POTATO (*Solanum tuberosum)* 'Russet Norkotah'
Pythium leak; *Pythium ultimum*

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Evaluation of in-furrow and foliar treatments for the control of potato Pythium leak in Idaho, 2012.

Russet Norkotah seed potatoes were hand cut on 11 May 2011 and planted on 21 May into 2-row x 20 ft-long plots (ca. 12 in. between plants to give a target population of 50 plants at 36 in. row spacing) replicated four times in a randomized complete block design. Treatment rows were separated by 5 ft-long empty (plant free) plots. In-furrow applications were made over the seed at planting, applied with a single nozzle R&D spray boom delivering 16 gal/A (40 p.s.i) and using one XR11003VS nozzle/row. Fertilizer (220 units P_2O_5 + 10 units Zn + 5 units Mn + 110 units N) was drilled into plots before planting, formulated according to the results of soil tests. Additional nitrogen (10-34 at 40lbs/A) was applied to the growing crop with irrigation based on the results of petiole sampling which was carried out periodically during the growing season. Weeds were controlled with herbicide (1.5 oz/A Matrix + 0.67 lb/A Sencor) which was applied post planting on 18 June. Insecticide (Admire, 16.9 oz/A) was applied at hilling on 13 June. Vines were killed with Reglone 2EC (1.0 pt/A on 24 September). Emergence was rated as the number of plants breaking the soil surface or fully emerged after planting. Emergence was first observed on 19 June and full emergence was observed on 27 June. Plant stand was rated for in-furrow treatments on 27 June. Final Plant Stand was expressed as the percentage of emerged plants divided by the expected number based on the planting rate. Applications were made at planting in-furrow (21 May), at hilling (13 June), at full bloom (25 July), when tubers were golf ball sized (1 August) and then on a 14-day interval after that on 8, 22 August and 5 September with an ATV rear-mounted R&D spray boom calibrated to deliver 25 gal/A (40 p.s.i.) using two XR8003VS nozzles per row. Plots were inoculated with Pythium shortly before hilling with Pythium-infected seed pieces. Infected seed pieces were placed between rows at about 1 seed piece per 2 plants and were incorporated into the soil at hilling. To encourage disease, Pythium plots were irrigated biweekly to maintain soil moisture at or above soil water retention capacity. Plots were further inoculated with Pythium on 3 Aug and 20 September as follows. Liquid cultures of *P. ultimum* were grown in Potato Dextrose Broth for 7 days prior to inoculation. On the day of inoculation, plots were irrigated heavily for 8 hrs so that standing water was visible in the furrows and the soil was at maximum moisture capacity. Concurrently, the Pythium cultures were blended to break up mycelia and oospores. The suspension was passed through cheese cloth and collected in 4 L conical flasks. The concentration of oospores in the resulting suspension was counted using a hemacytometer and adjusted to ca. 1 x 10^4 oospores ml^{-1}. Each 4L flask of suspension was then added to a 3 gallon spray canister and adjusted to 3 gallons. One 3 gallon spray canister was then used to inoculate each treatment replicate (equivalent to 540ft per row) resulting in 12 gallons of inoculum applied to all treatment plots. The inoculum was applied using the ATV rear mounted R&D spray boom after irrigation in the late afternoon. Tubers were harvested on 8 October and graded from 1-3 November. At grading, disease tubers were segregated and weighed. Samples of 25 healthy-looking US No.1 (6-10 oz.) tubers/plot were also retained and placed in storage at 50 °F. On 13 December 2012, storedtubers were placed in mesh onion sacks and inoculated with Pythium by immersion in a Pythium suspension at 72 °F. Tubers were left in the Pythium suspension for 24 h, then placed in storage at 50°F. Tubers were incubated for 3 weeks and evaluated on 2 January 2013 for Pythium incidence and severity. Severity was calculated as the volume of diseased tissue per tuber which was estimated visually by cutting the tuber in half lengthwise, from the stem end to bud end.

None of the fungicides applied at planting in-furrow resulted in significantly different RAUEPC compared to the untreated control plots. There were no significant differences in total yield among plots. At harvest, there were significant differences in the percentage of diseased tubers among treatments and the untreated check. At harvest, all treatments with less than 2.4 percent disease (by weight) had significantly less disease than the untreated control. After challenge inoculation and 3 weeks in storage, all treatments had significantly less disease severity than the untreated control.

Number	Treatment and rate/a (application times)[z]	Emergence (%)[y]	Yield (cwt/a) 4-6 oz	6-10 oz	> 10 oz	Postharvest disease (% weight[x])	Incidence (%)	Severity (%)
1	Resist 57 SC 10 pt (C, D, E)	86.3 a[w]	57.0 a	89.1 a	102.3 a	3.1 ab	75.0 a	13.4 b
2	Ridomil Gold 4SL 6.1 fl oz (A)	-[v]	47.9 a	84.8 a	102.4 a	5.1 ab	63.3 a	18.0 b
3	Ridomil Gold Bravo SC 2.5 pt (C, E)	92.0 a	50.2 a	69.7 a	95.3 a	5.2 ab	73.0 a	25.4 b
4	Ranman SC 6.1 fl oz (A); Ranman SC 2.75 fl oz (B, C)	94.2 a	32.9 a	86.8 a	76.2 a	4.2 ab	86.0 a	16.5 b
5	Ridomil Gold 4SL 6.1 fl oz (A); Ridomil Gold MZ WG 2.5 lb (D)	92.4 a	57.2 a	99.7 a	152.2 a	2.5 ab	73.0 a	19.7 b
6	Ranman SC 6.1 fl oz (A); Ranman SC 2.75 fl oz (B); Ridomil Gold MZ WG 2.5 lb (D)	97.5 a	46.3 a	98.5 a	139.0 a	2.1 b	55.0 a	15.4 b
7	GWN-4700 WP 6 oz wt + Moncut 70DF 1lb (A)	93.7 a	51.0 a	119.6 a	149.6 a	2.6 ab	44.1 a	13.2 b
8	Resist 57 SC 10 pt (C, E, F); Gavel DF 2 lb (F, G)	92.4 a	59.1 a	111.4 a	73.2 a	2.9 ab	63.7 a	19.3 b
9	Ranman SC 6.1 fl oz (A); Resist 57 SC 10 pt (C, E, F)	87.3 a	59.6 a	114.6 a	116.5 a	2.9 ab	62.1 a	16.7 b
10	Presidio SC 0.125 lb ai (A); Resist 57 SC 10 pt (C, E, F)	95.7 a	58.5 a	98.3 a	123.9 a	2.4 b	64.0 a	14.2 b
11	Presidio SC 0.125 lb ai (A, C, E)	86.3 a	32.9 a	76.1 a	120.8 a	4.8 ab	58.0 a	20.0 b
12	Untreated control check	95.6 a	37.0 a	101.9 a	111.1 a	7.8 a	70.0 a	43.7 a
	Tukey's $HSD_{0.05}$	24.70	45.28	72.61	97.44	5.45	45.62	17.65

[z]Application dates: A = 21 May; B = 13 June; C = 25 July; D = 1 Aug; E = 8 Aug; F = 22 Aug; G = 5 Sept.
[y]Final emergence count taken on 27 June.
[x]Percentage weight of diseased potatoes out of the total yield.
[w]Values followed by the same letter are not significantly different at p=0.05 (Tukey's HSD).
[v]"-" denotes values that were not collected.