POTATO (*Solanum tuberosum* 'Chieftain,' 'Yukon Gold')
Early blight; *Alternaria solani*
Black dot; *Colletotrichum coccodes*
Black scurf; *Rhizoctonia solani*
Silver scurf; *Helminthosporium solani*

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Combination of seed piece and foliar fungicides to improve tuber appearance and early blight control in potato, 2007.

Potato seed pieces were planted into a Howard gravelly loam on 22 May at the Thompson Research Farm, Freeville, NY. Eight seed piece/in-furrow treatments in combination with eight foliar treatments were arranged in a randomized complete block design with four replications. Each treatment block consisted of four 36-ft rows with a 34-in. bed width. The blocks were split so that each had four 15-ft rows for both Chieftain and Yukon Gold varieties, with 3 ft of either Atlantic or NY129 cultivars at the front and back of each block to serve as buffers. This provided 36 hills per variety, with the middle two rows serving as the data rows. Dry seed piece fungicides (Maxim MZ, and Moncoat MZ) were applied to cut seed the day prior to planting. Agriclay A6 and Amistar 80WG were applied as in-furrow sprays while the seed pieces were in the ground but still uncovered. Final seed emergence data was recorded on 27 Jun. A heavy Agriclay A6 spray "drench" was applied to potato stems on 28 Jun, four days prior to hilling. Rainfall (in.) was 1.66, 4.13, 5.48, 4.98, and 4.66 for May, Jun, Jul, Aug, and Sep, respectively, and was supplemented with overhead irrigation as needed. Every plant in the first of the four rows was field-inoculated with a 25,000 spores/ml suspension of *A. solani*, isolate 19 on 19 Jul. Fungicide sprays were applied with a CO_2 pressurized boom sprayer at 60 psi, delivering 23.0 gal/A through eight TeeJet XR11003 flat fan nozzles spaced 20 in. apart. Sprays were applied on a 7-day schedule (20, 26, Jul; 2, 9, 16, 23 Aug). Early blight infections were assessed on foliage using the Horsfall-Barratt scale (0-11) on 13, 17, 24, and 31 Aug. Vines were killed with Diquat (1.5pt/A) on 5 Sep. Six stems from the two data rows from each block were randomly chosen in order to measure black dot sclerotia on 12 Sep. Stems were trimmed to 12 in. from the soil line and black dot lesion severity was rated on a 0-5 scale (0=no sclerotia, 5=severe colonization). Tubers were harvested on 1 Oct and graded on 2 Oct. Specific gravity was measured by hydrometer and tuber appearance and the presence of black scurf, silver scurf and common scab were scored on a 0-5 scale (0=excellent; 5=very poor), with clean appearance and general freedom of disease noted for a good rating. Foliar data were converted using the area under the disease progress curve (AUDPC) model to account for foliar disease that progressed over time. Foliar AUDPC and tuber data were analyzed using a split plot, two-way ANOVA at P=0.05. Significant differences between means were separated using the Waller-Duncan k-ratio t-test at P=0.05.

Seed piece and in-furrow treatments had no significant effect on seed emergence (P=0.8973), but did improve tuber appearance at harvest. The seed treatments including Maxim MZ had the least amount of black scurf (P=0.0013), while the Agriclay A6 in-furrow + drench provided some control as well. The two treatments that included Maxim MZ + Amistar 80WG had significantly less silver scurf than the control and other treatments (P<0.0001). A similar trend occurred with Maxim MZ + Amistar 80WG treatments having the least amount of scab, though there were no significant differences among any of the seed treatments (P=0.4621). Of the fungicide treatments, Quadris Opti 5.5SC + Revus Top 500SC+ Bravo Weather Stik 720SC (WS) and Quadris Top 325SC + Bravo Weather Stik were most effective in controlling early blight on foliage (P=0.0007). Revus Opti 440SC + Bravo Weather Stik also provided good control but the QRD 800 treatments and Revus Top 500SC + Bravo Weather Stik treatments were not effective. There were no significant differences for total or marketable yield (P=0.3432 and 0.6092, respectively) or for specific gravity (P=0.1754) due to treatment. There were significant cultivar effects, however, with Chieftain plots having significantly more tubers than Yukon Gold plots for both total yield (352.21 vs, 284.02 cwt, respectively) and marketable yields (317.86 vs. 236.14 cwt, respectively). Yukon Gold tubers had a significantly higher specific gravity of 1.0784 compared with Chieftain tubers' specific gravity of 1.0770 (P<0.0001). There were no significant differences due to cultivar for seed emergence (P=0.5295), black dot length or severity (P=0.5767 and 0.3841, respectively). There were significant differences in the amount of early blight in the foliage with Chieftain having an average AUDPC of 82.84 and Yukon Gold having an average of 97.10 (P<0.0001). This was most likely due to the fact that Yukon Gold is an earlier maturing variety and was more susceptible to the effects of disease stress as the summer progressed. There were also significant differences on the amount of disease symptoms present on the harvested tubers due to cultivar (0.0008<P<0.0065). Chieftain tubers had less black scurf than Yukon Gold (0.84 vs. 1.48, respectively), as well as less silver scurf (1.61 vs. 2.08, respectively), while Chieftain tubers had more scab (2.16 vs. 1.14, respectively). No phototoxicity was observed.

Seed piece treatment/row length in-furrow, drench, or cwt[z] treatment	Emerged seed pieces, 27 Jun	Black scurf (0-5)	Silver scurf (0-5)	Scab (0-5)
1 Control, untreated	65.25	1.63 c [y]	2.25 b	2.19
2 Agriclay A6, 2.58 fl oz/1.0 gal in-furrow	66.25	1.66 c	2.38 b	1.96
3 Agriclay A6, 2.58 fl oz/1.0 gal in-furrow + 1.58 fl oz/1.0 gal drench	65.63	1.28 bc	2.19 b	1.78
4 Agriclay A6, 2.58 fl oz/1.0 gal in-furrow + 2.58 fl oz/1.0 gal drench	65.88	1.31 bc	2.19 b	1.60
5 Moncoat MZ, 12.0 oz/ cwt;	66.50	1.91 c	1.88 b	1.53
6 Maxim MZ, 8.0 oz/cwt	67.25	0.81 ab	1.94 b	1.70
7 Maxim MZ, 4.0 oz/cwt + Amistar 80WG, 0.15 oz/1000 sq ft in-furrow	66.38	0.56 ab	0.94 a	1.34
8 Maxim MZ, 4.0 oz/cwt + Amistar 80WG, 0.15 oz/1000 sq ft in-furrow	67.75	0.14 a	1.00 a	1.09

Treatment and rate/A	AUDPC[x] for Early blight	Specific Gravity	Total yield cwt/A	Market yield cwt/A
1 Control, unsprayed	101.98 bc	1.0767	312.22	273.18
2 QRD 800, 2.50 lb (A-F)[w]	99.75 bc	1.0758	326.06	287.73
3 QRD 800, 1.25 lb (A-F)	102.14 bc	1.0759	295.10	252.43
4 QRD 800, 0.63 lb (A-F)	114.38 c	1.0768	288.69	259.55
5 Revus Opti 440SC, 2.5 pt (ABDE); Bravo Weather Stik 720SC, 1.5 pt (CF)	80.46 ab	1.0770	322.39	281.36
6 Revus Top 500SC, 7.0 fl oz (ABDE); Bravo Weather Stik 720SC, 1.5 pt (CF)	94.83 bc	1.0773	331.51	280.01
7 Quadris Opti 5.5SC, 1.6 pt (AC); Revus Top 500SC, 7.0 fl oz (BD); Bravo Weather Stik 720SC, 1.5 pt (EF)	65.94 a	1.0775	338.52	291.32
8 Quadris Top 325SC, 8.4 fl oz (ABDE); Bravo Weather Stik 720SC, 1.5 pt (CF)	60.29 a	1.0783	330.44	290.40

[z] cwt/A = hundred weight per acre.
[y] Means in columns followed by the same letter are not significantly different (Waller-Duncan k-ratio t-test, *P*=0.05).
[x] Area under the disease progress curve.
[w] A-F refers fungicide application dates: A= 20 Jul; B=26 Jul; C=2 Aug; D=9 Aug; E=16 Aug; F=23 Aug.