

Evaluation of a biopesticide and fungicides for managing *Cercospora* and *Alternaria* blights of carrot, 2003.

This study was conducted at the Michigan State University Muck Soils Research Farm in Laingsburg, MI on a Houghton muck field previously planted to carrot. 'Bolero' carrot seeds were planted at a density of 22.8 seeds/ft of row on 19 May in three seed lines per row with rows centered 18 in. apart on three-row raised beds centered 64 in. apart. Treatment plots consisted of one row 15 ft long with 2.5 ft of unsprayed buffer between plots in the same row. Eight treatments were replicated four times in a randomized complete block design. The field was fertilized with applications of 8-21-29 (500 lb/A on 1 May) plus micronutrients (0.5% Cu, 1% Mn, and 0.5% Zn) and top-dressed with chelates (4% Zn, 1% Cu, 1% Mn, and 1% Mg at 2 qt/A on 9 Aug). Insects were controlled with applications of Sevin 80S (1.25 lb/A on 9 Jul), Vydate C -LV (4 pt/A on 19 Jul) and Lannate LV (3 pt/A on 9 Aug). Weeds were controlled with applications of Lorox 5 ODF (2 lb/A on 27 May; 1 lb/A on 19 Jun; 1.5 lb/A on 7 Jul) and Poast (1.5 pt/A on 4 Aug) mixed with 1 qt/A crop oil; supplemental hand weeding was performed as needed. Fungicides were applied with a CO₂ backpack sprayer equipped with three XR8003 flat fan nozzles spaced 18 in. apart and calibrated to deliver 50 gal/A at a nozzle pressure of 52 psi. Nine applications were made on 17 and 28 Jul; 4, 11, 18, and 25 Aug; and 2, 9, and 16 Sep. Disease assessments were recorded from plants in the center 10 ft of the middle row of each plot on 25 Sep. Carrots in the center 10 ft of the middle row were handharvested, the foliage was removed with a mechanical topper, and root yields were recorded on 26 Sep. Average minimum and maximum air temperatures (F) were 41.2 and 64.7, 48.2 and 76.4, 54.6 and 81.4, 53.6 and 82.0, and 44.1 and 72.3 for May, Jun, Jul, Aug, and Sep, respectively. Rainfall totals (in.) were 3.8, 1.6, 1.0, 1.4, and 2.1 for the same respective months.

Cercospora and *Alternaria* blight symptoms were detected during mid-Jul and mid-Aug, respectively. Leaving plots untreated resulted in 17.5% leaf blight and nearly all plants had petiole lesions. Treatment programs that included Bravo Ultrex 82.5 WDG or Cabrio 20WG were highly effective in limiting disease on leaves and petioles and resulted in significantly healthier petioles (≤ 3.3) when compared with the untreated (6.8) or 710-145f 0.14% w/v (≥ 6.8) treatments. Treatments of 710-145f 0.14% w/v applied at 2.8 or 5.7 pt/A did not limit disease on leaves or petioles and did not differ from the untreated control. Cabrio 20WG applied alone resulted in a significantly higher yield when compared with the 710-145f 0.14% w/v 2.8 pt/A treatment. No phytotoxicity occurred on any of the plants.

Treatment and rate/A (application sequence ^z)	Petiole blight		Petiole health ^w	Leaf blight (%) ^v	Yield (lb)
	Incidence (%) ^y	Severity ^x			
Untreated.....	98.5 b ^u	3.8 b	6.8 b	17.5 b	27.5 ab
Bravo Ultrex 82.5WDG 1.8 lb (1-9).....	5.3 a	2.0 a	2.8 a	1.0 a	32.8 ab
Cabrio 20WG 0.5 lb (1-9).....	4.3 a	2.0 a	3.0 a	1.0 a	33.7 a
710-145f 0.14% w/v 2.8 pt (1-9).....	100.0 b	3.5 b	6.8 b	17.5 b	25.1 b
710-145f 0.14% w/v 5.7 pt (1-9).....	100.0 b	3.8 b	7.0 b	17.5 b	25.8 ab
Bravo Ultrex 82.5WDG 1.8 lb (1,3,5,7,9) 710-145f 0.14% w/v 5.7 pt (2,4,6,8).....	10.2 a	2.0 a	3.3 a	1.0 a	31.7 ab
Cabrio 20WG 0.5 lb (1,3,5,7,9) 710-145f 0.14% w/v 5.7 pt (2,4,6,8).....	6.0 a	2.0 a	2.8 a	1.0 a	30.8 ab
Bravo Ultrex 82.5WDG 1.8 lb (1,4,7) 710-145f 0.14% w/v 5.7 pt (2,5,8) Cabrio 20WG 0.5 lb (3,6,9).....	5.3 a	2.0 a	2.8 a	1.0 a	31.4 ab

^z Application sequence: 1 = 17 Jul; 2 = 28 Jul; 3 = 4 Aug; 4 = 11 Aug; 5 = 18 Aug; 6 = 25 Aug; 7 = 2 Sep; 8 = 9 Sep; 9 = 16 Sep.

^y Percentage of plants from 10 ft of the center row with at least one petiole lesion.

^x Severity of petiole blight rated on a 1 to 5 scale; where 1 = 0 petiole lesions per plant, 2 = 1-10, 3 = 11-21, 4 = 21-50, and 5 = > 50. Variable could not be normalized.

^w Petiole health rated on a 1 to 10 scale; where 1 = healthy and vigorous to 10 = unhealthy, weak, or dead.

^v Evaluated using a leaf blight assessment key representing the percentage of disease foliage. Variable could not be normalized.

^u Means within a column followed by the same letter are not significantly different according to Tukey's Studentized Range Test ($P=0.05$).