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 exps. **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.

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). *
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 3rd app. All twice weekly schedule. (FL, 2016, PDMR 11:V045). *

**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). *

**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). *


Procidic 20 fl oz/A moderately effective on 3-day interval with Cueva applied for 3rd 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). *


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).


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). *


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 then 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 1 gal/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 128 oz/A effective, no benefit to using Yucca Ag Aide; copper numerically better, not significantly; preventive schedule (NY, 2013, PDMR 8:V227).

OxiDate 1% ineffective applied with Yucca Ag Aide; preventive schedule used; copper effective (NY, 2011, PDMR 6:V103).

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, 2013, 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** 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;
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
**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 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).
**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 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 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).

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).

**Powdery mildew – Butternut Squash**
**MilStop** 3 lb/A **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**

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

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


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


**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 Dispersss** 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 1.5% ineffective, Microthiol Dispersss 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).


**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 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 qt/A **effective**. Preventive. (NY, 2016, PDMR 11:V013).

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


OxiDate 128 oz/100 gal **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).


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).


**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).
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.

Anthracnose
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, PMDR 2:V056).

**Procidic** 12 and 15 fl oz/A **limited efficacy** applied at emergence and 9 and 16 days later. CTE. [AZ, 2016, PMDR 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, PMDR 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, PMDR 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, PMDR 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, PMDR 6:V061).

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

**Bacterial canker.** Greenhouse.
Cease + MilStop ineffective. Conventional treatment (Tanox + Kocide) also ineffective. (MS, 2012, PMDR 7:V056)

**Bacterial canker.**
Double Nickel 1 qt/A ineffective. Others effective. (OH, 2016, PMDR 11:V114).*

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

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

**Bacterial spot**

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

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

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

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

**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**
**Double Nickel** 1.5 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 ineffective (NY, 2009, PDMR 4:V115; MTM).
**Companion** moderately effective (NY, 2008, PDMR 3:V127; MTM).
Organocide ineffective (NY, 2009, PDMR 4:V115; MTM).
Regalia ineffective (NY, 2009, PDMR 4:V115; MTM).
Taegro ineffective (NY, 2009, PDMR 4:V115; MTM).


*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*