PUMPKIN (*Cucurbita pepo* 'Half Pint')
Phytophthora blight; *Phytophthora capsici*

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Efficacy of biopesticides for managing Phytophthora blight in cucurbits, 2017.

An experiment with field-grown pumpkins was conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in Riverhead, NY, in a field with Haven loam soil. The objective was to evaluate a program with a combination of biopesticide products used alone or added to a conventional fungicide program for control of Phytophthora blight on pumpkins. All products tested are labeled for this disease. Biopesticides were selected to cover the diversity of labeled active ingredients. The field was chosen because it has a history of Phytophthora blight. *Phytophthora capsici* proliferation was encouraged the previous season by growing squash and pumpkin throughout the field with no management practices for Phytophthora blight. The field was plowed on 25 Jun. Controlled-release fertilizer (N-P-K, 15-5-15) was applied on 28 Jun at 675 lb/A. Pumpkins were planted with a vacuum seeder at approximately 24-in plant spacing on 7 Jul. Strategy 3 pt/A, Sandea 0.5 oz/A and Roundup PowerMax 22 oz/A were applied prior to seedling emergence for weed control on 7 Jul using a tractor mounted sprayer. During the season, weeds were controlled by cultivating and hand weeding as needed. Moisture was provided all season using overhead irrigation. Plots were three 12-ft rows spaced 68 in. apart. The 20-ft area between plots was also planted to pumpkin. A randomized complete block design with four replications was used. All plots received the following fungicide applications to control powdery mildew: Vivando 15 fl oz/A on 7 Aug, Torino 3.4 fl oz/A on 14 Aug, Procure 8 fl oz/A on 21 Aug, and Vivando 15 fl oz/A on 28 Aug. Four applications of biopesticides were made to soil with one before planting, one pre-emergence, and two while plants were small. Foliar applications for Phytophthora blight were made five times on a 7-day preventive schedule beginning on 3 Aug. All nine were made using a tractor-mounted boom sprayer equipped with twinjet (TJ60-11004VS) nozzles spaced 17 in. apart that delivered 72 gal/A at 50 psi and 2.3 mph. Plots were evaluated for Phytophthora fruit rot symptoms on 24, 28, and 31 Aug. At each assessment all fruit within the plot were inspected for rot and recorded as a percentage of the total fruit. Average monthly high and low temperatures (^{o}F) were 83/69 in Jul, 81/66 in Aug, and 77/64 in Sep. Rainfall (in.) was 3.45, 4.95, and 3.00 for these months, respectively.

An intensive rainstorm on 18 Aug with 3.28 in. rain likely provided favorable conditions for Phytophthora blight. Symptoms were first observed in this experiment on 24 Aug. The rotation treatment of biopesticides failed to significantly reduce the incidence of Phytophthora blight. Only the rotation of conventional fungicides without the additional biopesticide soil treatments was able to significantly reduce the incidence of Phytophthora fruit rot compared to the untreated control. The conventional fungicide treatment with the additional biopesticide soil treatment produced similarly low level of Phytophthora fruit rot incidence but was not significantly distinguishable from the untreated control due to the high variability of disease occurrence across the field.

Treatment and rate/A (application dates) [z]	Application target	Affected fruit (%) [y,x]
Untreated control	--	31.5 ab
Bio-Tam 4 lbs + Taegro 4 oz (1,3),	soil	
SoilGard 12G 10 lbs (2,4),	soil	
Actinovate AG 12 oz (5,7,9),	plant	
Regalia 3 qt (5-9),	plant	
Double Nickel 1.5 lb + Cueva 2 qt (6,8)	plant	38.2 a
Bio-Tam 4 lbs + Taegro 4 oz (1,3),	soil	
SoilGard 12G 10 lbs (2,4),	soil	
Revus 8 fl oz (5,7,9),	plant	
K-Phite 1 qt (5-9),	plant	
Presidio 4 fl oz (6,8)	plant	2.5 bc
Revus 8 fl oz (5,7,9),	plant	
K-Phite 1 qt (5-9),	plant	
Presidio 4 fl oz (6,8)	plant	1.6 c
P-value (treatment)		0.0043

[z] Rate of formulated product/A. Soil-directed application dates were 1=29 Jun, 2=13 Jul, 3=20 Jul, and 4=27 Jul. Foliar application dates were 5=3 Aug, 6=11 Aug, 7= 17 Aug, 8=25 Aug, and 9=1 Sep.
[y] Numbers in each column with a letter in common are not significantly different from each other (Tukey's HSD, P=0.05).
[x] Values were square root transformed before analysis because raw data were not distributed normally. Table contains de-transformed values.