

## Efficacy of Organic Fungicides for Vegetable Diseases

Fungicides listed by crop grouping and disease, then by product. Effective products in bold. Almost all results are from Plant Disease Management Reports (PDMR), some one of its precursors, Fungicide & Nematicide Tests. References to studies include state and year of study. Reports almost always published following year. All field studies with weekly spray schedule except where noted.

CTE = Conventional treatment effective.

### HERBS - Basil

#### Downy mildew

2 GH expts. **Actinovate** (12 oz/A) **effective** in both. **Regalia** SC (1% v/v), **Companion** (32 fl oz/A), and **Sonata** (4 qt/A) **effective** in one. Serenade (3 lb/A) ineffective. Prophyt (4 pt/A) was much more effective. Prophyt (2 pt/A) + Quadris (9 fl oz/A) was excellent. 3 experimentals also examined. FL, 2010, PDMR 6:V059.

**Actinovate** 12 oz/A + Induce **moderately effective** (FL, 2007, PDMR 2:V068).\*

**Actinovate** 10 oz/A + ThermX70 **slightly effective** at 1 of 2 sites. Preventive schedule. (CT, 2011, PDMR 6:V073).\*

Actinovate 10 oz/A + ThermX70 ineffective, 2 sites. Preventive schedule. Also ineffective applied in alternation with OxiDate (CT, 2012, PDMR 7:V045).\*

Actinovate 12 oz/A ineffective. Preventive. Conventional fungicides also ineffective. (NY, 2010, PDMR 5:V098, MTM).

Companion 1 gal/A ineffective. Preventive. Conventional fungicides also ineffective. (NY, 2010, PDMR 5:V098, MTM).

Companion 1 gal/A ineffective. Preventive. Conventional fungicides also ineffective. (NY, 2011, PDMR 6:V099, MTM).

Cueva 1 gal/A ineffective applied twice weekly. (FL, 2016, PDMR 11:V045).\*

Double Nickel 0.5 lb/A ineffective applied 6X with Cueva 2X, or applied 4X with Regalia 1 qt/A with Cueva applied for 3<sup>rd</sup> app. All twice weekly schedule. (FL, 2016, PDMR 11:V045).\*

Double Nickel 3 lb/A ineffective. Preventive. CTE (NY, 2016, PDMR 11:V030, MTM).

**MilStop** 2.5 lb/A **moderately effective**, 2 sites. Preventive schedule. (CT, 2011, PDMR 6:V073).\*

MilStop 2.5 lb/A ineffective, 2 sites. Preventive schedule. (CT, 2012, PDMR 7:V045).\*

Nordox 75WG 14oz/A ineffective (IL, 2011, PDMR 6:V131).\*

Nordox 75WG 8 oz/A + TriTek 2% (v:v) ineffective (IL, 2011, PDMR 6:V131).\*

Organocide 2 fl oz/100 gal ineffective. Preventive. Conventional fungicides also ineffective. (NY, 2010, PDMR 5:V098, MTM).

**OxiDate** 0.6 and 1.2 gal/A (rate increased after symptoms seen) + Yucca Ag-Aide **moderately effective**. 2 sites. Preventive schedule. (CT, 2011, PDMR 6:V073).\*

**OxiDate** 0.6 gal/A + Yucca Ag-Aide **slightly effective** at 1 of 2 sites. Preventive schedule. (CT, 2012, PDMR 7:V045). \*

OxiDate 128 fl oz/100 gal ineffective. Preventive. Conventional fungicides also ineffective. (NY, 2010, PDMR 5:V098, MTM).

**Procidic** 20 fl oz/A **moderately effective** on 3-day interval with Cueva applied for 3<sup>rd</sup> app; one of the 3 most effective treatments, others not organic or labeled biopesticides, but not considered commercially acceptable control. (FL, 2016, PDMR 11:V045). \*

Procidic 20 and 40/A ineffective. Preventive. CTE (NY, 2016, PDMR 11:V030, MTM).

**Regalia** 1% **moderately effective**, slightly more effective applied with Sonata 4 qt/A, but neither were sufficiently effective to yield marketable stems (6-in stem tips with no symptoms). Control not improved by applying Regalia with Kocide 3000 2 lb/A (FL, 2010, PDMR 5:V155).

Regalia 1% ineffective. Preventive. Conventional fungicides also ineffective. (NY, 2010, PDMR 5:V098, MTM).

Serenade 2 qt/A + Induce 90 ineffective (IL, 2011, PDMR 6:V131). \*

Serenade 2 qt/A + Regalia 1% (v:v) ineffective (IL, 2011, PDMR 6:V131). \*

**Serenade Max** WP 4 lb/A + Biotune **moderately effective** (FL, 2007, PDMR 2:V068). \*

**Serenade MAX** 2 lb/A + ThermX70 **slightly effective** at 1 of 2 sites. Preventive schedule. (CT, 2011, PDMR 6:V073). \*

**Sil-Matrix** 3 qt/A **effective** applied 6X with Cueva 2X; twice weekly schedule. (FL, 2016, PDMR 11:V045). \*

**Sonata** ASO 4 pt/A + Biotune **moderately effective** (FL, 2007, PDMR 2:V068). \*

Sonata 2 qt/A + Induce 90 ineffective (IL, 2011, PDMR 6:V131). \*

Sonata AG 3 qt/A + BioLink ineffective. Preventive. Conventional fungicides also ineffective. (NY, 2010, PDMR 5:V098).

Sporatec AG 1 qt/A + BioLink ineffective. Preventive. Conventional fungicides also ineffective. (NY, 2010, PDMR 5:V098, MTM).

Timorex Gold 0.75% ineffective. Preventive. Conventional fungicides also ineffective. (NY, 2010, PDMR 5:V098, MTM).

**Trilogy** 77 fl oz/A **slightly effective** at 1 of 2 sites. Preventive schedule. (CT, 2011, PDMR 6:V073). \*

\* In CT trials, symptoms were confirmed during third week of treatments in 2011, second in 2012. Mean ratings for basil receiving best treatment (MilStop) were 1.6 and 2.0 versus 2.4 for non-treated basil at both sites. The rating scale used was based on percent leaf area with sporulation: 1 = <10% , 2 = 10-50%, and 3 = >50%.

\* In IL trial, all organic treatments tested were ineffective; conventional treatments were all very effective (9 provided complete control).

\* In FL trial in 2007 some conventional treatments provided effective control.

\* In FL trial in 2016 treatments were applied to susceptible (Large Leaf) and resistant (Eleanora) varieties. Treatments were applied twice weekly starting at 1-2 true-leaf stage. Disease pressure was extreme from the start.

Cotyledon drench treatment of conventional fungicide (Orondis) was applied to all plots to slow disease onset. No treatment afforded a level of downy mildew control that would have produced a marketable crop.

## **Asparagus**

### **Beet**

#### **Cercospora leaf spot**

**Actinovate** 12 oz/A **effective**, preventive schedule (NY, 2014, PDMR 9:V007). \*

**Serenade Optimum** 1 lb/A **effective**, preventive (NY, 2014, PDMR 9:V007). \*

**Copper**. Cueva 1 gal/A **effective**, preventive (NY, 2014, PDMR 9:V007). \*

\* all organic treatments equally effective; less disease on untreated resistant varieties. Serenade + Cueva not better than either alone. (NY, 2014, PDMR 9:V007)

### **Brassica (cruciferous) crops** (broccoli, cabbage, cauliflower, kale, kohlrabi, etc.)

#### **Alternaria leaf spot**

**Actinovate** 12 oz/A **effective** (NY, 2010, PDMR 5:V116).

Actinovate 12 oz/A ineffective tested on collards. CTE (MA, 2013, PDMR 8:V223).

Actinovate 6 oz/50 gal ineffective (NY, 2013; see below). \*

**Double Nickel** 55 LC 6 qt/A **effective** tested on collards, as effective as conventional fungicide (MA, 2013, PDMR 8:V223).

**Double Nickel** 3 lb/A **effective** after 2 applications in second trial and 1 wk after the one application made in first trial. (NY, 2012, PDMR 7:V054; NY, 2012, PDMR 7:V032)

EF 400 64 oz/100 gal ineffective. Cauliflower. (NY, 2013; see below). \*

**Regalia** 3 pt/A **effective** 1 wk after the one application made. (NY, 2012, PDMR 7:V032)

Regalia 3 pt/50 gal ineffective (NY, 2013; see below). \*

Serenade Max 3 lb/A ineffective (NY, 2013; see below). \*

Serenade Optimum 20 oz/A ineffective tested on collards. CTE (MA, 2013, PDMR 8:V223).

Sonata ASO 4 qt/A ineffective tested on collards. CTE (MA, 2013, PDMR 8:V223).

Sonata 4 qt/A ineffective (NY, 2013; see below). \*

Sporatec 3 pt/A ineffective (NY, 2013; see below). \*

\* NY, 2013: products applied 7X weekly at 40 gpa starting 2 days before inoculation, none effective, copper also ineffective (PDMR 8:V260)

#### **Black rot**

Actinovate 12 oz/A ineffective tested on collards. CTE (MA, 2013, PDMR 8:V223).

**Double Nickel** 55 LC 6 qt/A **effective** tested on collards, as effective as copper (MA, 2013, PDMR 8:V223).

Serenade Optimum 20 oz/A ineffective tested on collards. CTE (MA, 2013, PDMR 8:V223).

Sonata ASO 4 qt/A ineffective tested on collards. CTE (MA, 2013, PDMR 8:V223).

Regalia 3 pt/50 gal applied at 40 gpa ineffective applied alone in both experiments and didn't improve control achieved with Kocide 3000 in 2012 (NY, 2011, PDMR 6:V106; NY, 2012, PDMR 7:V060).

## **Bulb Crops** (onion, garlic, shallots)

## **Corn**

### Common rust

**Serenade** 32 fl oz/A **effective** (MI, 2009, PDMR 5:FC002)

### Grey leaf spot

**Serenade** 32 fl oz/A **effective** (MI, 2009, PDMR 5:FC002)

## **Corn, Sweet**

## **Cucurbit crops** (cucumber, melon, pumpkin, squash, watermelon, etc.)

### Anthracnose - Watermelon

Actinovate 6 oz/A ineffective, preventive schedule, assessed 3 wks after last spray, CTE (OK, 2006, 1:V036).

**OxiDate** 1% **effective** but not enough to increase yield compared to nontreated (IN, 2010, PDMR 5:V022).

Regalia 1gal/A ineffective (SC, 2013, PDMR 8:V218).

Serenade Optimum 20 oz/A ineffective (SC, 2013, PDMR 8:V218).

### Bacterial spot - Pumpkin

**Actinovate** 12 oz/A **effective** for controlling disease on leaves in both experiments and on fruit in 2013 (IL, 2012)(IL, 2013, PDMR 8:V).

**Serenade** 6 qt/A **effective** for controlling disease on leaves and fruit (IL, 2012)(IL, 2013, PDMR 8:V).

**Regalia** 1 qt/A **effective** for controlling disease on leaves and fruit; most effective treatment for protecting fruit in 2012 (IL, 2012)(IL, 2013, PDMR 8:V).

**Sonata** 4 qt/A **effective** for controlling disease on leaves and fruit (IL, 2012)(IL, 2013, PDMR 8:V).

### Downy mildew - Cucumber

**Actinovate somewhat effective** after 2 applications at lower rates (6 and 8 oz, but not at 12 oz/A), started 2 days after first symptoms; ineffective at last rating 1 wk later. CTE. (PA 2016, PDMR 11:V065)

**Actinovate** 12 oz/50 gal applied at 40 gpa alone or tank mixed with Regalia 3 pt **effective** but authors concluded not sufficient control. Control similar to copper (3 products tested). (NY, 2015, PDMR 10:V015).

Actinovate 6 oz/A applied at 60 gpa ineffective. CTE. (FL, 2015, PDMR 10:V065).

**Actinovate** 6 oz/50 gal **effective**; copper numerically better but not significantly; preventive schedule used (NY, 2013, PDMR 8:V227).

**Actinovate** 12 oz/A + Biolink **somewhat effective**, same as copper; preventive schedule (NY, 2008, PDMR 3:V116).

**Actinovate** 12 oz/A **moderately effective**, copper slightly better; symptoms present at first application (NY, 2009, PDMR 4:V123).

Actinovate 12 oz/A applied in alternation with copper (Champ) less effective than Champ weekly (MD, 2013, PDMR 8:V210).

**Double Nickel** LC 1.25 lb/A applied at 40 gpa **effective** but authors concluded not sufficient control. Control similar to copper (3 products tested). (NY, 2015, PDMR 10:V015).

Double Nickel 0.75 lb/A ineffective. CTE. (FL, 2016, PDMR 11:V060).

**Neem oil** 1 fl oz/gal **somewhat effective**; copper more effective (OH, 2013, PDMR 8:V177).

Organocide 1 oz/gal applied with low rate copper (NuCop HB 1 lb/A) at 75 gpa effective, same as copper at high rate (1 lb/A); symptoms present at first application (NY, 2009, PDMR 4:V123).

OxiDate 1% weekly schedule ineffective. CTE. (NC, 2015, PDMR 10:V086).

**OxiDate** 1% weekly schedule **effective**, copper numerically better but not significantly (OH, 2013, PDMR 8:V177).

**OxiDate** 128 oz/A **effective** only when applied with Yucca Ag Aide; preventive schedule used; copper more effective (NY, 2012, PDMR 7:V049).

**OxiDate** 128 oz/A **effective**, no benefit to using Yucca Ag Aide; copper numerically better, not significantly; preventive schedule (NY, 2013, PDMR 8:V227).

OxiDate 128 oz/A ineffective applied with Yucca Ag Aide; preventive schedule used; copper effective (NY, 2011, PDMR 6:V103).

OxiDate 4 pt/A ineffective applied every 4-6 days; 5% infection when started sprays; conventional fungicides effective (MI, 2009, PDMR 4:V057).

OxiDate 3 pt/A applied in alternation with copper (Champ) less effective than Champ weekly (MD, 2013, PDMR 8:V210).

**Regalia** 3 pt/50 gal applied at 40 gpa **alone or tank mixed with Actinovate** 12 oz **effective** but authors concluded not sufficient control. Control similar to copper (3 products tested). (NY, 2015, PDMR 10:V015).

**Regalia** 0.5% **limited efficacy**, copper better; symptoms present at first application (NY, 2009, PDMR 4:V123).

Regalia 1% ineffective; copper effective (OH, 2013, PDMR 8:V177).

Regalia 3 pt/50 gal applied at 40 gpa ineffective; copper effective; preventive schedule used (NY, 2013, PDMR 8:V227).

Regalia 1 qt/A applied in alternation with copper (Champ) less effective than Champ weekly (MD, 2013, PDMR 8:V210).

**Serenade Max** 3 lb/A **limited efficacy**, copper better; symptoms present at first application (NY, 2009, PDMR 4:V123).

Serenade Max 1.5 lb/A ineffective, started 2 days after first symptoms. CTE. (PA 2016, PDMR 11:V065)

Serenade Max 2 lb/A ineffective; copper effective (OH, 2013, PDMR 8:V177).

Serenade Max 3 lb/A ineffective; copper effective (NY, 2011, PDMR 6:V103)).

Serenade 3 lb/A ineffective applied every 4-6 days; 5% infection when started sprays; conventional fungicides effective (MI, 2009, PDMR 4:V057).

**Serenade Opti** 14 oz/A **moderately effective**. CTE. (FL, 2016, PDMR 11:V060).

Serenade Soil 2 qt/A applied in alternation with copper (Champ) as effective as Champ weekly (MD, 2013, PDMR 8:V210).

**Sil-Matrix** 4 qt/100 gal **slightly effective**. CTE. (NC, 2016, PDMR 11:V096)

**Sonata** 2 qt/A + BioTune **somewhat effective**; Bravo more effective (GA, 2006, PDMR 1:V166).

Sonata 2 qt/A ineffective in 2 experiments; CTE (SC, 2007, PDMR 2:V024).

**Sonata** 3 qt/A **somewhat effective**; numerically more severe DM with Manzate (GA, 2010, PDMR 5:V169)

**Sonata** 4 qt/A **effective**; preventive schedule used; numerically better but not significantly (NY, 2011, PDMR 6:V103).

**Sonata** 4 qt/A **moderately effective**, copper slightly better; symptoms present at first application (NY, 2009, PDMR 4:V123).

Sonata 4 qt/A ineffective; copper effective (NY, 2012, PDMR 7:V049).

**Sporatec** AG 2 pt/A applied with Biolink 2 fl oz/gal was **effective**, as effective as copper; symptoms present at first application (NY, 2009, PDMR 4:V123).

**Sporatec** 2 pt/A **somewhat effective**, other biopesticides more effective; preventive schedule (NY, 2008, PDMR 3:V116).

Sporatec 3 pt/A ineffective; preventive schedule used; copper effective (NY, 2011, PDMR 6:V103).

**Taegro** 3.5 oz/A **somewhat effective**, same as copper; preventive schedule (NY, 2008, PDMR 3:V116).

**Taegro** 3.5 oz/100 gal applied at 75 gpa **somewhat effective**, copper better; symptoms present at first application (NY, 2009, PDMR 4:V123).

Taegro 4 oz/A ineffective. CTE. (FL, 2016, PDMR 11:V060).

**Timorex Gold** 14 fl oz/A **effective**, best organic product. (FL, 2016, PDMR 11:V060).

**Zonix** 38 fl oz/50 gal applied at 40 gpa **effective** but authors concluded not sufficient control. Control similar to copper (3 products tested). (NY, 2015, PDMR 10:V015).

\*FL, 2016. Symptoms seen day before first application.

\*NY, 2010. Downy mildew started to develop late, severity remained low. Preventive schedule. None of the 9 organic treatments including copper were effective; conventional fungicide program effective (PDMR 5:V100).

### **Downy mildew - Cantaloupe**

Actinovate 12 oz/A applied in alternation with copper (Champ) as effective as Champ weekly (MD, 2013, PDMR 8:V210).

OxiDate 3 pt/A applied in alternation with copper (Champ) as effective as Champ weekly (MD, 2013, PDMR 8:V210).

Regalia 1 qt/A applied in alternation with copper (Champ) as effective as Champ weekly (MD, 2013, PDMR 8:V210).

Serenade Soil 2 qt/A applied in alternation with copper (Champ) as effective as Champ weekly (MD, 2013, PDMR 8:V210).

### **Downy mildew - Summer Squash**

Double Nickel 1 qt/A tested in 2 programs with Oso and Cueva. Control achieved with Oso applied weekly, not when alternated with Double Nickel suggesting later ineffective (SC, 2013, PDMR 8:V219).

### **Downy mildew - Butternut Squash**

Regalia 1 qt/A applied in alternation with copper (Champ) as effective as Champ weekly (MD, 2013, PDMR 8:V211).

Serenade Soil 2 qt/A applied in alternation with copper (Champ) as effective as Champ weekly (MD, 2013, PDMR 8:V211).

### **Downy mildew - Hubbard Squash**

Regalia 1 qt/A applied in alternation with copper (Champ) ineffective; Champ weekly effective (MD, 2013, PDMR 8:V211).

Serenade Soil 2 qt/A applied in alternation with copper (Champ) ineffective; Champ weekly effective (MD, 2013, PDMR 8:V211).

### **Downy mildew - Pumpkin**

Regalia 1 qt/A applied in alternation with copper (Champ) as effective as Champ weekly, which was moderately effective (MD, 2013, PDMR 8:V211).

Serenade Soil 2 qt/A applied in alternation with copper (Champ) as effective as Champ weekly, which was moderately effective (MD, 2013, PDMR 8:V211).

### **Fusarium Wilt - Watermelon**

Serenade Soil 2 or 4 qt/100 gal ineffective applied as soil drench at transplanting and also when followed by 2 qt/A foliar spray (GA, 2011, PDMR 6:V138).

### **Gummy Stem Blight - Watermelon**

Regalia 2 qt/A ineffective, preventive schedule (5 applications before symptoms seen), CTE (GA, 2009, PDMR 4:V146).

Regalia 2 qt/A ineffective, preventive schedule (3 applications before symptoms seen), CTE (GA, 2009, PDMR 4:V152).

### **Powdery mildew - Cantaloupe**

**Actinovate** 3 oz/A **very effective** at 5/13 assessment, not 5/28; preventive schedule (FL, 2009, PDMR 4:V103).

**Actinovate** 6 oz/A **moderately effective** (AZ, 2006, PDMR 1:V073).

**Actinovate** 6 oz/A **somewhat effective** (AZ, 2012, PDMR 7:V107).

**Actinovate** 6 oz/A **very limited efficacy** (AZ, 2013, PDMR 8:V197).

**Actinovate** 6 oz/A **very limited efficacy**. CTE. (AZ, 2016, PDMR 11:V003).

**Actinovate** (rate not specified) **very limited efficacy**, other organic products more effective (AZ, 2015, PDMR 10:V010).

Actinovate 3 oz/A ineffective (FL, 2010, PDMR 5:V062).

Actinovate 12 oz/A applied in alternation with copper (Champ) as effective as Champ weekly (MD, 2013, PDMR 8:V210).

**Companion** 32 fl oz/A **effective** both rating dates; preventive schedule (FL, 2009, PDMR 4:V103).

**Companion** 1 qt/A **effective** on 5/21, not 6/4 (FL, 2010, PDMR 5:V062).

**Kaligreen** 4.1 lb/A **moderately effective** (AZ, 2006, PDMR 1:V073).

Kaligreen 5 lb/A among least effective treatments (AZ, 2012, PDMR 7:V107).

**Microthiol Disperss** (sulfur) 8 lb/A **very effective** both leaf surfaces (AZ, 2006, PDMR 1:V073). 10 lb/A no symptoms (AZ, 2012, PDMR 7:V107; AZ, 2013, PDMR 8:V197).

OxiDate 3 pt/A applied in alternation with copper (Champ) more effective than Champ weekly (MD, 2013, PDMR 8:V210).

**Regalia 5%** **moderately effective** (GA, 2009, PDMR 4:V145).

Regalia 1% very effective at 5/13 assessment, not 5/28; preventive schedule (FL, 2009, PDMR 4:V103).

Regalia 1% effective at 5/21 assessment, not 6/4 (FL, 2010, PDMR 5:V062).

Regalia 4 qt/A among least effective treatments (AZ, 2012, PDMR 7:V107).

Regalia 1 qt/A applied in alternation with copper (Champ) more effective than Champ weekly (MD, 2013, PDMR 8:V210).

**Serenade Max 2 lb/A moderately effective** (AZ, 2006, PDMR 1:V073).

Serenade applied in alternation with copper (Champ) more effective than Champ weekly (MD, 2013, PDMR 8:V210).

**Sonata 4 qt/A moderately effective** (AZ, 2006, PDMR 1:V073).

**Sonata 4 qt/A somewhat effective**, other organic products better, Timorex Gold best. (AZ, 2015, PDMR 10:V010).

Sonata 4 qt/A ineffective (AZ, 2013, PDMR 8:V197).

**Taegro 5.2 oz/A effective** (AZ, 2013, PDMR 8:V197).

**Taegro 5.2 oz/A effective**, other organic products better (AZ, 2015, PDMR 10:V010).

**Taegro 5.2 oz/A limited efficacy**. CTE. (AZ, 2016, PDMR 11:V003).

**Timorex Gold 20.3 fl oz/A effective**, best organic product. (AZ, 2015, PDMR 10:V010).

Timorex Gold 20.3 fl oz/A ineffective. CTE. (AZ, 2016, PDMR 11:V003).

#### **Powdery mildew – Acorn Squash**

**M-Pede 2% effective** until last assessment, copper (Nordox) more effective (KY, 2013, PDMR 8:V203).

Regalia 5L 2 and 4 qt/A ineffective, preventive schedule. Only organic trts. CTE (VA, 2012, PDMR 7:V038).

#### **Powdery mildew – Butternut Squash**

**MilStop 3 lb/A moderately effective**, IPM schedule. (NY, 2009, PDMR 4:V024,MTM).

**Organocide 2 fl oz/gal moderately effective**, IPM schedule. (NY, 2009, PDMR 4:V024,MTM).

Serenade Max 2 lb/A + Biotune 1 pt/100 gal ineffective, preventive schedule. CTE (GA, 2006, PDMR 1:V164).

**Sonata AS 2 qt/A + Biotune 1 pt/100 gal somewhat effective** but not signif dif from Serenade Max (other organic trt that was ineffective), preventive schedule. CTE (GA, 2006, PDMR 1:V164).

#### **Powdery mildew – Scallop Squash**

Serenade Max 12 fl oz/A ineffective, preventive schedule. Only organic trt. CTE (FL, 2015, PDMR 10:V062).

#### **Powdery mildew – Summer Squash**

**Actinovate 12.0 oz/A effective** at first assessment (FL, 2010, PDMR 4:V112).



Actinovate 12.0 oz/A ineffective, preventive schedule (GA, 2008, PDMR 3:V149).

**Companion** 1 qt/A **effective** at first assessment (FL, 2010, PDMR 4:V112).

**Companion** 3 qt/A **somewhat effective**, preventive schedule (GA, 2008, PDMR 3:V149).

OxiDate 2 1% ineffective, applied with Yucca Ag Aide, treatment started 3 days after first symptoms seen. CTE (GA, 2013, PDMR 8:V272).

**Regalia** 0.5% **moderately effective**, preventive schedule (VA, 2010, PDMR 5:V128).

**Regalia** 2 qt/A **somewhat effective**, preventive schedule. Only organic trt. CTE (FL, 2015, PDMR 10:V055).

Regalia 1% effective at first assessment (FL, 2010, PDMR 4:V112).

Regalia 5L 2 and 4 qt/A ineffective, preventive schedule. Only organic trts. CTE (VA, 2012, PDMR 7:V039).

Regalia 2 qt/A ineffective, preventive schedule (GA, 2009, PDMR 4:V141).

**Sonata** 2 qt/A + Biotune **effective** (GA, 2006, PDMR 1:V165).

Sonata 2 qt/A + Biotune effective at first assessment (GA, 2007, PDMR 2:V174).

Sporan 3 pt/A ineffective, preventive schedule (GA, 2008, PDMR 3:V149).

#### **Powdery mildew - Pumpkin**

**Actinovate** 6 oz/A effective on upper surface only (2006).

JMS Stylet-oil 5 qt/100 gal ineffective, CTE (WI, 2015, PDMR 10:V070).

**JMS Stylet-oil** 5 qt/100 gal **very effective** on upper leaf surfaces, some efficacy on lower (2004b). Moderately effective on upper surfaces (2005).

**Microthiol Disperss** 80W 4 lb/A **very effective** on upper leaf surfaces, some efficacy on lower (2004b). Effective on upper surfaces, numerically best organic product; some efficacy on lower (2005). At least 50% control on both surfaces (2006).

**Microthiol Disperss** 4 lb/A **somewhat effective**, CTE (WI, 2015, PDMR 10:V070).

**Microthiol Disperss** 5 lb/A **effective** (TN, 2014, PDMR 10:V027).

**Mildew Cure** 1% (was named GC-3 organic fungicide) **very effective** on upper leaf surfaces, some efficacy on lower (2004). Ineffective; provided some control early in disease development based on assessment after 2 applications when severity low (2005). Effective on upper surface only (2006).

**Milstop** 2.5 lb/A **effective** on upper surface only (2006).

MilStop 3 lb/A ineffective, IPM schedule. (NY, 2007, PDMR 2:V141).

**Organocide** 2 oz/gal **very effective** on upper leaf surfaces, some efficacy on lower (2004). Effective on upper surfaces, provided some control on lower surface early in disease development based on rating after 2 applications when severity low (2005). Effective only on upper surface (2006).

**Organocide** 2 fl oz/gal **moderately effective**, IPM schedule. (NY, 2007, PDMR 2:V141).

Organocide 1.5% ineffective, Microthiol Disperss effective (TN, 2014, PDMR 10:V027).

OxiDate 128 fl oz/100 gal ineffective applied following the IPM or a curative schedule starting with three consecutive applications when powdery mildew reached a level of being easily seen but not severe (average severity on older leaves was 1% on upper surfaces and 2% on lower surfaces). IPM treatment provided some control early in disease development based on assessment after 3 applications when severity low. (2004). Similar results with applications twice weekly (2005).

Potassium bicarbonate 5 lb/A ineffective, Microthiol Disperss effective (TN, 2014, PDMR 10:V027).

**Regalia** pre-cursor MOI-106 1% **effective** on upper surface, provided some control on lower early in disease development based on rating after 4 applications when severity moderately low (2008).

**Regalia** 1 qt/A **applied in alternation with copper** (Champ) more **effective** than Champ weekly, which was moderately effective (MD, 2013, PDMR 8:V211).

**Serenade** 1 gal/A **effective** on upper surfaces, applied with compost tea, which was ineffective applied alone (2003, 2004a). Effective on lower surfaces in 2004 only.

Serenade Opti 20 oz/A ineffective. CTE. (NY, 2016, PDMR 11:V025).

**Serenade Soil** 2 qt/A **applied in alternation with copper** (Champ) as **effective** as Champ weekly, which was moderately effective (MD, 2013, PDMR 8:V211).

Sonata 2 qt/A ineffective applied alone or combined with compost tea. Copper effective on both leaf surfaces (2003, 2004a).

Sporan (aka Sporatec) 1.5 qt/A + NuFilm P ineffective. Provided some control early in disease development based on assessment after 3 or 2 applications when severity low (2004b, 2005).

**Trilogy** 1% **moderately effective** on upper leaf surfaces, no efficacy on lower (2004) or limited efficacy (2005).

Kocide effective (TN, 2014, PDMR 10:V027).

Kocide ineffective (WI, 2015, PDMR 10:V070).

#### **Powdery mildew - Zucchini**

**MilStop** 2.5 lb/A **very effective**, best in 2 trials (NY, 2011, PDMR 6:V104; NY, 2012, PDMR 7:V051). \*

**M-Pede** 2% **very effective**. (NY, 2011, PDMR 6:V104). \*

**OxiDate** 128 oz/A **moderately effective** applied with Yucca Ag Aide (both trials) or without (in 2012). (NY, 2011, PDMR 6:V104; NY, 2012, PDMR 7:V051). \*

**Sonata** 4 qt/A **very effective**. (NY, 2011, PDMR 6:V104).

**Serenade Max** 3 lb/A **moderately effective**. (NY, 2011, PDMR 6:V104). \*

**Sporatec** 3 pt/A **moderately effective**. (NY, 2011, PDMR 6:V104). \*

**MilStop** 2.5 lb/A **effective**. Preventive. (NY, 2016, PDMR 11:V013).

**Regalia** 1 gal/A **effective**. Preventive. (NY, 2016, PDMR 11:V013).

**Regalia + Actinovate** **effective**. Preventive. (NY, 2016, PDMR 11:V013).

**OxiDate** 128 oz/100 gal **moderately effective**. (NY, 2016, PDMR 11:V013).

**Double Nickel** 2 qt/A **moderately effective**. (NY, 2016, PDMR 11:V013).

**Actinovate 12 oz/A moderately effective.** (NY, 2016, PDMR 11:V013).

\*NY, 2011 and 2012. Applications started after first symptoms found.

\*NY, 2016. Sulfur most effective.

## **Lettuce**

**Drop** (caused by *Sclerotinia minor* and *S. sclerotiorum*)

**Actinovate 12.0 oz/A effective** against both pathogens applied twice as soil spray. Inoculated plots. (AZ, 2013, PDMR 8:V198).

BioTam 4.0 lb/A ineffective. (AZ, 2013, PDMR 8:V198).

**Contans WG 4.0 lb/A very effective** against both pathogens, better for both than conventional fungicides tested. Applied once as soil spray at thinning, incorporated. Control not improved by re-applying 18 days later. Inoculated plots. (AZ, 2011, PDMR 6:V077).

**Contans WG 4.0 lb/A very effective** against *S. sclerotiorum*, not *S. minor*.

Similar results applied 1 or 2 times as soil spray. (AZ, 2013, PDMR 8:V198). Contans applied with Soilgard (AZ, 2011) or Serenade Soil (AZ, 2013) did not improve control.

**Procidic 15 and 20 fl oz/A limited efficacy** for both pathogens applied 5 times, low rate better. CTE. Inoculated. (AZ, 2016, PDMR 11:V006).

**Soilgard 12G 4.0 lb/A effective.** Control of *S. sclerotiorum* better with 2 applications but not significantly; control same for *S. minor*. Inoculated plots. (AZ, 2011, PDMR 6:V077).

**Soilgard 12G 4.0 lb/A effective** especially for *S. sclerotiorum*. Inoculated plots. (AZ, 2013, PDMR 8:V198).

**Serenade Soil 4.0 qt/A limited efficacy** for only *S. sclerotiorum*. Inoculated plots. (AZ, 2013, PDMR 8:V198).

**Timorex Gold 20.3 fl oz/A limited efficacy** for both pathogens applied twice. CTE. Inoculated. (AZ, 2016, PDMR 11:V006).

## **Powdery mildew**

**Serenade Soil 2.0 qt/A limited efficacy** applied twice, 17-day interval.

Preventive. Rated almost 4 wk later. CTE. (AZ, 2016, PDMR 11:V004).

**Leafy vegetables other than lettuce + spinach** (celery, parsley, radicchio, etc.)

## **Legumes** (succulent and dried beans and peas)

### **Damping-off (pea)**

Actinovate STP was ineffective (emergence not increased). (WA, 2011, PDMR 6:ST012).

Heads Up Plant Protectant ineffective. (WA, 2011, PDMR 6:ST012).

Mycoseed Treat was ineffective. (WA, 2011, PDMR 6:ST012).

Mycostop Mix was ineffective. (WA, 2011, PDMR 6:ST012).

Serenade Soil drench was ineffective. (WA, 2011, PDMR 6:ST012).

Soilgard 12G drench was ineffective. (WA, 2011, PDMR 6:ST012).

T-22 HC was ineffective. (WA, 2011, PDMR 6:ST012).

Actinovate seed treatment was ineffective. Several unregistered organic materials tested also; only copper increased emergence (WA, 2007, PDMR 2:V153).

Serenade ASO seed treatment was ineffective. Several unregistered organic materials tested also; only copper increased emergence (WA, 2007, PDMR 2:V153).

### **White mold (snap bean)**

**Double Nickel** 55 WG 1 qt/A as **effective** as 4 of 6 conventional fungicides tested. All applied twice before the first and third inoculations with ascospores (NY, 2015, PDMR 10:V004).

EF400 + BacStop applied alone twice or once in alternation with copper. None effective but neither were the 9 conventional fungicide treatments or copper alone (WI, 2015, PDMR 10:V032).

### **Pepper. Fruiting vegetables** (pepper, tomato, eggplant, tomatillo, okra, etc.)

#### **Bacterial leaf spot**

OxiDate 1% ineffective on greenhouse transplants. Preventive, twice weekly schedule; sprayed twice before inoculating center plants in tray. Copper effective. (GA, 2007, PDMR 2:V160).

Regalia 3 pt/A ineffective. 4-day schedule; then 7-day. Copper effective. (GA, 2009, PDMR 4:V151).

Regalia 4 pt/A ineffective. Preventive, one spray before inoculating. CTE. (NC, 2011, PDMR 6:V091).

Serenade 1 lb/A ineffective on greenhouse transplants. Preventive, twice weekly schedule; sprayed twice before inoculating center plants in tray. Copper effective. (GA, 2007, PDMR 2:V160).

**Serenade Max** 1 lb/A **effective** for controlling foliar symptoms, but only based on AUDPC, did not reduce % fruit affected. Preventive schedule; sprayed once before inoculating. Copper effective. (FL, 2010, PDMR 6:V038).

Serenade Max 1.5 lb/A ineffective applied alone or with Biotune (NC, 2007, PDMR 2:V003).

#### **Phytophthora blight**

**Actinovate** 12.0 oz/A **limited efficacy** but copper and conventional fungicides not better (NY, 2012, PDMR 7:V017).

### **Potato.**

#### **Black scurf (Rhizoctonia)**

**Double Nickel** **effective** applied in furrow. Diseases pressure moderate to low. (WI, 2016, PDMR11:V102).

Regalia ineffective applied in furrow but marketable yield increased. (WI, 2016, PDMR11:V102).

#### **Early blight**

**Actinovate** 9 oz/A preventive schedule **effective**; limited disease (ID, 2010, PDMR 5:V075).

Double Nickel 4.5 pt/A ineffective, also copper. CTE (WI, 2016. PDMR 11:V101).  
EF 400 12 fl oz/A ineffective (WI, 2013, PDMR 8:V246).

**M-Pede** 2% preventive schedule **effective**; limited disease (ID, 2010, PDMR 5:V075).

**Regalia Max** 1 pt/A **somewhat effective**. CTE (PA, 2009, PDMR 4:V077).

Regalia Max 20SC 1 pt/A ineffective (MI, 2009, PDMR 4:V089).

**Serenade Max** 3 lb/A preventive schedule **effective**; limited disease (ID, 2010, PDMR 5:V075).

### **Late blight**

**Regalia Max** 20SC 1 pt/A **effective** for foliar symptoms, not tuber blight; limited residual activity as ineffective 16 d after last application when conventional fungicides still effective (MI, 2009, PDMR 4:V089).

## **Spinach.**

### **Anthraco**

Oxidate 1 gal/A ineffective applied weekly starting before symptoms; incidence and defoliation ratings significantly higher than untreated control; also occurred with an ineffective conventional fungicide. CTE for some (OK, 2007, PDMR 2:V055).

### **Damping off** (*Rhizoctonia solani* and *Fusarium oxysporum* isolated from plants)

Actinovate 9 oz/100 gal **effective**. (MA, 2016, PDMR 11:V046). \*

Double Nickel 1.5 qt/100 gal **effective**. (MA, 2016, PDMR 11:V046). \*

Mycostop 2 g/100 sq ft **effective**. (MA, 2016, PDMR 11:V046). \*

Oxidate **effective**. (MA, 2016, PDMR 11:V046). \*

Rootshield Plus 8 oz/100 gal ineffective. (MA, 2016, PDMR 11:V046). \*

\*MA, 2016. Efficacy based on plant stand; significant differences only at second of 3 ratings.

### **Damping off** (*Pythium* spp primarily, *Fusarium* also detected)

Kodiak Concentrate Biological Fungicide applied as a seed treatment was ineffective based on final emergence rating; product has since been discontinued (WA, 2007, PDMR 2:V133).

**Micro 108 Seed Inoculant** applied to seed + Actinovate AG applied as a soil drench was the most **effective** treatment (WA, 2007, PDMR 2:V133).

Mycostop Mix applied as a seed treatment was ineffective. Micro 108 + Actinovate was effective (WA, 2007, PDMR 2:V133).

SoilGard 12G applied as a soil drench was ineffective based on final emergence rating. Micro 108 + Actinovate was effective (WA, 2007, PDMR 2:V133).

T-22 Planter Box applied as a seed treatment was ineffective. Micro 108 + Actinovate was effective (WA, 2007, PDMR 2:V133).

Yield Shield applied as a seed treatment was ineffective. Micro 108 + Actinovate was effective (WA, 2007, PDMR 2:V133).

### **Downy mildew**

**Actinovate** AG 12 oz/A **effective**, Taegro better, see that entry for more information. Actinovate + Taegro same as Actinovate alone (CA, 2015, PDMR 10:V016).

**Oxidate** 2.5%v/v **effective** applied with surfactant (Aquasil), as effective as Cueva; not considered commercially acceptable. (CA, 2016, PDMR 11:V017)

Oxidate 1 gal/A ineffective applied weekly starting when incidence was <1%. CTE (OK, 2007, PDMR 2:V056).

**Procidic** 12 and 15 fl oz/A **limited efficacy** applied at emergence and 9 and 16 days later. CTE. (AZ, 2016, PDMR 11:V002).

**Taegro** 5.2 oz/A **effective**, better than other organic trts, but none “reduced downy mildew to an acceptable level for fresh market standards”; disease pressure relatively high. (CA, 2015, PDMR 10:V016).

**Timorex Gold** 27.4 fl oz/A **limited efficacy** perhaps because not truly preventive; symptoms seen 2 days after first of 2 applications. CTE. (AZ, 2016, PDMR 11:V002).

Cueva 2% effective, Taegro better, see that entry for more information. Cueva applied with Actinovate or Taegro slightly but not signif better than Cueva alone (CA, 2015, PDMR 10:V016).

## **Tomato. Fruiting vegetables** (pepper, tomato, eggplant, tomatillo, okra, etc.)

### **Anthracnose**

All products tested were ineffective in an evaluation with very high disease pressure: Regalia MAXX, experimental products, std (Kocide + Manzate) (OH, 2011, PDMR 6:V061).

Serenade Max 1 lb/A + Kocide 1 lb + Biotune ineffective. CTE (Manzate + Kocide) (OH, 2006, PDMR 1: V005).

### **Bacterial canker.** Greenhouse.

Cease + MilStop ineffective. Conventional treatment (Tanos + Kocide) also ineffective. (MS, 2012, PDMR 7:V056)

### **Bacterial canker.**

Double Nickel 1 qt/A ineffective. Others effective. (OH, 2016, PDMR 11:V114).\*

**Serenade Opti** 20.0 oz/A + **Milstop** 2.0 lb/A **effective**. Numerically but not significantly better than Cueva copper. (OH, 2016, PDMR 11:V114). \*

Serenade Max 1 lb/A + Kocide 1 lb + Biotune ineffective. CTE (Manzate + Kocide) (OH, 2006, PDMR 1: V005).

### **Bacterial speck**

**Actinovate** 12 oz/A **effective**. Actinovate + Regalia poor, some control at second rating, significantly less than Actinovate. (NY, 2016, PDMR 11:V014)\*

**Double Nickel** 1 qt/A **effective**. Best, numerical less severe than copper. (NY, 2016, PDMR 11:V014). \*

**OxiDate** 128 oz/A **effective** at second rating, Double Nickel and Regalia better at both assessments. (NY, 2016, PDMR 11:V014). \*

**Regalia 1 gal/A effective** at second rating. (NY, 2016, PDMR 11:V014). \*

### **Bacterial spot**

All products tested were ineffective in an evaluation with very high disease pressure: Regalia MAXX, experimental products, std (Kocide + Manzate) (OH, 2011, PDMR 6:V061).

**Actinovate** moderately **effective** in GH (FL, 2013).

**Regalia** + Cueva alt. OxiDate + Aquasil **effective**. Best, numerically less severe than copper. OxiDate and Cueva alone both ineffective. GH expt with

seedlings, inoculated 2 days after first spray. Disease pressure low to moderate. (NC, 2016, PDMR 11:V053).

### **Early blight**

Serenade Max 1 lb/A ineffective (IN, 2008, PDMR 3:V135).

OxiDate 128 oz/A applied with Yucca Ag Aide ineffective; Nordox also (NY, 2011, PDMR 6:V105).

Serenade Max 3 lb/A ineffective; Nordox also (NY, 2011, PDMR 6:V105).

Sonata 4 qt/A ineffective; Nordox also (NY, 2011, PDMR 6:V105).

**Sporatec** AG 3 pt/A **effective** (others not) (NY, 2011, PDMR 6:V105).

### **Late blight**

**Double Nickel** 1 qt/A + **Cueva** 2 qt/A **somewhat effective**. Preventive.

Conventional treatments all more effective. (NC, 2016, PDMR 11:V039).

### **Leaf mold in high tunnel**

**Zonix** 500 ppm **effective**. Preventive. Numerically second best after copper; all organic products (NY, 2016, PDMR 11:V029).

**Double Nickel** 1.5 gal/A **effective**. Preventive. (NY, 2016, PDMR 11:V029).

**Regalia** 1 gal/A **effective**. Preventive. (NY, 2016, PDMR 11:V029).

**OxiDate** 128 oz/100 gal **effective**. Preventive. (NY, 2016, PDMR 11:V029).

### **Septoria leaf spot**

**Actinovate** **moderately effective** (NY, 2008, PDMR 3:V127; MTM).

Actinovate ineffective (NY, 2009, PDMR 4:V115; MTM).

**Companion** **moderately effective** (NY, 2008, PDMR 3:V127; MTM).

Companion ineffective (NY, 2009, PDMR 4:V115; MTM).

**Organocide** **moderately effective** (NY, 2008, PDMR 3:V127; MTM).

Organocide ineffective (NY, 2009, PDMR 4:V115; MTM).

**Regalia** **moderately effective** (NY, 2008, PDMR 3:V127; MTM).

Regalia ineffective (NY, 2009, PDMR 4:V115; MTM).

Sporatec ineffective (NY, 2008, PDMR 3:V127 and NY, 2009, PDMR 4:V115).

Taegro ineffective (NY, 2009, PDMR 4:V115; MTM).

\*OH, 2016. Inoculated spreader plants at both ends of plots. Canker slow to develop until rain in Aug. Foliar sprays started 6/7. Processing tomato.

\*NY, 2016. Preventive sprays. Inoculated 2 days after first spray. Low disease pressure due to dry weather.

### **Root/Tuber and Corm Crops** (beets, carrot, potato, radish, ginger, turnip, etc.)

#### **Turnip - black leg, light leaf spot, and white leaf spot**

Serenade Max 20 oz/A ineffective. CTE. (OR, 2016, PDMR 11:V110)

Regalia **effective** only for **white leaf spot**. CTE. (OR, 2016, PDMR 11:V110)

Stylet Oil **effective** only for **black leg**. CTE. (OR, 2016, PDMR 11:V110)

*Compiled by Margaret T. McGrath. Up-dated 4-3-17*