-f	301	378	1.3
BravoWS 6SC 1.5 pt (A,C,E,F,G,H,I)								
Evito 4SC 1.9 fl oz + 0.125% NIS (B,D)	0.8b	3.3b	12.0bcd	45.0cd	7.6cde	305	369	0.0
Polyoxin D 2.5 WDG 2 lb (A-I)	1.3b	5.5b	16.3b	73.8b	11.8b	300	378	0.0
Dithane RS 2.0 lb (A-I)	0.5b	2.3b	8.8bcd	35.0c-f	5.7def	302	376	0.0
Echo ZN 2.125 pt (A-I)	0.3b	2.3b	8.3bcd	35.0c-f	5.5def	330	401	0.0
Echo 720 1.5 pt (A-I)	0.3b	1.5b	11.3bcd	36.3c-f	6.1c-f	313	387	1.9
SA 010903 4SC 1.5 pt (A-I)	0.0b	1.0b	4.3d	20.0ef	3.0f	298	375	0.0
Untreated	4.8a	32.5a	75.0a	100a	32.1a	236	331	0.0
HSD _{0.05}	2.64	4.86	9.37	20.03	3.51	88.8	97.3	2.79

^z Days after inoculation with *Phytophthora infestans*, US8, A2.

^y Days after final application of fungicide.

^x RAUDPC, relative area under the disease progress curve calculated from day of inoculation to last evaluation of late blight.

^w Incidence of tuber late blight after storage at 50°F.

^v Application dates: A= 5 Jul; B= 12 Jul; B= 20 Aug; D= 28 Aug; E= 3 Aug; F= 10 Aug; G= 17 Aug; H= 24 Aug; I= 31 Aug.

^u Values followed by the same letter are not significantly different at $p = 0.05$ (Tukey Multiple Comparison).