

PENNSYLVANIA VEGETABLE MARKETING AND RESEARCH PROGRAM

PENNSYLVANIA VEGETABLE GROWERS ASSOCIATION

2017 RESEARCH REPORT

Phytophthora Blight Management

Personnel: John Esslinger, Horticulture Educator, Penn State Extension conducted the research. Dr. Beth Gugino served as an advisor.

Introduction: We first encountered *Phytophthora capsici* or *Phytophthora* blight in Northeastern Pennsylvania in the late 1990's. It was first in pepper and pumpkin fields along the Susquehanna River that had a history of flooding. Over the next decade it has dramatically spread and now infects vegetable farms in every county in the Central Susquehanna and Northeast regions of Pennsylvania. Growers across the state assure me that they have phytophthora on their farms also. Vegetable growers have seen apparently healthy fields turn into a total loss as a result of a phytophthora infection. *Phytophthora* has the ability to last in the soil for seven or more years. *Phytophthora* blight infects a wide range of vegetable crops but the crops that have been most severely impacted are cucurbit crops and peppers.

Educational efforts have focused on the importance of keeping phytophthora off the farm and on cultural practices that minimize the impact of an infection. In 2016 a new fungicide was used in pepper fields on a Luzerne County farm. This farm has a long history of battling phytophthora. The fungicide, Orondis, appeared to stop the spread of the phytophthora infection despite weather conditions that favored the spread of the disease. This research was conducted to determine if the apparent benefits of Orondis could be repeated and if there are other control options that offer equal or better control and if control can be obtained at a lower cost per acre.

Objectives: The purpose of the project is four fold. First and foremost, we want to see if Orondis is as effective as it appeared to be on one farm in 2016. Second, we want to see if there is another fungicide option that can give comparable control at a lower cost per acre. Third, compare a pepper cultivar tolerant to phytophthora blight with one that is not tolerant under each treatment. Finally, we want to see if a generous application of manure based compost has a positive impact on limiting phytophthora blight by out competing it in the soil. The hope is that the final objective will provide a viable phytophthora management option for the state's organic vegetable growers.

Procedure: The plot was planted on June 14, 2017 on the Brian Campbell Farm in Columbia County. A field in Benton, Pennsylvania was selected based on its history of phytophthora blight and the soil within the field is productive and uniform. Irrigation was available but due to adequate rainfall was not used until August 25, 2017.

A soil sample was taken and recommended lime was applied on May 26, 2017. Black plastic mulch on 6' centers was laid on June 12, 2017. Three randomized replications of each of the four treatments were

established. The manure compost was worked into the soil on May 22, 2017 in the compost treatment replications only. The plot was planted on June 14, 2017. The peppers were planted in a double row 25 feet long. One of the double rows was planted to the cultivar Zsa Zsa and the other row was planted to the cultivar Playmaker. Zsa Zsa, a two lobed yellow pepper, was selected because of its susceptibility to phytophthora and Playmaker, a green to red bell pepper, was selected because of its resistance to phytophthora. The four replicated treatments were 1) Orondis 2) Revus and Kocide rotated with Tanos and Kocide, 3) manure compost, and 4) untreated check.

Treatment 1: Orondis Gold was applied one time only as a drench at the rate of 2.4 oz./acre on June 28, 2017. Label recommendation is 2.4 oz. to 9.6 oz. per acre.

Treatment 2: The Revus and NuCop rotated with Tanos and NuCop treatments were applied to the treatment 2 areas on a 7 to 9 day rotating basis starting July 27 through September 12, 2017. The untreated check and the compost treatments received no fungicides treatments. Revus and Tanos were applied at 8 oz. /acre (label recommendation) and the Nu-Cop was applied at 1 lb./acre. The Revus and Nu-Cop tank mix was applied on August 4, August 17, and September 1 and the Tanos and NuCop were applied on July 27, Aug. 8, Aug. 25, and Sept. 12.

Treatment 3: The manure (dairy) compost was applied broadcast at the rate of 3 tons/acre on May 22, 2017. The compost was worked shallowly into the soil immediately after application.

Treatment 4: The check did not receive any fungicide or soil treatments.

Based on soil test recommendations, the plot received 1.5 tons of high calcium lime was on May 26, 2017. The entire field was fertilized with 80-80-80 on June 1, 2017. The plastic mulch was laid on June 11, 2017.

Phytophthora was not observed in the plot from the time of planting though the middle of August so the plot was irrigated on August 25th and inoculated with phytophthora on August 28th. Phytophthora was first observed on Zsa Zsa fruit in the untreated check on September 15, 2017. On September 21, 2017 each plant was evaluated for the presence of phytophthora. The table below indicates the number of plants that had at least one fruit with phytophthora symptoms out of the 75 plants that made up each treatment.

Treatments:	Zsa Zsa	Playmaker
Orondis	13 b	22 b
Tanos & Copper, Revus & Copper	2 a	1 a
Manure compost	35 c	25 b
Untreated check	24 c	38 c

The Tanos & Copper, Revus & Copper treatment out-performed the other treatments. The Orondis treatment was second best. The manure compost had less disease than the untreated check with the Playmaker variety but not with the Zsa Zsa treatment.

Below is the cost comparison of the treatments.

Treatment 1 consisted of Orondis applied at 2.4 oz./acre which cost \$65.00/acre.

Treatment 2 consisted of Tanos and Nu-Cop (July 27, Aug. 8, Aug. 25 and Sept. 12) rotated with Revus and Copper (Aug. 4, Aug. 17, Sept. 1).

Tanos cost per/acre $\$19.33 \times 4$ applications = \$77.32/acre

Revus cost per/acre $\$21.64 \times 3$ applications = \$64.92/acre

Copper cost per/acre $\$6.00 \times 7$ applications = \$42.00/acre

Total cost of treatment 2 per acre was **\$184.24**. (does not include the cost of 7 applications)

Treatment 3 consisted of 3 tons of manure compost/acre which cost approximately \$180.00/acre.

Treatment 4 had no additional costs.

Conclusions: Treatment 2 performed very well. While the treatment did not totally prevent disease development, it did keep disease to a manageable level. The cost was relatively high. Treatment 1 did a good job but there was enough diseased fruit to cause concern. Since Orondis was only applied once early in the season and at the lowest labeled rate the cost per acre was significantly lower than the other treatments. Syngenta has increased the lowest labeled rate from 2.4 oz./acre to 4.8 oz./acre. The 4.8 ounce rate gives better season-long control and would still be the lowest cost treatment. Treatment 3 had little or no benefit in managing the disease. The treatment cost was high compared to the benefit.