

POTATO (*Solanum tuberosum* 'Lamoka')
Early Blight; *Alternaria solani*
Brown Spot; *Alternaria alternata*

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Evaluation of in-furrow and foliar fungicides to manage foliar diseases of potato in Michigan, 2023.

Experimental and commercially available fungicides were tested to determine their efficacy in managing potato early blight and brown spot. A field trial was established at the Montcalm Research Center in Stanton, MI. A randomized complete block design was used, and treatments were replicated four times. Soil type is a loamy sand. US#1 'Lamoka' potatoes were cut into 2-oz seed pieces and left to suberize. Seed was treated 23 May via slurry (3.2 fl oz/cwt) in a cement mixer. The trial was hand planted 25 May, and in-furrow treatments were applied before closing rows. A CO₂-powered backpack sprayer, equipped with TJ2503E nozzles, was used to apply fungicides in-furrow at 6 gal/A (43 psi). Plots were two rows wide (34-in row spacing) by 20 ft long and seeded at 1.2 seed/row-ft. On 29 Jun, banded applications were made before re-hilling plots using a CO₂-powered backpack sprayer, equipped with TJ2504 nozzles (40 PSI) at 20 gal/A. Due to the trial's proximity to commercial potato fields, a blanket application of Manzate Max (1.6 qt/A) or Orondis Ultra (5.5 fl oz/a) was applied weekly after row-closure to the entire trial to reduce the risk of late blight developing near commercially grown potatoes. Beginning at 50% row closure, six foliar applications (D, E, F, G, H, and I) were made across programs on 4 Jul, 11 Jul, 18 Jul, 25 Jul, 31 Jul, and 9 Aug. Foliar fungicides were applied at a volume of 20 gal/A (38 psi) via CO₂-powered backpack sprayer (TJ8004XR nozzles). Plots were inoculated on 19 Jul with an *A. solani* solution (8x10³ conidia/mL) at a volume of 20 gal/A using the previously mentioned equipment. Stand establishment was monitored and foliar disease data (combined early blight and brown spot observations) were collected regularly throughout the growing season. The trial was harvested 9 Oct, and both rows were dug and later graded. The final disease incidence (DI), disease severity (DS), estimated yield, and estimated marketable yield (cwt/A) were compared among treatments. A generalized linear mixed model procedure was used to conduct the ANOVA and mean separations at the $\alpha=0.05$ significance level (SAS version 9.4).

Disease pressure was moderate, and differences were observed among the foliar DI ($P < 0.0001$) and foliar DS ($P < 0.0001$) values of programs. All treated programs had significantly lower incidence (30.0-71.3%) and severity (3.5-7.0%) values than the control (DI=87.5%, DS=12.5%). The lowest DI and DS were both observed in program 11, but the values were not significantly different from many of the other programs. No significant differences were observed in yield or marketable yield. It is likely that the short infection duration due to late disease onset was not adequate time to observe differences among program yields.

No.	Treatment (Rate ^z) Timing ^y	Disease Incidence (%) ^{x,w}		Disease Severity (%) ^w		Total Yield (cwt/A)	Marketable Yield (cwt/A)
1	Treated Control ^v	87.5	a	12.5	a	353.4	324.4
2	Exp ^u 1 (13 fl oz) B; Propulse (10 fl oz) E; Scala 60 SC (7 fl oz) G	55.0	c-e	7.0	b	313.7	291.1
3	Exp 1 (13 fl oz) B; Propulse (10 fl oz) E; Luna Tranquility (11.2 fl oz) G	53.8	c-e	5.0	b-e	334.9	310.7
4	Elatus (6.4 oz) B; Miravis Prime (10 fl oz) EG	71.3	b	5.8	b-d	378.3	351.5
5	Exp 1 (13 fl oz) B; Endura (5.5 oz) EG; Provysol (4 fl oz) EG	43.8	e-h	5.0	b-e	355.8	324.9
6	Exp 1 (13 fl oz) B; Delaro (8 fl oz) D; Luna Tranquility (11.2 fl oz) G	58.8	b-d	4.5	c-e	338.9	311.1
7	Exp 1 (13 fl oz) B; Quadris (9 fl oz) D; Miravis Prime (10 fl oz) G	46.3	c-g	5.0	b-e	361.7	334.6
8	Elatus (6.4oz) B; Quadris (9 fl oz) D; Omega (8 fl oz) E; Miravis Prime (10 fl oz) G	60.0	bc	6.5	bc	332.3	301.1
9	Exp 1 (13 fl oz) B; Headline (9 fl oz) D; Endura (5.5oz) EG; Provysol (4 fl oz) EG	37.5	f-h	4.0	de	333.6	303.0
10	Exp 1 (13 fl oz) B; Velum Prime (6.5oz) E; Scala 60 SC (7 fl oz) G	50.0	c-g	5.0	b-e	357.7	332.8
11	CruiserMaxx Vibrance Potato (0.5 fl oz/ cwt) A; Elatus (6.4oz) B; Omega (8 fl oz) E; Miravis Prime (11.4 fl oz) FH; Revus Top (7 fl oz) I	30.0	h	3.5	e	346.6	314.9
12	Emesto Silver (0.31 fl oz/ cwt) A; Velum Prime (6.5 fl oz) B; Luna Tranquility (11.2 fl oz) EFH; Scala (7 fl oz) I	46.3	c-g	4.5	c-e	348.1	315.9
13	EXP-2 (10 fl oz) B	45.0	d-g	5.0	b-e	301.8	283.3
14	Topguard (28 fl oz) B	36.3	gh	4.0	de	295.4	280.9
15	Adastrio (18 fl oz) C	51.3	c-f	5.0	b-e	342.3	314.1
16	Topguard (28 fl oz) C	53.8	c-e	5.0	b-e	335.9	312.2
17	Adastrio (9 fl oz) EG; Super Tin (5 fl oz) I; Endura (7oz) I	42.5	e-h	5.3	b-e	317.1	285.2
18	Luna Tranquility (11.2 fl oz) EG; Super Tin (5 fl oz) I; Endura (7oz) I	60.0	bc	5.0	b-e	312.1	286.3

^z All rates are listed as a measure of product per acre, unless otherwise specified. MasterLock was added to all foliar tank mixes at a rate of 0.25 % v/v.

^y Application letters code for the following dates: A=23 May (seed treatment), B=25 May (in-furrow), C=29 Jun (re-hill), D=4 Jul, E=11 Jul, F=18 Jul, G=25 Jul, H=31 Jul, and I=9 Aug.

^x Column values followed by the same letter were not significantly different based on Fisher's Protected LSD ($\alpha=0.05$). If no letter, then means were not significantly different.

^w Final foliar disease incidence and severity ratings (combined early blight and brown spot) collected 7 Sep.

^v A blanket application of Manzate Max (1.6 qt/A) or Orondis Ultra (5.5 fl oz/a) was applied weekly to the entire trial to reduce the risk of late blight development.

^u Exp=Experimental compound.