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Tomato, Pepper, Lettuce, Parsley, Squash, and Edamame Soybean

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TABLE OF CONTENTS

TOMATO (*Lycopersicon esculentum* 'Peto 696')
Early blight; *Alternaria solani*
Anthracnose; *Colletotrichum coccodes*
Bacterial speck; *Pseudomonas syringae* pv. *tomato*

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Evaluation of fungicides for the control of foliar and fruit diseases of processing tomatoes, 2003.

The experiment was conducted at the Ohio Agricultural Research and Development Center Vegetable Crops Station in Fremont, OH on Rimer loamy fine sand. Potassium (210 lb/A K_2O), phosphorous (69 lb/A P_2O_5) and nitrogen (84.5 lb/A Urea) were incorporated into the test field on 21 Apr. The field was cultivated and raised beds on 5 ft centers were prepared on 19 May. 'Peto 696' tomato seeds were hot water-treated and sown on 18 Apr into 288-cell plug trays containing Metromix 360 seedling mix. On 23 May, seedlings were transplanted 1 ft apart into single rows 30 ft long on the beds. The insecticide Diazinon AG500 (6 oz/50 gal water) and starter fertilizer (N-P-K 10-34-0; 0.7 qt/50 gal water) were applied in the transplant water. Treatments were arranged in a randomized complete block design with four replications. Treatment rows were alternated with untreated border rows. The herbicide Dual II Magnum was applied at 1 pt/A on 19 May and Sencor 75 DF was applied at 0.33 lb/A and 0.35 lb/A on 19 May and 14 Jul, respectively. Asana XL (6.9 oz/A) was applied by aircraft on 12 Jul to control insects. The field was cultivated on 1 Jul and hand weeded on 15 and 17 Jul. Treatments were applied using a tractor-mounted CO_2-pressurized sprayer (55 psi, 44.8 gal/A) on a 7-10 day schedule beginning 25 Jun and ending 4 Sep for a total of ten applications. Severity of foliar disease was evaluated on 6 Aug and 8 Sep using a modified Horsfall-Barratt rating scale. Early blight and bacterial speck ratings were made separately, as well as an overall rating including both diseases. Disease ratings were converted to midpoints (% disease) prior to statistical analysis. Means for Horsfall-Barratt ratings or midpoints were reported according to appropriateness for ANOVA. Fruit were harvested from five plants in the center of each treatment row on 9 Sep and weights of marketable fruit, green fruit, fruit with anthracnose, bacterial disease, blossom end rot and other rots were determined. Data were analyzed by ANOVA using SAS statistical software. Means were separated using Fisher's protected least significant difference test. Average maximum temperatures for 23-31 May, Jun, Jul, Aug, and 1-9 Sep were 68.3, 76.8, 82.7, 82.9, and 74.6 °F; average minimum temperatures were 43.7, 54.8, 58.8, 59.2, and 51.7 °F; and rainfall was 1.09, 2.65, 5.42, 3.5, and 1.8 in., respectively.

Weather conditions were cool and rainy for most of the growing season, and both bacterial speck and early blight appeared naturally in the plots. All treatments resulted in significantly less early blight than the untreated control at the 8 Sep evaluation. Dithane alone and Amistar or Cabrio alternated with Bravo Weather Stik were most effective. Bacterial speck was least severe in the untreated control and plots treated with Cuprofix MZ. Foliar disease severity overall was lowest in plots treated with either Amistar or Cabrio alternated with Bravo Weather Stik. All treatments except Cuprofix MZ significantly reduced fruit anthracnose incidence compared to the control. Amistar, Cabrio or Flint alternated with Bravo, and Bravo alone were significantly more effective than Dithane in reducing anthracnose incidence. There were no differences in marketable yield among treatments or the control, but plants treated with Amistar or Cabrio alternated with Bravo produced significantly more green fruit than the untreated control.

Treatment and rate/A (application times [z])	Early blight foliage (HB rating[y]) 6 Aug[x]	Early blight foliage (HB rating[y]) 8 Sep	% Bacterial speck (foliage) 6 Aug	% Bacterial speck (foliage) 8 Sept	Foliar disease overall (HB rating[y])
Control	3.8 a	7.8 a	8.4 b	11.9 b	8.6 a
Cuprofix MZ30 42% DF 5 lb (1-10)	2.8 a	6.0 b	14.8 a	11.9 b	7.1 b
Amistar 80WG 2 oz (1,3,5,7,9) alt. Bravo Weather Stik 1.67 pt (2,4,6,8,10)...	2.5 a	2.8 c	8.4 b	28.5 a	6.0 c
Dithane M-45 2.25 lb (1-10)…………………………………...	3.0 a	4.0 c	11.9 ab	30.9 a	6.6 bc
Cabrio 20WG 0.75 lb (1,3,5,7) alt. Bravo Weather Stik 1.67 pt (2,4,6,8,9,10)..	3.0 a	3.0 c	8.4 b	26.1 a	6.0 c
Flint 50WG 2.5 oz (1,3,5) alt. Bravo Weather Stik 1.67 pt (2,4,6,7,8,9,10)..	3.3 a	5.5 b	9.6 ab	25.0 ab	7.3 b
Bravo Weather Stik 1.67 pt (1-10)..	2.8 a	5.8 b	14.3 a	26.1 a	7.3 b
P value	0.367	0.000	0.091	0.036	0.000

Treatment and rate/A (application times[z])	Anthracnose (tons/A)[x]	% Anthracnose	Marketable Yield (tons/A)	Healthy Green (tons/A)
Control	3.6 a	11.8 a	13.2 a	1.0 c
Cuprofix MZ 30 42% DF 5 lb (1-10)	3.3 a	9.6 a	12.6 a	1.0 c
Amistar 80 WG 2 oz (1,3,5,7,9) alt. Bravo Weather Stik 1.67 pt (2,4,6,8,10)	0.7 c	1.9 c	18.2 a	2.5 ab
Dithane M-45 2.25 lb (1-10)	2.1 b	5.5 b	16.8 a	2.3 abc
Cabrio 20WG 0.75 lb (1,3,5,7) alt. Bravo Weather Stik 1.67 pt (2,4,6,8,9,10)	0.6 c	1.9 c	16.2 a	2.6 a
Flint 50WG 2.5 oz (1,3,5) alt. Bravo Weather Stik 1.67 pt (2,4,6,7,8,9,10)	0.9 c	2.9 c	16.2 a	1.2 bc
Bravo Weather Stik 1.67 pt (1-10)	0.4 c	1.4 c	13.6 a	1.9 abc
P value	0.000	0.000	0.396	0.060

[x] Means in a column followed by the same letter are not significantly different at the indicated *P* value.

[y] Modified Horsfall-Barratt (HB) rating scale (percent diseased foliage): 1=0; 2=1-3;3=4-6; 4=7-12; 5=13=25; 6=26-50; 7=51=75; 8=76-87; 9=88-94; 10=95-97; 11=98-99; 12=100. Values in a column followed by the same letter are not significantly different at the *P* value indicated.

[z] Application times were: 1= 25 Jun; 2= 1 Jul; 3= 10 Jul 4=17 Jul; 5= 24 Jul; 6= 1 Aug; 7= 11 Aug; 8= 19 Aug; 9= 26 Aug and 10=4 Sept.

TOMATO (*Lycopersicon esculentum* 'Peto 696')
Bacterial spot; *Xanthomonas axonopodis* pv. *vesicatoria*
(syn. *Xanthomonas campestris* pv.*vesicatoria*)
Bacterial speck; *Pseudomonas syringae* pv. *tomato*

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Evaluation of fungicides for the control of bacterial foliar and fruit diseases of processing tomatoes, 2003.

The experiment was conducted at the Ohio Agricultural Research and Development Center Vegetable Crops Station in Fremont, OH on Rimer loamy fine sand. Potassium (210 lb/A K_2O), phosphorous (69 lb/A P_2O_5) and nitrogen (84.5 lb urea/A) were incorporated into the test field on 21 Apr. The field was cultivated and beds were prepared on 5 ft centers on 19 May. The herbicide Dual II Magnum was applied at 1 pt/A on 19 May and Sencor 75 DF was applied at 0.33 lb/A and 0.35 lb/A on 19 May and 14 Jul, respectively. 'Peto 696' tomato seeds were hot water-treated and sown on 15 Apr into 288-cell plug trays containing Fafard seedling mix. A treatment of Bonzi plus Actigard was applied using a hand-held sprayer to tomato seedlings at the two-leaf stage on 5 May. Bonzi was applied at the rate of 5 ppm and four hours later Actigard was applied at the rate of 30 ppm. Tomato seedlings were transplanted on 3 Jun; transplant water contained starter fertilizer (N-P-K 10-34-0) at 0.7 qt/50 gal water and the insecticide Diazinon AG500 at 6 oz/50 gal water. Treatments were arranged in a randomized complete block design with four replications. Each plot was a row of 30 plants spaced 1 ft apart. Treatment rows were alternated with untreated border rows. Asana XL (6.9 oz/A) was applied by aircraft on 12 Jul, and by tractor at 8 oz/A on 8 Aug to control insects. The field was cultivated on 1 Jul and hand weeded on 15 and 17 Jul for weed control. Plants were inoculated with approximately 10^8 CFU/ml *Xanthomonas axonopodis* pv. *vesicatoria* strain 767, race T1P3 on 1 Jul in the evening using a tractor mounted CO_2 sprayer at 55 psi, 41.6 gal/A. Plants were misted with water using an FMC sprayer with a PTO-driven pump (200 PSI, 32.6 gal/A) prior to inoculation. Plants were sprinkle irrigated with 0.25 in. of water on 2 Jul. Quadris 2.08SC (5.5 oz/A) was applied in alternation with Bravo Weather Stik (1.67 pt/A) as cover spray at 7-10 day intervals on the untreated control and Bonzi + Actigard 50 WG treatments only. Treatments were applied at 44.8 gal/A on 5-7 or 7-10 day schedules beginning 26 Jun and ending 5 Sep using a tractor- mounted CO_2 pressurized sprayer at 55 psi. Severity of bacterial leaf spot on foliage was evaluated on 6 Aug and 8 Sep using a modified Horsfall-Barratt rating scale. Fruit were harvested from five plants in the center of each treatment row on 8 Sep and weights of marketable fruit, green fruit, and bacterial spot and/or speck were recorded. Average maximum temperatures for 3-30 Jun, Jul, Aug and 1-8 Sep were 72.9, 82.7, 82.9, and 74.1°F; minimum averages were 55.4, 58.8, 59.2 and 51.8 °F; and rainfall was 2.61, 5.42, 3.5, and 1.8 in., respectively. Data were analyzed by ANOVA using SAS statistical software. Means were separated using Fisher's protected least significant difference test.

Weather conditions were cool and rainy for most of the growing season, and despite inoculation with *X. axonopodis* pv. *vesicatoria*, the primary disease present was bacterial speck. Only the Actigard plus Manzate treatment reduced foliar bacterial disease and percentage fruit with bacterial speck or spot symptoms, compared to the untreated control. Marketable yield was higher in plots treated with Actigard plus Manzate compared to the least effective treatments (e.g. Manzate plus Kocide), but not compared to the untreated control.

Treatment and rate/A (application time)	Bacterial disease (HB rating[x]) 6 Aug	Bacterial disease (HB rating[x]) 8 Sep	Fruit with bacterial disease symptoms (T/A)	% fruit with bacterial disease symptoms	Marketable yield (T/A)
Control…………………………………………………...	5.0 a	7.8 ab	12.1 a	40.5 a	13.2 bc
Actigard 50WG 0.5 oz (1-6) + Manzate 75DF 2 lb (1-10)[y]	3.0 c	5.8 c	11.6 a	26.3 bc	23.2 ab
Bonzi 5 PPM + Actigard 50WG 30 PPM………………….	4.6 a	7.1 abc	8.3 a	30.0 abc	14.5 bc
Tanos 50WG 10 oz + Kocide 2000 2 lb (1,3,5,7,9) alt. Manzate 75DF 2 lb + Kocide 2000 2 lb (2,4,6,8,10)[Z]……	4.3 ab	6.0 bc	12.5 a	40.0 ab	11.9 c
Manzate 75DF 2 lb + Kocide 2000 2 lb (1-10)[Z]…………...	4.5 ab	6.3 bc	11.5 a	36.8 ab	12.2 c
P value	0.010	0.059	0.435	0.074	0.063

[x]Modified Horsfall-Barratt (HB) rating scale (percent diseased foliage): 1=0; 2=1-3;3=4-6; 4=7-12; 5=13=25; 6=26-50; 7=51=75; 8=76-87; 9=88-94; 10=95-97; 11=98-99; 12=100. Values in a column followed by the same letter are not significantly different at the *P* value indicated.

[y] Application times for treatments applied at 7-10 day intervals were: 1=25 Jun, 2=3 Jul, 3=11 Jul, 4=18 Jul, 5=25 Jul, 6=1 Aug, 7=8 Aug, 8=19 Aug, 9=26 Aug, and 10=4 Sep.

[Z] Application times for treatments applied at 5-7 day intervals were: 1=25 Jun, 2=3 Jul, 3=10 Jul, 4=17 Jul, 5=24 Jul, 6=31 Jul, 7=8 Aug, 8=14 Aug, 9=20 Aug, and 10=26 Aug.

Tomato (*Lycopersicon esculentum*)
Bacterial Spot; *Xanthomonas axonopodis* pv. *vesicatoria*
(syn *Xanthomonas campestris* pv.*vesicatoria*)
Bacterial speck; *Pseudomonas syringae* pv. *tomato*
Early blight; *Alternaria solani*
Septoria leaf spot; *Septoria lycopersici*
Anthracnose; *Colletotrichum coccodes*

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Evaluation of hot water seed treatment for the control of bacterial diseases of fresh market and processing tomatoes, 2003.

An experiment was conducted at the Ohio Agricultural Research and Development Center, Snyder Farm in Wooster, OH on Wooster silt loam. Seedlings produced from hot water-treated and non-treated seeds were transplanted into separate fields approximately 0.25 mi apart. Prior to planting, 400 lb/A 19-19-19 (N-P-K) was broadcast, top dressed and incorporated into both of the test fields on 28 May. The herbicide Sencor DF (1/3 lb/A) was incorporated on 6 Jun. Dual II Magnum (1 pt/A) was tank mixed with the wetting agent George II (20 oz/A) and applied on 16 Jun. Beds were prepared on 30 May and plastic mulch spread on 2 Jun using a JD 7210 power bedder. Seeds were hot water-treated on 7 Apr. All treated and untreated tomato seeds were sown on 16 and 18 April in 288-cell plug trays (for processing tomatoes) and 128-cell plug trays (for fresh market tomatoes) containing Fafard seedling mix. Seedlings from were hot water-treated seeds were kept separate from those from untreated seed. Tomato seedlings were transplanted on 5 Jun; 8 oz of starter fertilizer (N-P-K 9-45-15) at 1.65 lb/55 gal water was applied per plant. The treated field was cultivated 23 Jul and 11 Aug, and the untreated on 8 and 11 Aug for weed control. Treatments were arranged in a randomized complete block design with three replications. Each treatment consisted of two rows containing 20 plants spaced 1 ft apart with 5 ft between rows and bordered on each side with one row of Peto 696 tomato plants (from hot water- treated seeds). The insecticide Provado 1.6 F (3 oz/A) was applied on 18 Jul, and Sevin XLR Plus (3 qt/A) tank mixed with Spintor 2 SC (5.3 oz/A) was applied on 14 Aug. Quadris 2.08SC (5.5 oz/A) was applied in alternation with Bravo Weather Stik (1.67 pt/A) as cover spray at 7-10 day intervals for a total of ten applications (four of Quadris 2.08SCand six of Bravo Weather Stik). Plants were overhead-irrigated with 1 in. water on 2 Jul. Foliar disease severity for bacterial leaf spot and early blight was evaluated on 3, 16, and 25 Jul, 8 and 20 Aug, and 6 Sep using a modified Horsfall-Barratt rating scale. Disease ratings were converted to midpoints (% disease) prior to statistical analysis. On 11 and 18 Sep, fruit were harvested from three plants in the center of each treatment row for processing tomatoes, and for fresh market tomatoes fruit were harvested based on the distance between four stakes on 11 and 17 and 26 Sep. Weights of marketable fruit, green fruit, ripe or green fruit with bacterial disease symptoms and fruit with anthracnose or blossom end rot were recorded. Average maximum temperatures for 5-30 Jun, Jul, Aug, and 1-26 Sep were 79.1, 82.3, 82.9 and 75.3 °F; minimum averages were 57.3, 60.2, 60.9 and 51.9 °F; and total rainfall was 3.47, 7.17, 3.74 and 4.31 in., respectively.

A second trial was conducted at Hirzel Farms in Pemberville, OH utilizing certified organic processing tomatoes. Seeds of a single lot of 'Peto 696' were divided into two portions, one of which was hot water-treated on 7 Apr at OARDC in Wooster according to the protocol outline in *OSU Extension Bulletin 672, Ohio Vegetable Production Guide*. Both treated and non-treated seed were sown at Hirzel Farms and seedlings from treated and non-treated seeds were raised in separate greenhouses under certified organic conditions. All treated and untreated tomato seedlings were transplanted on 5, 6 and 7 Jun into a 30 A field in a randomized design with two replications per treatment. Plot size varied from 3.5 to 12 A. Plots were managed by Hirzel Farms according to certified organic requirements. Foliar disease severity for bacterial leaf spot was evaluated on 1 Sep using a modified Horsfall-Barratt rating scale. Disease ratings were made on a group of two to four plants at each of ten sites selected throughout each plot in a W-shaped pattern. Disease ratings were converted to midpoints (% disease) prior to statistical analysis using the average of the ten values per replicate. On 10 Sep fruit were harvested from ten plants per replicate plot, one of which was sampled from each of 10 sites in a W-shaped pattern throughout each plot, and weights of marketable fruit, green fruit, ripe or green fruit with bacterial disease symptoms and fruit with anthracnose or blossom end rot were recorded.

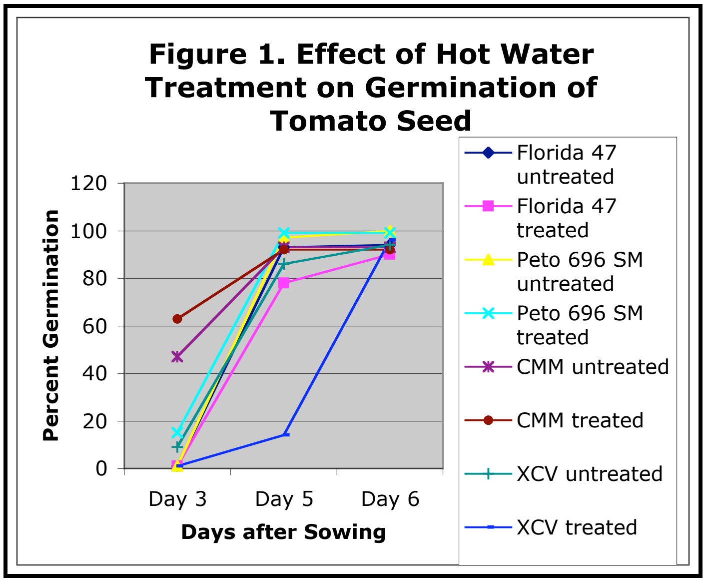
Results

Effects of Hot Water Seed Treatment on Germination and Growth of Tomato Seedlings

There was very little difference among varieties in the final germination count (day 6 after sowing) for seeds treated with hot water or not treated (Figure 1). However, hot water-treated seed of some varieties germinated more slowly than non-treated seed, which is also reflected in seedling height 32-34 days after sowing (Figure 2).

Incidence of Bacterial Diseases in Tomatoes from Seeds Treated with Hot Water or Not Treated - Wooster

Weather conditions were unusually rainy, with numerous storms that contributed to disease development and spread. Bacterial disease incidence was very low in plants produced from hot water-treated seed (Table 1), but it was rampant in plants from untreated seed (Table 2). The predominant disease was bacterial canker, and bacterial spot was also present, particularly in plants produced from *Xanthomonas axonopodis* pv. *vesicatoria*-infested seeds that were not treated with hot water. There were no differences among varieties in bacterial disease incidence or severity on the foliage. Bacterial disease incidence was very low on fruit in plots containing plants from hot water-treated seeds. In the non-hot water-treated plots, bacterial disease incidence was highest in Florida 47 and plants from *Clavibacter michiganensis* subsp *michiganensis* (Cmm; bacterial canker)-infested and *X. axonopodis* pv. *vesicatoria* (Xcv; bacterial spot)-infested seed Anthracnose was also higher in plots with high levels of bacterial disease. Although marketable yields cannot be compared directly between the two sets of plots, it was clear that bacterial diseases reduced yield in the non-treated plots. There were no significant difference in size among "FL47" fruit from treated and untreated plots.



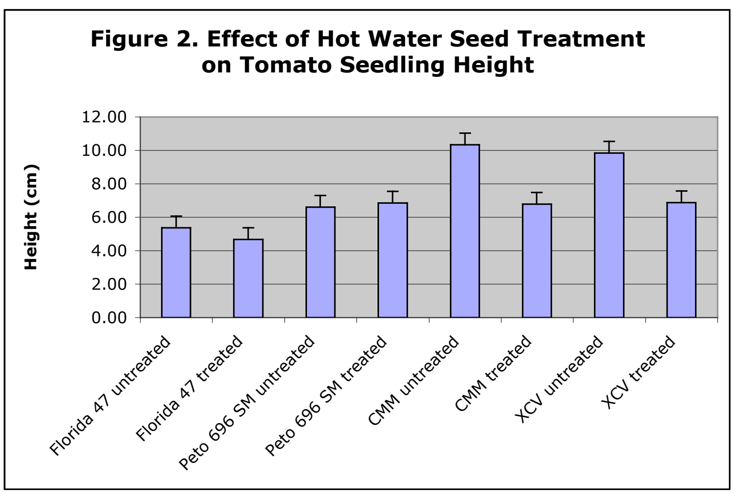


Table 1. Bacterial disease, anthracnose and marketable yield for tomato plants raised from seed **treated** with hot water.

Variety	Foliar bacterial disease AUDPC[1]	Foliar bacterial disease 6 Sep (%)[2]	Anthracnose (T/A)	Bacterial disease-mature fruit (T/A)	Marketable Yield (T/A)
Florida 47……………………….………	23.3 a	0.7 a	0.22 bc	0.00 a	41.5 a
TR 12……………………………………	23.3 a	0.7 a	0.12 c	0.18 a	40.4 ab
Peto 696-1………………………………	0.0 a	0.0 a	0.37 bc	0.37 a	40.0 b
Peto 696-2………………………………	0.0 a	0.0 a	0.20 c	0.05 a	41.1 ab
CMM-infested…………………………..	19.3 a	0.0 a	1.01 abc	0.12 a	28.5 b
XCV-infested……………………………	0.0 a	0.0 a	0.27 bc	0.05 a	41.0 ab
P value	0.699	0.465	0.007	NS	0.001

[1]Means in a column followed by the same letter are not significantly different.
[2]Foliar bacterial disease % and AUDPC were analyzed using log-transformed values.

Table 2. Bacterial disease, anthracnose and marketable yield for tomato plants raised from seed **not treated** with hot water.

Variety	Foliar bacterial disease AUDPC[1]	Foliar bacterial disease 6 Sep (%)[2]	Anthracnose (T/A)	Bacterial disease- mature fruit (T/A)	Marketable Yield (T/A)
Florida 47……………………….………..	489.8 b	22.2 b	1.18 a	2.10 a	25.1 b
Peto 696-1……………………………..	609.4 b	40.0 b	1.22 ab	0.40 bc	33.8 b
Peto 696-2……………………………..	877.0 b	48.3 ab	0.12 c	0.36 bc	28.5 b
CMM…………………………………..	3003.3 a	75.3 a	1.60 a	1.33 b	8.9 c
XCV…………………………………….	497.8 b	25.3 b	0.59 bc	0.83 bc	36.4 b
P value	0.012	0.028	0.007	0.001	0.001

[1]Means in a column followed by the same letter are not significantly different.
[2]Foliar bacterial disease % and AUDPC were analyzed using log-transformed values.

Incidence of Bacterial Diseases in Tomatoes from Seeds Treated with Hot Water or Not Treated – On-Farm Trial, Pemberton, OH

Weather conditions were also very rainy in this location, favorable for a high incidence of bacterial diseases (Table 3). Bacterial canker was the predominant disease in all plots at the time of foliar disease rating, although Septoria leaf spot caused noticeable defoliation between foliar evaluation and harvest. Foliar ratings indicated a trend toward much higher bacterial disease in the non-treated plots compared to the hot water-treated plots. Tonnage of fruit with bacterial disease and anthracnose symptoms was significantly greater in the non-treated plots than the treated plots. Plants in the non-treated plots were more mature than in the treated plots, as indicated by the significantly lower tonnage of immature fruit in the former. Fruit from non-treated plots were also significantly smaller than fruit from treated plots.

Table 3. Disease incidence and yield of organic tomatoes plants raised from seed treated with hot water or not treated.

Treatment	Foliar bacterial disease (%)	Fruit bacterial disease (T/A)	Anthracnose (T/A)	Marketable Yield (T/A)	Fruit size (kg/fruit)	Healthy immature fruit (T/A)
Hot water-treated	2.4 a	0.9 a	3.1 a	23.3 a	1.9 a	10.6 a
Non-treated	66.6 a	2.4 b	12.6 b	16.7 b	1.6 b	0.9 b
P value	0.1182	0.00211	0.1325	0.0151	0.017	0.0795

[1]Means in a column followed by the same letter are not significantly different.
[2]Foliar bacterial disease % and AUDPC were analyzed using log-transformed values.

TOMATO (*Lycopersicon esculentum* 'Celebrity')
Early blight; *Alternaria solani*
Anthracnose; *Colletotrichum coccodes*
Septoria leaf spot; *Septoria lycopersici*

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Evaluation of approved materials for the control of foliar and fruit diseases of organic fresh-market tomatoes, 2003.

This experiment was conducted at the Ohio Agricultural Research and Development Center (OARDC) in Wooster, OH on Wooster silt loam soil. Composted dairy barn manure (~12.5 T/A), bedded on sawdust and straw, obtained from the OARDC compost pad and fresh dairy barn manure (~8.5 T/A), bedded on sawdust and straw, were broadcast and incorporated into the test field on 16 Jun. The field was cultivated and beds prepared on 23 Jun. 'Celebrity' tomato seeds were hot water-treated and sown on 15 Apr into 288-cell plug trays containing Paygro organic potting mix (Paygro Co., South Charleston, OH). Transplants were fertilized twice a week with Bradfield Gold 3-1-5 fertilizer tea (2 cups/55 gal) (Bradfield Industries, Inc., Springfield, MO). On 23 Jun seedlings were transplanted 14 in. apart into rows 20 ft long on 5 ft centers, and watered in. Wheat straw (0.75 lb/ft^2) was applied between rows to suppress weed growth. Treatments were arranged in a randomized complete block design with four replications. Treatment rows were alternated with untreated border rows. Treatments were applied according to manufacturer's instructions on a 5-14 day schedule, beginning 11 Jul and ending 26 Sep using Hudson Heavy Duty Perfection Plus Pumpless Sprayers (2 gal capacity). Foliar disease severity (% disease) was evaluated on 22 and 29 Jul, 6, 19 and 31 Aug, and 8, 15 and 26 Sep using a modified Horsfall-Barratt rating scale. Disease ratings were converted to midpoints (% disease) and the Area Under the Disease Progress Curve (AUDPC) was calculated. Insect damage (% foliar damage) was also evaluated on 6, 19 and 31 Aug, and 8, 15 and 26 Sep using the modified Horsfall-Barratt rating scale. Fruit were harvested from five plants in the center of each treatment row on 19 and 30 Sep and weights of marketable fruit, green fruit, fruit with physiological disorders (blossom end rot, cracks, and zippers), fruit with pest or predator damage (insect and bird) and diseased fruit (anthracnose, early blight, and 'other') were recorded. Average maximum temperatures for 23-30 Jun, Jul, Aug, and Sep were 84.8, 82.3, 82.9, and 73.4 °F; minimum averages were 58.2, 60.2, 60.9, and 50.8 °F; and rainfall was 0.68, 7.17, 3.74, and 5.45 in., respectively. Data were analyzed by ANOVA using SAS statistical software. Means were separated using Fisher's protected least significant difference test.

Disease pressure remained low until the end of August, at which time early blight and Septoria leaf spot appeared. By mid-September, foliar disease was higher in plots treated with Humega and in the untreated control plots than in plots treated with all other materials. By late September, the treatments that contained copper, except for Sonata + Champion, resulted in significantly less foliar disease than the control. Overall, half of the treatments resulted in a lower AUDPC than the control. Bordeaux mixture, Champion WP, Garlic Barrier, and seaweed extract (SW-3) were most effective in reducing foliar disease, while Biodynamic 508, Humega, Kaligreen, Sonata, Storox, Timor and Timorex were least effective. Treatments containing copper were generally effective in reducing Septoria leaf spot severity, while Humega, SW-3 and Biodynamic 508 were ineffective. Yields were highly variable among replications and significant differences were not observed. There were no differences in incidence of fruit diseases (anthracnose and "other"), which were all quite low. There were no differences among treatments in pest or predator damage.

Treatment- Rate and (Timing [z])	% Foliar disease 15 Sep	% Foliar disease 26 Sep	AUDPC[y]	Marketable yield (T/A)
Control- water to run off (1, 4, 6, 8, 11, 14, 17, 19, 20, 22, 24)…………..	55.1 ab[*x]	66.0 ab[**]	1050.7 ab[**]	49.6
Biodynamic 508- *Equisetum arvense*- 11 oz tea/3 qt water/A (19, 21, 25)………………………………………………………………..	26.5 cd	59.0 ab	726.0 abcd	55.7
Bordeaux mixture- 3 oz/gal (1, 4, 6, 8, 11, 14, 17, 19, 20, 22, 24)……….	4.6 d	5.0 e	85.4 f	53.3
Champion WP- 2.1 lb/A (1, 4, 6, 8, 11, 14, 17, 19, 20, 22, 24)…………..	6.1 d	10.8 de	175.2 ef	57.0
Garlic Barrier- 2.7 oz/2.7 oz canola oil/gal (3, 5, 7, 10, 13, 16, 18, 20, 22, 24)…………………………………………	16.6 cd	39.4 bcd	517.3 cdef	33.6
Humega- 1 oz/gal (1, 6, 11, 17, 20, 24)…………………………………...	56.8 a	75.9 a	1163.7 a	49.6
Kaligreen- 3lb/A (8, 11, 14, 17, 19, 20, 22, 24)………………………….	32.4 abc	47.9 abc	765.9 abcd	57.8
Serenade- 6 lb/A (3, 5, 7, 10, 13, 16, 18, 20, 22, 24)……………………..	23.8 cd	44.3 abc	579.0 cde	56.4
Serenade + Champion WP- same as single treatments (3, 5, 7, 10, 13, 16, 18, 20, 22, 24)………………………………………..	28.5 cd	21.4 cde	585.9 cde	56.2
Sonata- 6 lb/A (3, 5, 7, 10, 13, 16, 18, 20, 22, 24)………………………..	26.1 cd	37.0 bcd	629.9 bcd	68.8
Sonata + Champion WP- same as single treatments (3, 5, 7, 10, 13, 16, 18, 20, 22, 24)………………………………………..	30.0 bcd	45.6 abc	671.7 bcd	35.0
StorOx- 1.3 oz/gal (2, 4, 5, 7, 9, 12, 15, 18, 20, 22, 24)…………………..	26.1 cd	61.4 ab	742.7 abcd	51.1
StorOx (4, 8, 14, 19, 22) alternated with Champion WP (1, 6, 11, 17, 20, 24)- same as single treatments…………………………….………………	14.3 cd	25.0 cde	367.9 def	50.4
SW-3- 2 oz/gal (1, 6, 11, 17, 20, 24)…………….……………………..	25.3 cd	37.1 bcd	511.8 cdef	52.8
Timor- 10 oz/gal (11, 14, 17, 19, 20, 23, 24)……………………………..	28.5 cd	67.6 ab	812.7 abc	64.1
Timorex- 10 oz/gal (11, 14, 17, 19, 20, 23, 24)…………………………...	25.3 cd	44.1 abc	683.1 bcd	78.0
Trilogy- 1 qt/A (9, 12, 15, 18, 20, 22, 24)……………….………………..	26.5 cd	39.5 bcd	592.8 cde	61.0

[z] Application times were: 1=11 Jul; 2=14 Jul; 3=15 Jul; 4=18 Jul; 5=24 Jul; 6= 25 Jul; 7=31 Jul; 8=1 Aug; 9=6 Aug; 10=7 Aug; 11=8 Aug; 12=13 Aug; 13=14 Aug; 14=15 Aug; 15=20 Aug; 16=21Aug; 17=22 Aug; 18=28 Aug; 19=29 Aug; 20=8 Sep; 21=12 Sep; 22=15 Sep; 23=16 Sep; 24=25 Sep; and 25=26 Sep.

[y] Area under the disease progress curve calculated using midpoints of modified Horsfall-Barratt ratings for early blight and Septoria.

[x] Means followed by different letters within each column are significantly different at $P \leq 0.1$ (+), 0.05 (*), and 0.01 (**), respectively.

PEPPER (*Capsicum annuum* 'Paladin', 'North Star')
Phytophthora blight; *Phytophthora capsici*
Soft rot; *Erwinia caratovora* subsp. *carotovora*

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Evaluation of fungicides for control of the foliar phase of Phytophthora blight of peppers, 2003.

The experiment was conducted at the Ohio Agricultural Research and Development Center, Snyder Farm in Wooster, OH on Wooster silt loam. Prior to planting, 400 lb/A 19-19-19 (N-P-K) was broadcast, top dressed and incorporated into the test field on 28 May. The herbicide Treflan EC (2pt/A) was incorporated on 6 Jun. Roundup Ultra Max (1 qt/A) was tank mixed with the wetting agent George II (20 oz/A) and applied on 16 Jun. 'Paladin' pepper seeds were sown 14 April in 200 cell plug trays containing Fafard seedling mix. The ReZist treatment (Help™ System, including Stabilizer) was applied to runoff to seedlings with a hand sprayer at 0.5% on 17 Jun. Pepper seedlings were transplanted on 23 Jun; transplant water contained starter fertilizer (N-P-K 9-45-15) at 1.65 lb/55 gal water. Treatments were arranged in randomized complete block design with 4 replications. Each plot consisted of 20 plants spaced 1 ft apart and 5 ft between rows. Treatment rows were alternated with untreated border rows. Inoculum was produced using greenhouse-grown, 8-week-old 'North Star' pepper seedlings transplanted into 4 in. pots. Seven *Phytophthora capsici*-infested millet seeds were placed on the rootball of each plant and covered with soil. Pots were soaked and placed for one week in trays containing approximately 1 in. water. Two plants per row were transplanted 7 ft in from the ends of each treatment row on 8 Jul, followed by 0.78 in. rain. The disease did not spread within the test plots and 'North Star' plants were re-inoculated by placing five *Phytophthora capsici*-infested millet seeds at the junction of the main stem and a middle branch of two plants per plot on 15 Aug. Seeds were covered with Vaseline to prevent desiccation. After inoculation plants were sprinkle-irrigated with 0.25 in. water. Ridomil Gold EC was applied as a drench on 24 Jun, 25 Jul and 26 Aug; the drench was applied within a 12-in. diameter around the base of each plant. Foliar applications were made with a tractor-mounted CO_2-pressurized sprayer (40 psi, 38.93gal/A) beginning 24 Jun, ending 4 Sep for a total of 10 applications for treatments applied at 7 day intervals, and a total of nine applications for treatments applied on 7-10 day schedules, and a total of five applications for treatments made at 14 day intervals. The field was cultivated on 7 and 14 Jul and 7, 12, and 20 Aug for weed control. Provado 1.6 F (3 oz/A), Pounce 3 EC (8 oz/A,), Spintor 2 SC (4 oz/A) and Sevin XLR Plus (3 qts/A) tank mixed with Spintor (5.3 oz/A) were applied on 18 Jul, 31 Jul, 7 Aug, and 14 Aug, respectively. On 20 Aug and 10 Sep fruit were harvested and numbers and weights of marketable fruit, fruit infected with Phytophthora, fruit with other rots and fruit damage by insects were recorded. Data for percent Phytophthora and percent marketable fruit were analyzed using arcsin square root-transformed values; data for percent soft rot on fruit were analyzed using log transformed values; the remaining data were analyzed without transformation, all by ANOVA using SAS statistical software. Means were separated using Fisher's protected least significant difference test. Average maximum temperatures for 23-30 Jun, Jul, Aug and 1-10 Sep were 84.78, 82.27, 82.94, and 76.68 ºF; minimum temperatures were 58.20, 60.17, 60.91, and 55.3 ºF; and rainfall was 0.68, 7.17, 3.74 and 1.72 in., respectively.

Despite two inoculations, Phytophthora blight did not develop in this trial; stand count was not affected and no plants exhibited stem or leaf lesions. Fruit blight occurred but was minimal. However, significantly less soft rot was observed in plots treated with KP481 + Kocide + Maneb alternated with Kocide + Maneb on a tonnage basis compared to the untreated control. On a proportional basis, all of the treatments containing KP481 resulted in significantly less soft rot than the control and several other treatments. Both treatments containing KP481 at 8 oz/A resulted in significantly higher yield (P = 0.102) than the untreated control. All KP481 treatments and Maneb + Kocide resulted in significantly higher percentages of marketable fruit than the untreated control.

Treatment (rate/A)	Fruit with Phytophthora blight (T/A)[v]	% Phytophthora fruit blight	Insect-damaged fruit (T/A)	% Insect-damaged fruit
Untreated control..	0.1 a	2.2 a	1.5 abc	27.8 ab
[w] Ridomil Gold EC 1pt…………………………………………………………...	0.0 a	1.2 a	1.7 ab	31.4 a
[x]Amistar 80WG 2 oz/A alt. Manex 1.4 qt/A…………………………………	0.1 a	0.9 a	1.7 ab	24.9 ab
[y]ReZist 1 pt/A + Stabilizer 1 pt/A (1-5)……………………………………….	0.1 a	1.5 a	1.1 bcd	24.1 ab
[z]Tanos 50WG 8 oz/A + Kocide 2000 2 lb/A (1,3,5,7,9) alt. Maneb 75DF 2lb/A + Kocide 2000 2 lb/A (2,4,6,8,10)……………………………………	0.1 a	1.8 a	0.9 cde	12.3 c
[z]Tanos 50WG 8 oz/A + Kocide 2000 2 lb/A + Maneb 75DF 2 lb/A (1,3,5,7,9) alt. Maneb 75DF 2 lb/A + Kocide 2000 2 lb/A (2,4,6,8,10)…...	0.0 a	0.0 a	0.4 e	6.7 c
[z]Tanos 50WG 10 oz/A + Kocide 2000 2 lb/A (1,3,5,7,9) alt. Maneb 75DF 2 lb/A + Kocide 2000 2 lb/A (2,4,6,8,10)…………………………………..	0.0 a	0.4 a	0.5 de	8.2 c
[z]Maneb 75DF 2 lb/A + Kocide 2000 2 lb/A (1-10)…………………………..	0.0 a	0.4 a	0.3 e	5.4 c
[x]Agrifos 1 1/4 qt/A (1-9)………………………………………………………	0.1 a	1.8 a	1.2 abcd	21.6 b
[y]Agrifos 2 1/4 qt/A (1-5)………………………………………………………	0.1 a	1.4 a	1.8 a	26.2 ab
P value	0.233	0.254	0.0001	0.000

Treatment (rate/A)	Soft Rot (T/A)[v]	% Soft Rot	Marketable Yield (T/A)	% Marketable
Untreated control..	0.6 ab	11.5 a	3.1 b	49.9 c
[w] Ridomil Gold EC1 pt………………………………………………………………	0.4 bc	10.9 a	3.0 b	47.1 c
[x]Amistar 80WG 2 oz/A alt. Manex 1.4 qt/A………………………………………..	0.5 abc	7.6 a	4.0 ab	54.5 c
[y]ReZist 1 pt/A + Stabilizer 1 pt/A (1-5)…………………………………………….	0.4 bc	11.3 a	2.9 b	48.5 c
[z]KP481 WG50 8 oz/A + Kocide2000 2 lb/A (1,3,5,7,9) alt. Maneb 75DF 2lb/A + kocide 2000 2 lb/A (2,4,6,8,10)…………………………………………………….	0.2 bc	3.0 b	5.5 a	70.7 b
[z]KP481 50WG 8 oz/A + Kocide 2000 2 lb/A + Maneb 75DF 2 lb/A (1,3,5,7,9) alt. Maneb 75DF 2 lb/A + Kocide 2000 2 lb/A (2,4,6,8,10)………………………	0.1 c	1.8 b	5.2 a	85.3 a
[z]KP481 50WG 10 oz/A + Kocide 2000 2 lb/A (1,3,5,7,9) alt. Maneb 75DF 2 lb/A + Kocide 2000 2 lb/A (2,4,6,8,10)………………………………………………...	0.2 bc	1.8 b	4.8 ab	85.0 ab
[z]Maneb 75DF 2 lb/A + Kocide 2000 2 lb/A (1-10)………………………………….	0.3 bc	5.9 ab	4.3 ab	84.0 ab
[x]Agrifos 1 1/4 qt/A (1-9)…………………………………………………………...	0.5 abc	9.4 a	3.0 b	49.1 c
[y]Agrifos 2 1/4 qt/A (1-5)…………………………………………………………...	0.9 a	13.3 a	3.6 ab	50.7 c
P value	0.039	0.007	0.102	0.000

[v]Values in a column followed by the same letter are not significantly different at the indicated *P* value.
[w]Ridomil Gold EC was applied as a drench at planting and every 30 days after planting: 1= 24 Jun, 2= 25 Jul, and 3= 26 Aug.
[x] Application dates for treatments applied at 7-10 day intervals were: 1= 2 Jul, 2= 11 Jul, 3= 18 Jul, 4= 25 Jul, 5= 4 Aug, 6= 11 Aug, 7= 19 Aug 8= 26 Aug, 9= 4 Sep.
[y]Application dates for treatments applied at 14 day intervals were: 1= 2 Jul, 2= 18 Jul, 3= 4 Aug, 4= 19 Aug, 5= 4 Sep.
[z] Application dates for treatments applied at 5-7 day intervals were: 1= 2 Jul, 2= 11 Jul, 3= 18 Jul, 4= 25 Jul, 5= 31 Jul, 6= 7 Aug, 7= 14 Aug, 8= 19 Aug, 9= 26 Aug, 10= 4 Sep.

PEPPER (*Capsicum annuum* 'North Star')
Anthracnose; *Collectotrichum acutatum*

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Evaluation of the effects of long-term compost amendment on pepper anthracnose and yield, 2003.

The experiment was conducted at the Ohio Agricultural Research and Development Center in Wooster, OH in a long-term (since 1997) compost amendment field trial on Wooster silt loam. The field consists of plots replicated three times in a randomized complete block design amended with one of two rates of compost or not amended and fertilized with synthetic fertilizers. For the 2003 trial, compost was applied on 26 Nov 2001 at 0 (OX), 17.96 (1X) or 27.0 T/A (2X). Twenty soil cores (3.25 x 6 in.) were randomly sampled from each replicate plot on 3 Apr, combined and air-dried. One approx. 80 g (dry weight) sample per plot was analyzed by the STAR Laboratory, OARDC, Wooster. On 28 May prior to planting, ammonium nitrate (63 lb/A NH_4 NO_3) and calcium nitrate (52 lb/A Ca (NO_3)2) were applied, broadcast, top-dressed and incorporated into control (non-compost-amended) plots. The herbicide Treflan EC (2 pt/A) was applied and incorporated on 6 Jun. Dual II Magnum (1 pt/A) was tank mixed with the wetting agent George II (20 oz/A) and applied on 6 Jun. 'North Star' peppers seeds were Clorox-treated on 4 Apr and sown on 15 Apr into 200-cell plug trays containing Fafard seedling mix. Pepper seedlings were hand-transplanted on 17 Jun. Starter fertilizer (N-P-K 9-45-15, 1.65 lb/55 gal water, 8 oz/plant) was applied to all plots on 26 Jun. Each plot contained eight rows of 30 pepper plants spaced 1 ft apart on 5 ft centers. The field was cultivated on 25 Jun, 14 and 31 Jul and 7 and 20 Aug and hoed on 8 Aug for weed control. Plants were inoculated with approximately 10^4 spores/ml *Colletotrichum acutatum* isolates AN1 and AN2 on the evening of 5 Aug, using a hand-held Herbi Sprayer (red nozzle) at 8.2 gal/A and an approximate walking rate of 2 ft/sec. Provado 1.6 F (3 oz/A), Pounce EC (8 oz/A), Spintor 2SC (5.3 oz/A) and Sevin XRL Plus (3 qt/A) tank mixed with Spintor 2SC (5.3 oz/A) were applied on 18 Jul, 31 Jul, 7 Aug and 14 Aug respectively to control insects. Leaf and stem fresh and dry weight, leaf area, and fruit number and weight were determined on a subsample of three plants/replicate plot on 25 Jul. On 18 Aug and 5 Sep, three plants were harvested from each row in a treatment and weights and numbers of marketable fruit, fruit with anthracnose (divided in three categories: 1 spot, 2-3 spots, and 4+ spots per fruit), blossom end rot, and other rots were determined. Average maximum temperatures for 17-30 Jun, Jul and Aug and 1-5 Sep were 79.8, 82.3, 82.9 and 73.0 ºF; averages minimum temperatures were 56.4, 60.2, 60.9 and 59.1ºF; and total rainfall was 0.77, 7.17, 3.74 and 1.7 in., respectively. Data were analyzed by ANOVA using SAS statistical software. Means were separated using Fisher's protected least significant difference test.

Compost amendment once a year over a 5-year period (1997-2001) significantly improved soil quality parameters including organic matter content (increase from 2.8 to 4.4%) and concentration of most nutrients (Table 1). Lime Test Index and pH were not affected, and phosphorus content was marginally increased in compost-amended plots compared to the non-amended control. There were no significant differences in plant growth parameters (leaf and stem weight, leaf area, fruit number and weight) measured during the early fruiting stage among the treatments. However, first harvest and total yields of marketable pepper fruit were significantly higher in plots amended with the high rate of compost than in the non-amended control plots and plots amended with the low rate of compost (Table 2). There were no differences between treatments in anthracnose incidence or severity at either harvest.

Table 1. Effect of compost amendment on soil quality parameters.

Soil Quality Parameter	No Compost	Compost 17.96 T/A	Compost 27.0 T/A	P value
Lime Test Index………………………..	69.7 a	70.0 a	70.0 a	0.444
PH……………………………………	6.9 a	7.0 a	7.2 a	0.257
Phosphorous…………………………….	124.3 b	168.7 ab	201.7 a	0.082
Calcium…………………………………	1021.0 b	1288.0 ab	1564.0 a	0.025
Magnesium……………………………..	246.3 c	264.7 b	285.0 a	0.009
Potassium……………………………….	207.3 c	320.7 b	434.0 a	0.001
Soluble Salt……………………………..	0.12 b	0.14 a	0.16 a	0.012
Nitrogen………………………………...	0.11 c	0.14 b	0.19 a	0.000
Organic Matter………………………….	2.8 c	3.5 b	4.3 a	0.000

Means in a row followed by the same letter are not significantly different.

Table 2. Effect of compost soil amendment on pepper yield and fruit anthracnose incidence and severity.

Treatment and rate/A	Marketable fruit Harvest 1 (ton/A)[1]	Marketable fruit Harvest 2 (ton/A)	Total Marketable fruit (ton/A)	Anthracnose Incidence (%)[2,3]	Anthracnose Severity
No Compost………………………….	1.2 b	1.2 a	2.4 b	59.4 a	14.8 a
Compost 17.96 T/A………………..	1.1 b	0.9 a	2.1 b	58.5 a	13.4 a
Compost 27.0 T/A.…………………	1.7 a	1.4 a	3.1 a	51.2 a	12.8 a
P value	0.002	0.203	0.006	0.376	0.584

[1]Means in a row followed by the same letter are not significantly different; [2] Data for both harvests combined; [3] Based on number of fruit with symptoms of anthracnose.

Lettuce (*Lactuca sativa* ‘Green Towers’ Romaine)
Sclerotinia drop; *Sclerotinia minor*

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Evaluation of biological and chemical treatments to control Sclerotinia drop in lettuce, 2003.

The experiment was conducted at K. W. Zellers & Sons Farms, Hartville, OH on organic (Linwood muck, pH 5.4, 76% OM). Plots were managed according to normal practices for fertility and weed and insect control. Treatments were applied by Mr. R. W. Zellers. Two separate trials were established: Trial 1- Evaluation of Switch, Serenade and BAS 510 (Endure) and Trial 2 – Contans. Trial 1: Treatments were arranged in a randomized complete block design with three replications. Each plot consisted of one 50 ft long raised bed within a larger production field. Lettuce seedlings were transplanted on 25 Apr with a three-row transplanter, with plants 10 in. apart within the rows. Treatments were applied on 30 April, and 10 and 19 May using a tractor mounted field sprayer (25 psi, 100 gpa). The Endura plots were treated with Rovral instead of Endura on 10 May. The numbers of healthy plants and plants with drop symptoms in each plot were determined on 2 Jun. Trial 2: Each plot consisted of one 150-ft long raised bed within a larger production field. The two treatments and the untreated control were randomized in each of three blocks; blocks were separated by one untreated bed. Lettuce seedlings were transplanted on 29-30 Apr with a three-row transplanter, with plants 12 in. apart within the rows. Contans was applied on 29 Apr (pre-plant; applied and disked in before preparing beds; disked in top 2 in. –roller behind disk) (broadcast) or 30 Apr (post-plant) (directed spray; drop pipe boom w/ nozzles directed at 45 degree angle at base of plant; 2 nozzles per row), using a tractor mounted field sprayer (25 psi, 100 gpa). The numbers of healthy plants and plants with drop symptoms in each plot were determined on 5 May. Proportional data were $\log_{10}$-transformed prior to analysis by ANOVA using SAS statistical software and means were separated using Fisher’s protected least significant test. Non-transformed means are reported.

Weather conditions were unusually cool and rainy and disease pressure was severe. There were no significant differences among Switch, Serenade, and Endure treatments and the untreated control in Trial 1. There was a great deal of variation in the distribution of the disease in the field, with higher disease incidence in several low spots. Switch appeared to be somewhat effective, although the variation resulted in a lack of statistical significance. In Trial 2, the biological control agent *Coniothyrium minitans* (Contans) was not effective in reducing the incidence of Sclerotinia drop in lettuce. In fact, the pre-plant application resulted in significantly more drop than the untreated control and post-plant Contans application. Since *C. minitans* acts by parasitizing the sclerotia (resting structures) of *Sclerotinia*, some time is usually necessary for the product to be effective. In addition, incorporation of the product into the soil for the pre-plant application probably brought additional sclerotia to the surface where they germinated to produce “mushrooms” and spores, resulting in higher disease incidence than in the control or post-plant (not incorporated) treatment.

Trial 1: Evaluation of fungicides and a biological control agent for Sclerotinia drop control in lettuce

Treatment, rate/A	**% Drop**[z]
Switch 62.5WG, 14 fl oz	29.0
Serenade, 6 lb	63.5
Endure (1,3), 11 oz alt. Rovral (2)	47.6
Untreated control	60.3
Rovral, 1lb	53.1
P value	0.129

[z] Means followed by the same letter are not significantly different at $P \leq 0.05$.

Trial 2: Evaluation of the biocontrol agent, Contans, for control of Sclerotinia drop in lettuce

Treatment, rate/A	**% Drop**[z]
Contans, 2 lb, applied prior to planting	52.4 a
Contans, 2 lb, applied after planting	41.3 b
Untreated control	37.4 b
P value	0.0410

[z] Means followed by the same letter are not significantly different at $P \leq 0.05$.

PARSLEY (*Petroselinum crispum* 'Dark Green Italian')
Septoria leaf spot; *Septoria petroselini*

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Evaluation of fungicides for the control of Septoria leaf spot of parsley, 2003.

The experiment was conducted at the Ohio Agricultural Research and Development Center Muck Crops Research Branch in Celeryville, OH. Fertilizer (17-17-17, 500 lbs/A) was incorporated into the test field on 18 Apr. Plots were disked, leveled and rolled and parsley was direct seeded on 25 Apr. Treatments were arranged in a randomized complete block design with three replications. Each plot consisted of three, 20-ft. rows seeded at a rate of 15 seeds/ft. The herbicide Lorox (1/2 lb /A) was applied 30 May, 11 Jun, and 23 Jul. Treatments were applied on 25 Jul, 4, 11, 18, and 25 Aug, and 3, 10, and 16 Sep using a tractor mounted 3.5 hp Honda motor driven sprayer (40 psi**,** 4.4 gal/A) for the first three applications and a tractor mounted 3.0 hitch (hydraulic attach) motor driven sprayer (75 psi, 56 gal/A) for the last five applications. Plants were overhead irrigated on 29 Apr, 19 May, and 11 and 16 Sep with 1.5, 1.5, 1.0, and 0.7, in. of water respectively. Average maximum temperatures for 25-30 Apr, May, Jun, Jul, Aug and 1-16 Sep were 68.2, 67.9, 76.2, 81.3, 82.2, and 74.9 ºF; minimum temperatures were 40.5, 48.0, 55.7, 60.7, 60.8, and 52.1ºF; and rainfall was 0.21, 5.23, 1.03, 7.03, 3.76, and 4.04 in., respectively. Leaves were harvested from a 10 ft section from the center row of each plot on 25 Sep. Approximately 150 leaves were randomly selected from the harvested section and rated for Septoria incidence. Proportional data were $\log_{10}$-transformed prior to analysis by ANOVA using SAS statistical software and means were separated using Fisher's protected least significant test. Non-transformed means are reported.

Symptoms of Septoria leaf spot did not appear until September and disease pressure was low/moderate. All of the treatments had significantly lower disease incidence than the untreated control. There were no differences in disease incidence among fungicide treatments. None of the treatments were phytotoxic to parsley.

Treatment, rate/A (application number)	% Septoria^{z}
Untreated control………………………………………………………………...	24.8 a
Cabrio 20WG 0.75 lb (1-8)……………………………………………………..	5.3 b
Quadris 2.08SC 6.2 fl. oz (1-8)……………………………………………………	2.4 b
Tilt EC 4 fl. oz (1-8)……………………………………………….………….	1.3 b
Switch 62.5WG 0.875 lb (1,2)……………………………………………..…	5.0 b
Quadris 2.08SC 6.2 fl. oz (1,3,5,7) alt. Tilt EC 4 fl. oz (2,4,6,8)…………………	3.3 b
Quadris 2.08SC 6.2 fl. oz (1,2,4,6,8) alt. Switch 62.5WG 0.875 lb (3,5,7)……..	3.3 b
Cabrio 20WG 0.75 lb (1,3,5,7) alt. Tilt EC 4 fl. oz (2,4,6,8)……………………..	3.9 b
Cabrio 20WG 0.75 lb (1,3,5,7) alt. Switch 62.5WG 0.875 lb (2,4,6,8)………….	2.4 b

^{z} Means followed by the same letter are not significantly different at $P \leq 0.05$.

SQUASH (*Cucurbita moschata* 'Crookneck')
Powdery mildew; *Sphaerotheca fuliginea*
Bacterial wilt, *Erwinia tracheiphila*
Anthracnose, *Colletotrichum orviculare*

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Evaluation of the effect of compost amendments on squash diseases and yield, 2003.

The experiment was conducted at the Ohio Agricultural Research and Development Center in Wooster, OH in a long-term (since 1997) compost amendment field trial on Wooster silt loam. The field consists of plots replicated three times in a randomized complete block design amended with one of two rates of compost or not amended and fertilized with synthetic fertilizers. For the 2003 trials, compost was applied on 26 Nov 2001at 0 (OX), 17.96 (1X) or 27.0 T/A (2X). Twenty soil cores (3.25 x 6 in.) were randomly sampled from each replicate plot on 3 Apr, combined and air-dried. One approx. 80 g (dry weight) sample per plot was analyzed by the STAR Laboratory, OARDC, Wooster. On 28 May prior to planting, ammonium nitrate (63 lb/A NH_4 NO_3) was applied, broadcast, top-dressed and incorporated into control (non-compost-amended). The herbicides Curbit EC (4 qt/A) and Round Up Ultra (1.25 qt/A tank mixed with the wetting agent George II (20 oz/A)) were applied on 6 Jun. 'Crookneck' squash seeds were sown on 19 May into 50-cell plug trays containing Fafard seedling mix. Squash seedlings were hand-transplanted (eight rows per treatment) on 9 Jun. Each row consisted of 15 plants spaced 2 ft apart on 5 ft centers. The field was cultivated on 25 Jun and 14 Jul and hoed on 7, 14 and 29 Jul and 19 Aug for weed control. The insecticide Pounce EC (8 oz/A) was applied on 16 and 31 Jul and Sevin XLR Plus (1 qt/A) was applied on 21 Aug. Plant vigor was assessed by measuring the height and diameter of three plants from the center of each treatment row on 17 Jul. Severity of powdery mildew and anthracnose was evaluated on 30 Jul and 19 Aug using a modified Horsfall-Barratt rating scale. Incidence and severity of bacterial wilt and severity of yellow vine decline were also evaluated on 30 Jul and 19 Aug. Fruit were harvested from the center three plants of each row on 24 and 29 Jul, 4, 6, 8, 11, 13, 15, 18, 20 and 22 Aug, and the weight and number of healthy fruit, marketable fruit, culls, and overripe fruit were determined. Average maximum temperatures for 9-30 Jun, Jul, and 1-22 Aug were 79.5, 82.3 and 83.6 °F; minimum averages were 58.0, 60.2 and 62.2 °F; and total rainfall was 2.76, 7.17 and 2.00 in, respectively.

Compost amendment once a year over a 5-year period (1997-2001) significantly improved soil quality parameters including organic matter content (increase from 2.8 to 4.4%) and concentration of most nutrients (Table 1). Lime Test Index and pH were not affected, and phosphorus content was marginally increased in compost-amended plots compared to the non-amended control. However, compost amendment had no effect on the incidence or severity of foliar anthracnose, powdery mildew, bacterial wilt or yellow vine decline (Table 2). The total number of fruit after 11 harvests was marginally higher in plots amended with the high rate of compost compared to the low rate (P = 0.085). The proportion of healthy fruit among all fruit harvested was high (88 - 91.2%) and did not differ among treatments.

Table 1. Effect of compost amendment on soil quality parameters.

Soil Quality Parameter	No Compost[1]	Compost 17.96 T/A	Compost 27.0 T/A	P value
Lime Test Index……………………...	69.7 a	70.0 a	70.0 a	0.444
PH……………………………………	6.9 a	7.0 a	7.2 a	0.257
Phosphorous…………………………….	124.3 b	168.7 ab	201.7 a	0.082
Calcium…………………………………	1021.0 b	1288.0 ab	1564.0 a	0.025
Magnesium……………………………..	246.3 c	264.7 b	285.0 a	0.009
Potassium……………………………….	207.3 c	320.7 b	434.0 a	0.001
Soluble Salt……………………………..	0.12 b	0.14 a	0.16 a	0.012
Nitrogen………………………………...	0.11 c	0.14 b	0.19 a	0.000
Organic Matter………………………….	2.8 c	3.5 b	4.3 a	0.000

[1]Means in a row followed by the same letter are not significantly different.

Table 2. Effect of compost soil amendment on squash yield and disease incidence and severity.

Treatment and rate/A	Anthracnose (%)[1,2]	Powdery mildew (%)[1]	Bacterial wilt (%)[3]	Yellow vine decline (%)[3]	Total Healthy (No./A)	Healthy (%)[4]
No Compost…………	1.5 a	5.4 a	0.0 a	0.0 a	29824.2 ab	88.0 a
Compost 17.96 T/A…	2.1 a	5.1 a	12.5 a	12.5 a	27524.5 b	91.7 a
Compost 27.0 T/A.…	1.6 a	6.3 a	4.2 a	0.0 a	32485.5 a	88.2 a
P value	0.183	0.505	0.284	0.160	0.085	0.419

[1]Based on midpoint of Horsfall-Barrat rating on 19 Aug; [2]Means in a column followed by the same letter are not significantly different; [3] Proportion of plants with symptoms on 19 Aug; [4] Based on number of fruit.

EDAMAME SOYBEAN (*Glycine max*)

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Evaluation of the effects of long-term compost amendment and cultivars on the production of edamame soybean, 2003.

Eight edamame cultivars were evaluated for production characteristics in a long-term (since 1997) compost amendment field trial at the Ohio Agricultural Research and Development Center in Wooster, OH on Wooster silt loam. The field consists of plots replicated three times in a randomized complete block design amended with one of two rates of compost, or not amended. For the 2003 trials, compost was applied on 26 Nov 2001at 0 (OX), 17.96 (1X) or 27.0 T/A (2X). Twenty soil cores (3.25 x 6 in.) were randomly sampled from each replicate plot on 3 Apr, combined and air-dried. One approx. 80 g (dry weight) sample per plot was analyzed by the STAR Laboratory, OARDC, Wooster. Plots were chisel plowed and disked on 28 May. The herbicides Lorox®-DF (1/2 lb/A), Dual II Magnum (1 pt/A) and Round-up Ultra (1/4 qt/A) were tank mixed with the wetting agent George II (20 oz/A) and applied on 29 May. No additional fertilizers were added to the plots. Edamame was direct seeded on 29 May at a seeding rate of six seeds per foot. Cultivars were randomized with three replications within the compost amendment plots in a split plot design. Each plot was 30 ft long and consisted of one row per cultivar, with 30 in. between rows. The field was cultivated on 2 Jul and 19 Aug and hoed on 13 Aug for weed control. Emerged seedlings were counted from a 10-ft section in the center of each row on 16 Jun. Plants were harvested from the same 10 ft section of row between 21 and 28 Aug depending on the cultivar. Plant height was measured from the first root to the highest pod. Numbers of plants, numbers and weights of pods containing two, three, or four seeds and culls (0-1 seeds) were obtained. Average maximum temperatures were 29-31 May, Jun, Jul, and 1-28 Aug were 71.5, 76.4, 82.3 and 83.6 °F; average minimum temperatures were 49.4, 55.3, 60.2 and 61.3 ºF; rainfall 0.58, 3.29, 7.17 and 2.9 in. respectively.

Compost amendment once a year over a 5-year period (1997-2001) significantly improved soil quality parameters including organic matter content (increase from 2.8 to 4.4%) and concentration of most nutrients (Table 1). Lime Test Index and pH were not affected, and phosphorus content was marginally increased in compost-amended plots compared to the non-amended control. Compost amendment had no effect on any of the edamame soybean yield variables examined, including yield. However, there were significant differences among cultivars in all of the variables measured (Tables 2 & 3). Plant emergence (average 15.2 - 52%) was poor due to poor seed quality resulting from drought conditions during seed production in 2002 and cool, wet soil in 2003. ‘Misono-Green’ had the highest stand count and also highest marketable yield, although yield per plant was low. ‘Lucky Lion’ had the highest yield per plant, compensating for low stand count. ‘Buker’s Favorite’ and ‘Kenko’ also produced relatively high yields. ‘Sayasume’ had the most large pods (three seeds) while ‘Misono green’ had the least. Plant height ranged from 8.8 to 16.4 in on average.

Table 1. Effect of compost amendment on soil quality parameters.

Soil Quality Parameter	No Compost	Compost 17.96 T/A	Compost 27.0 T/A	P value
Lime Test Index………………………..	69.7 a	70.0 a	70.0 a	0.444
PH………………………………………	6.9 a	7.0 a	7.2 a	0.257
Phosphorous…………………………….	124.3 b	168.7 ab	201.7 a	0.082
Calcium…………………………………	1021.0 b	1288.0 ab	1564.0 a	0.025
Magnesium……………………………..	246.3 c	264.7 b	285.0 a	0.009
Potassium……………………………….	207.3 c	320.7 b	434.0 a	0.001
Soluble Salt……………………………..	0.12 b	0.14 a	0.16 a	0.012
Nitrogen………………………………...	0.11 c	0.14 b	0.19 a	0.000
Organic Matter………………………….	2.8 c	3.5 b	4.3 a	0.000

Means in a row followed by the same letter are not significantly different.

Table 2. Emergence, height, marketable yield and yield components for edamame soybean cultivars.

Cultivar	Stand Count 16 Jun	Height (in.)	Marketable yield (lb/A)	Marketable yield/plant (oz)	No. marketable pods/plant
White Lion	21.6 b	8.8 g	4898.5 cd	2.6 de	27.6 c
Early Hakucho	11.1 cd	12.0 de	4850.5 cd	4.0 bc	38.8 b
Lucky Lion	9.1 d	12.9 cd	5271.4 bc	5.3 a	51.3 a
Sapporo Midori	14.6 c	11.2 ef	3854.4 cd	2.7 de	29.8 c
Buker's Favorite	23.2 b	16.4 a	6691.1 ab	2.4 e	28.0 c
Misono-Green	31.0 a	14.5 b	8251.5 a	2.5 e	29.6 c
Sayasume	9.7 d	10.0 fg	3338.5 d	3.5 dc	31.9 bc
Kenko	15.3 c	14.0 bc	6896.5 ab	4.9 ab	49.9 a
P value	0.000	0.000	0.000	0.000	0.000

Means in a column followed by the same letter are not significantly different.

Table 3. Number, weight and size (two or three seeds) of pods for edamame soybean cultivars.

Cultivar	No. culls/plant	Culls/plant (oz)	Pods with three seeds (oz)	Pods with two seeds (oz)
White Lion	9.9 d	0.42 f	0.12 c	0.08 bc
Early Hakucho	22.6 a	1.11 a	0.13 b	0.09 a
Lucky Lion	18.8 b	0.90 b	0.13 b	0.09 a
Sapporo Midori	15.7 bc	0.66 cde	0.12 bc	0.08 bc
Buker's Favorite	12.0 cd	0.56 def	0.13 bc	0.09 b
Misono-Green	10.5 d	0.50 ef	0.10 d	0.07 c
Sayasume	14.9 c	0.72 bcd	0.14 a	0.10 a
Kenko	14.9 c	0.78 bc	0.12 bc	0.09 ab
P value	0.000	0.000	0.000	0.000

Means in a column followed by the same letter are not significantly different.

For more information on this report or to receive copies of this or similar publications, please contact:

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