

**Evaluation of biorationals for control of Stemphylium leaf blight on onion, 2020.**

This study was conducted with a grower cooperator in Hamilton, MI, in a field of Houghton muck soil previously planted to celery. Onion 'Bradley' seeds were sown on 3 Apr on raised beds that were 6 in tall and 60 in wide at the top and were spaced 80 in apart at the row center. Each bed consisted of eight rows of plants spaced 6 in apart and seeds spaced 2 in apart within rows (approximately 250,000 seeds/A). Treatment plots were 20-ft long with a 2-ft buffer section between replicates within a row and arranged in a randomized complete block design (RCBD) with four replications for each treatment. Fertilization and weeds were managed by the grower cooperator. Plants were irrigated with a hard-hose traveler and single sprinkler on 9 and 25 Jul. Biorational treatments were applied as a foliar spray using a CO<sub>2</sub> backpack sprayer and a broadcast boom equipped with three XR8003 flat-fan nozzles spaced 18 in apart and calibrated at 30 and 36 psi to deliver 50 gal/A. Treatments were applied on 9, 14, 21, and 28 Jul and 4 Aug. Downy mildew, purple blotch, and Botrytis leaf blight were not observed during the trial. Premature leaf death resulting in a mid-season loss of green leaf tissue is typical of Stemphylium leaf blight and the percentage of green tissue (0 to 100%) was assessed visually on 28 Jul and 3 and 10 Aug. Assessments were combined into a single value by calculating the area under the green tissue progress curve (AUGTPC). Bulbs from the 5 ft of center four rows of each replicate were harvested on 1 Sep. The bulbs were dried and topped on 23 Oct, and sorted into small (<2 in), medium (2-3 in), and large (>3 in) sizes and weighed on 26 Oct. Statistical analysis was conducted with SAS software (v9.3) and a linear mixed model. Some data were transformed to meet assumptions of normality and equal variances; back-transformed data are presented in tables. Data were analyzed using an analysis of variance (ANOVA) with mean separation performed using Fisher's protected least significant difference (LSD).

In an adjacent experimental plot, the first plant with *Stemphylium*-like conidia was observed on 7 Jul and the pathogen was isolated from 50 plants. Stemphylium leaf blight disease pressure was moderate to high in this field. Onion thrips (approximately > 1 thrips per onion plant) were observed throughout the trial. At the first rating date (28 Jul), the green tissue (%) for those plots treated with a biorational product did not differ from the untreated control. On 3 Aug, the biorational insecticide Entrust SC 7.2 fl oz mixed with a non-ionic surfactant (Dyne-amic 0.05% v/v), Entrust SC 7.2 fl oz + the biorational fungicide Kocide 3000-O 1.5 lb, and Kocide 3000-O 1.5 lb had more green tissue (%) than the untreated control; Kocide 3000-O was similar to treatments containing the biorational insecticide Neem Oil 1 oz. On the last rating date (10 Aug), Entrust SC 7.2 fl oz mixed with Dyne-amic 0.05% v/v, Entrust SC 7.2 fl oz + Kocide 3000-O 1.5 lb, and Neem Oil 1 oz + Kocide 3000-O had more green tissue (%) than the control and Kocide 3000-O 1.5 lb. Entrust SC 7.2 fl oz mixed with either a non-ionic surfactant (Dyne-amic 0.05% v/v) or Kocide 3000-O 1.5 lb were the only treatments with a significantly higher AUGTPC value than the untreated control. There were no yield differences among biorational treatments and the untreated control. No lodging of the onion neck was observed in any of the treatment plots as plants died prematurely. No phytotoxicity was observed.

Treatment and rate, 7-day application interval <sup>y</sup>	Green Leaf Tissue (%) <sup>x</sup>			AUGTPC
	7/28	8/3	8/10	
Untreated Control	85.8a <sup>z</sup>	60.0c	8.0c	675.3b
Entrust SC 7.2 fl oz/a + Kocide 3000-O 1.5 lb/A	88.3a	77.5a	14.3a	818.38a
Entrust SC 7.2 fl oz/a + Dyne-amic (0.05 % v/v)	87.0a	76.5a	14.8a	809.9a
Neem Oil 1 oz/gal+ Kocide 3000-O 1.5 lb/A	85.5a	65.8bc	10.0ab	711.9b
Neem Oil 1 oz/gal+ Dyne-amic (0.05 % v/v)	81.3a	66.6bc	8.0bc	709.4b
Kocide 3000-O 1.5 lb/A	80.3a	63.5b	7.5c	679.8b
<i>P</i> value	0.1895	< 0.0001	0.0105	0.0003

<sup>x</sup> Premature leaf death resulting in a mid-season loss of green leaf tissue is typical of Stemphylium leaf blight and the green tissue (0 to 100%) was assessed visually; AUGTPC = Area under the green tissue progress curve calculated from three visual assessments of the green tissue (%).

<sup>y</sup> Applications dates: 9, 14, 21, and 28 Jul; 4 Aug; A = acre, gal = gallon, and v/v = volume by volume.

<sup>z</sup> Column means with a letter in common are not significantly different (LSD t Test; *P*=0.05).

Treatment and rate, 7-day application interval <sup>y</sup>	Yield (ton/A) <sup>x</sup>			
	Small	Medium	Large	Total
Untreated Control	3.8a <sup>z</sup>	7.9a	0.3a	11.9a
Entrust SC 7.2 fl oz/a + Kocide 3000-O 1.5 lb/A	3.9a	9.1a	0.6a	13.3a
Entrust SC 7.2 fl oz/a + Dyne-amic (0.05 % v/v)	3.7a	8.6a	0.3a	12.9a
Neem Oil 1 oz/gal+ Kocide 3000-O 1.5 lb/A	4.1a	7.7a	0.2a	11.9a
Neem Oil 1 oz/gal+ Dyne-amic (0.05 % v/v)	3.8a	8.3a	0.0a	12.0a
Kocide 3000-O 1.5 lb/A	3.6a	8.9a	0.0a	12.4a
<i>P</i> value	0.9875	0.8759	0.0704	0.0801

<sup>x</sup> Bulbs from the 5 ft of center four rows of each replicate were harvested on 1 Sep. The bulbs were dry and topped on 23 Oct, and sorted into small (<2 in.), medium (2-3 in.), and large (>3 in.) sizes and weighed on 26 Oct; weight was converted to ton/acre.

<sup>y</sup> Applications dates: 9, 14, 21, and 28 Jul; 4 Aug; A = acre, gal= gallon, and v/v = volume by volume.

<sup>z</sup> Column means with a letter in common are not significantly different (LSD t Test; *P*=0.05).