

POTATO (*Solanum tuberosum* 'Russet Norkotah')
Potato early blight; *Alternaria solani*
Brown leaf spot; *Alternaria alternata*

W. W. Kirk, R. L. Schafer, P. Tumbalam
and P. Wharton.
Department of Plant Pathology
Michigan State University
East Lansing, MI 48824

Evaluation of fungicide programs for potato early blight and brown leaf spot control, 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 fungicides in this trial were applied on a 7-day interval from 5 Jul to 29 Aug (9 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 early blight and brown leaf spot on 15, 22, 29 Aug and 5 Sep [7 days after final application (DAFA)]. The relative area under the disease progress curve was calculated for each treatment from 5 Aug to 5 Sep, a period of 31 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. 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.

Early blight and brown leaf spot (*Alternaria* complex) developed steadily in about equal proportions and untreated controls reached about 65% foliar infection by 5 Sep. Up to 5 Aug, fungicide programs with 0% *Alternaria* complex were significantly different from the untreated control. *Alternaria* developed to 8% by 22 Aug in the untreated control and programs with less than 1.5% *Alternaria* complex were significantly different to the untreated control but not from any other treatment. *Alternaria* developed to 20.0% in the untreated control by 29 Aug. Programs with 2.0 to 12.5%, 2.5 to 13.3% and 11.3 to 20.0% *Alternaria* complex were not significantly different. *Alternaria* developed to 63.8% in the untreated control by 5 Sep. All treatments had significantly less *Alternaria* complex in comparison to the untreated control. Programs with 7.3 to 27.5% and 11.3 to 32.5% *Alternaria* complex were not significantly different. All fungicide programs significantly reduced the average amount of *Alternaria* complex over the season (RAUDPC, 0 to 31 days after the first evaluation) compared to the untreated control. Application programs with RAUDPC values from 1.2 to 5.7 and 1.4 to 6.7 were not significantly different. There were no significant differences in marketable or total yield among treatments. *Alternaria* tuber blight was not observed after harvest. Phytotoxicity was not noted in any of the treatments. The Penncozeb plus Super Tin program was not within label guidelines and was included to determine if the addition of Penncozeb could ameliorate potential phytotoxic effects associated with Super Tin 80WDG.

Treatment and rate/A	Foliar early blight and brown leaf spot (%)				RAUDPC Max = 100 ^y 0 - 40 DAI	Yield (cwt/A)	
	5 Aug	22 Aug	29 Aug	5 Sep 7 DAFA ^z		US1	Total
Sonata 500SC 4.0 pt + Dithane RS 75DF 1.5 lb + Biotune 1EC 4.5 fl oz (A,C,E ^x); Headline 2.08EC 6 fl oz (B,D,F).....	0.0b ^w	0.8ab	4.3b	12.5bcd	2.2b	240abc	361a
Headline 2.08EC 9.0 fl oz (A,E,H); Bravo ZN 6SC 1.5 pt (B,D,F,I); Endura 70WDG 2.5 oz (C,G).....	0.0b	0.3b	2.8b	8.8cd	1.4b	268a	384a
Penncozeb 75DF 2.0 lb (A,B,C,D,E); Penncozeb 75DF 2.0 lb + Super Tin 80WP 5 oz (F,G,H,I).....	0.5ab	4.8ab	12.5ab	31.3bc	6.5ab	254abc	384a
BravoWS 6SC 1.5 pt (A,C,E,F,G,H,I) Evito 4FL 3.8 fl oz + 0.125% NIS (B,D).....	0.3ab	1.8ab	5.8b	20.0bcd	3.5b	223abc	333a
BravoWS 6SC 1.5 pt (A,C,E,F,G,H,I) Evito 4FL 1.9 fl oz + 0.125% NIS (B,D).....	0.0b	2.0ab	5.8b	22.5bcd	3.7b	247abc	375a
Polyoxin D 2.5 WP 2.0 lb (A-I).....	0.5ab	4.0ab	13.3ab	32.5b	6.7ab	236abc	367a
LEM 17 200EC 9.6 fl oz (A-I).....	0.5ab	3.8ab	11.3ab	27.5bcd	5.7b	209abc	334a
LEM 17 200EC 16.8 fl oz (A-I).....	0.3ab	0.5b	5.0b	12.5bcd	2.4c	230abc	344a
LEM 17 200EC 24.0 fl oz (A-I).....	0.3ab	2.8ab	6.8b	20.0bcd	3.9b	238abc	358a
LEM 17 200SC 16.8 fl oz (A-I).....	0.3ab	0.5b	2.5b	11.3bcd	1.8b	210abc	349a
LEM 17 200SC 24.0 fl oz (A-I).....	0.0b	0.5b	2.0	7.3d	1.2b	212abc	329a
Tanos 50 WDG 6.0 oz + Manzate 75DF 1.5 lb (A,C,E); Manzate 75DF 1.5 lb (G); Endura 2.5 oz (B,D,F,H).....	0.0b	0.5b	3.3b	8.8cd	1.6b	258ab	364a
Untreated.....	1.5a	8.0a	20.0a	63.8a	12.1a	192c	327a
HSD _{0.05}	1.34	7.33	11.21	23.27	5.81	53.7	74.8

^z Days after final application of fungicide.

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

^x Application dates: A= 5 Jul; B= 12 Jul; B= 19 Aug; D= 25 Aug; E= 1 Aug; F= 8 Aug; G= 15 Aug; H= 22 Aug; I = 29 Aug.

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