

POTATO (*Solanum tuberosum* L. 'FL1879')
Late blight; *Phytophthora infestans*

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Evaluation of Headline, Ranman, EBDC and chlorothalonil-based programs for potato late blight control, 2002.

Potatoes [cut seed, treated with Maxim MZ 0.5D (0.5 lb/cwt)] were planted at the Michigan State University Muck Soils Experimental Station, Bath, MI on 5 Jun 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 23 Jun to 21 Aug (9 applications) with an ATV rear-mounted R&D spray boom delivering 25 gal/A (80 p.s.i.) and using three XR11003VS nozzles per row. Weeds were controlled by hilling and with Dual 8E (2 pt/A on 20 Jun), Basagran (2 pt/A on 20 Jun and 15 Jul) and Poast (1.5 pt/A on 28 Jul). Insects were controlled with Admire 2F (20 fl oz/A at planting on 15 Jun), Sevin 80S (1.25 lb/A on 1 and 28 Jul), Thiodan 3EC (2.33 pt/A on 1 and 21 Aug) and Pounce 3.2EC (8 oz/A on 28 Jul). Plots were rated visually for percentage foliar area affected by late blight on 27 Jul; 6, 12, 20, 27 Aug [6 days after final application (DAFA)] and 7 Sep (17 DAFA) when there was 100% foliar infection in the untreated plots. The relative area under the disease progress curve was calculated for each treatment from date of inoculation, 27 Jul to 7 Sep, a period of 42 days. Vines were killed with Reglone 2EC (1 pt/A on 8 Sep). Plots (2 x 25-ft row) were harvested on 5 Oct and individual treatments were weighed and graded. Maximum and minimum air temperature (°F) were 92.1 and 64.4 (Jun), 92.5 and 72.5 (Jul), 88.7 and 68.6 (Aug) and 91.3 and 64.8. Maximum and minimum soil temperature (°F) were 82.0 and 70.8 (Jun), 84.6 and 74.2 (Jul), 84.3 and 74.2 (Aug) and 82.3 and 69.3 (to 7 Sep). Precipitation was 0.32" (Jun), 1.14" (Jul), 0.41" (Aug) and 0.0" (to 7 Sep). Plots were irrigated to supplement precipitation to about 1"/A/4 day period with overhead sprinkler irrigation.

Late blight developed slowly after inoculation then rapidly during Aug and untreated controls reached 100% foliar infection by 7 Sep. From 50% emergence to harvest, 100 late blight disease severity values were accumulated (base 80% ambient relative humidity). Taking 31 days after inoculation (DAI) as a key reference point, all fungicide programs reduced the foliar late blight significantly compared to the untreated control. Programs 12 and 15 had significantly greater foliar late blight than programs with less than 1.75% foliar late blight. Taking 42 DAI as a key reference point, there was complete defoliation of the untreated control due to late blight and all fungicide programs had significantly less foliar late blight than the untreated control. Program 12 had significantly greater foliar late blight than all other programs except 1 and 15. Programs 1 and 15 had significantly greater foliar late blight than late blight programs with 5.0% foliar late blight. Programs 2, 5, 11 and 22 had significantly more foliar late blight than programs with less than 3.75% foliar late blight. All other programs were not significantly different from each other. All fungicide programs significantly reduced the average amount of foliar late blight over the season (RAUDPC, 0 to 37 DAI) compared to the untreated control. Application programs 12 had a significantly higher RAUDPC value than all other programs with values below 0.6. All other programs except program 15 had RAUDPC values < 1.19 and were not significantly different from each other. All programs had significantly greater US1 yield compared to the untreated control. There were no significant differences between programs with US1 yield from 245 to 278 cwt/A and programs with US1 yield from 229 to 260 cwt/A. All programs except program 19 had significantly greater total yield compared to the untreated control. There were no significant differences between programs with total yield from 292 to 333 cwt/A and programs from 316 to 358 cwt/A. Phytotoxicity was not noted in any of the treatments.

Treatment and rate/A	Foliar late blight (%)		RAUDPC ^x	Yield (cwt/A)	
	31 DAI ^z	42DAI	0 - 42 DAI	US1	Total
	6 DAFA ^y	13 DAFA			
1 Echo ZN 6SC 2.13 pt (A,B,C,D,E,F,G,H,I) ^w	2.62 bcd ^y	9.00 bc	1.19 bcd	275 a	357 a
2 Echo ZN 6SC 1.5 pt + Quadris 2.08SC 0.28 pt (A,C) Echo ZN 6SC 1.5 pt (B,D,E,H,I)					
Polyram 80WP 2.0 lb + Super Tin 80WP 0.23 lb (F,G).....	1.60 cd	6.50 cd	0.81 bcd	278 a	354 a
3 Echo ZN 6SC 2.13 pt (A,B,D,F,H,I);Gem 50WP 0.19 lb (C,E,G).....	1.75 cd	5.00 de	0.73 bcd	259 abcd	342 ab
4 Ranman 40SC 0.13 pt + Silwet I-77 6SC 0.1 pt (A,B,C,D,E,F,G,H,I).....	1.75 cd	5.00 de	0.72 bcd	240 bcd	318 abc
5 Ranman 40SC 0.17 + Silwet I-77 6SC 0.1 pt (A,B,C,D,E,F,G,H,I).....	3.25 bc	6.50 cd	1.11 bcd	246 abcd	316 abc
6 Ranman 40SC 0.13 pt + Silwet I-77 6SC 0.1 pt (A,B,D,F,H,I) BAS536F 18.7 WP 1.66 lb (C,E,G).....	0.87 cd	4.50 de	0.53 cd	237 cd	323 abc
7 Ranman 40SC 0.17 pt + Silwet I-77 6SC 0.1 pt (A,B,D,F,H,I) BAS536F 18.7 WP 1.66 lb (C,E,G).....	0.80 d	3.25 e	0.41 cd	276 a	344 ab
8 Ranman 40SC 0.13 pt + Silwet I-77 6SC 0.1 pt (A,D,G) Headline 2SC 0.77 pt (B,E,H) BAS550 50WP 0.4 lb + Polyram 80WP 2.0 lb (C,F,I).....	0.77 d	2.50 e	0.34 cd	273 ab	337 ab
9 Ranman 40SC 0.13 pt (A,C,E,G,I); Headline 2SC 0.77 pt (B,D,F,H).....	1.07 cd	3.75 e	0.49 cd	264 abc	335 ab
10 Headline 2SC 0.77 pt (A,C); Bravo WS 6SC 1.5 pt (B,H) Polyram 80WP 2.0 lb + Agri Tin 80WP 0.16 lb (D,E,F,G,I).....	1.58 cd	4.75 de	0.73 bcd	269 ab	335 ab
11 Headline 2SC 0.77 pt (A,C); Bravo WS 6SC 1.5 pt (B,H) Polyram 80WP 2.0 lb + Acrobat 50WP 0.4 lb (D,E,F,G,I).....	2.35 bcd	6.75 cd	0.97 bcd	237 cd	321 abc
12 Bravo WS 6SC 1.5 pt (A,C,E,G,I) Messenger 3WDG 0.38 lb (B,D,F,H).....	4.25 b	13.00b	1.90 b	258 abcd	340 ab
13 Bravo WS 6SC 1.5 pt + Champ DP 4.6FL2.67 pt (A,B,C,D) Dithane RS 75DF 1.5 lb + Champ DP 4.6FL2.0 pt + Agri Tin 80WP 0.13 lb (E,F,G,I).....	1.12 cd	3.00 e	0.45 cd	230 cd	306 bc
14 Bravo WS 6SC 1.5 pt + Champ DP 4.6FL2.67 pt (A,B,C,D) Dithane RS 75DF 1.5 lb + Champ DP 4.6FL2.0 pt + Phostrol 53.6SC 8.0 pt (E,F,G,I).....	0.83 cd	2.00 e	0.31 cd	260 abcd	337 ab
15 Bravo WS 6SC 1.5 pt + Champ DP 4.6FL2.67 pt (A,B,C,D) Champ DP 4.6FL2.0 pt + Phostrol 53.6SC 8.0 pt (E,F,G,I).....	4.25 b	9.00 bc	1.53 bc	237 cd	324 abc
16 Quadris 2.08SC 0.4 pt + Bravo WS SC 1.5 pt (A) Bravo WS 6SC 1.5 pt + Champ DP 4.6FL2.67 pt (B,D) Bravo WS 6SC 1.5 pt + Acrobat 50WP 0.4 lb (C,H) Dithane RS 75DF 1.5 lb + Champ DP 4.6FL2.0 pt + Agri Tin 80WP 0.16 lb + Phostrol 53.6SC 8.0 pt (E,F,G,I).....	0.65 d	1.50 e	0.24 d	251 abcd	327 abc
17 Quadris 2.08SC 0.4 pt + Equus SC 1.5 pt (A); Equus SC 1.5 pt (B,D) Equus SC 1.5 pt + Acrobat 50WP 0.4 lb (C,H) Equus SC 1.5 pt + Kocide4.5FL 2.67 pt (E,F,G,I).....	1.75 cd	5.25 cde	0.73 bcd	247 abcd	317 abc
18 Quadris 2.08SC 0.4 pt + Equus SC 1.5 pt (A,C,E); Equus SC 1.5 pt (B,D) Manzate 75WP 2.0 lb + Super Tin 80WP 0.16 lb (F,G,H,I).....	0.70 d	2.00 e	0.29 cd	245 abcd	308 bc
19 Quadris 2.08SC 0.4 pt + Equus SC 1.5 pt (A,C,E) Equus SC 1.5 pt (B,D) Equus SC 1.5 pt + Super Tin 80WP 0.16 lb (F,G,H,I).....	1.20 cd	4.75 de	0.60 cd	229 d	292 cd
20 Headline 2SC 0.77 pt + Polyram 80WP 2.0 lb (A,B,C) Ranman 40SC 0.13 pt + Polyram 80WP 2.0 lb (D,E,F,G) Polyram 80WP 2.0 lb + Agri Tin 80WP 0.16 lb (H,I).....	1.20 cd	3.50 e	0.50 cd	241 bcd	309 bc
21 Headline 2SC 0.77 pt + Polyram 80WP 2.0 lb (A,B,C) Acrobat 50WP 0.4 lb + Polyram 80WP 2.0 lb (D,E,F,G) Polyram 80WP 2.0 lb + Agri Tin 80WP 0.16 lb (H,I).....	1.25 cd	4.00 de	0.57 cd	273 ab	348 ab
22 Headline 2SC 0.77 pt + Polyram 80WP 2.0 lb (A,B,C) Curzate 60DF 0.2 lb + Polyram 80WP 2.0 lb (D,E,F,G) Polyram 80WP 2.0 lb + Agri Tin 80WP 0.16 lb (H,I).....	1.50 cd	8.75 cd	0.99 bcd	234 cd	316 abc
23 Headline 2SC 0.77 pt + Polyram 80WP 2.0 lb (A,B,C) Previcur 6SC 1.2 pt + Polyram 80WP 2.0 lb (D,E,F,G) Polyram 80WP 2.0 lb + Agri Tin 80WP 0.16 lb (H,I).....	0.92 cd	4.00 de	0.52 cd	264 ab	333 abc
24 Untreated.....	83.75a	100.0a	27.86a	182 e	263 d

^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. Maximum value of 100.

^w Application dates: A= 23 Jun; B= 1 Jul; C= 8 Jul; D= 15 Jul; E= 22 Jul; F= 30 Jul; G= 7 Aug; H= 14 Aug; I= 21Aug.

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

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