Evaluation of OMRI-listed fungicides for disease management in small fruit crops

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List of products allowed for use in organic crop production:

Organic Materials Review Institute: [www.omri.org](http://www.omri.org)
Fungicides on OMRI list:

Serenade, Kodiak (Bacillus subtilis)
Sonata, Yield Shield (Bacillus pumilis)
Mycostop Biofungicide (Streptomyces griseoviridis)
SoilGard 12G (Gliocladium virens)
Blight Ban A506 (Pseudomonas fluorescens)
PlantShield (Trichoderma harzianum)
Contans (Coniothyrium minitans)

Copper, Sulfur (multiple formulations)
Sporan EC (rosemary, clove, and thyme oil)
JMS Stylet Oil (paraffinic oil)
Neem Oil (azadirachtin)
Kaligreen, Milstop (potassium bicarbonate)
Lime Sulfur (calcium polysulfide)
Oxidate (hydrogen peroxide)

Biological control agents
Elementals
Oils / Plant extracts
Salts
Other
Botrytis bunch rot severity in grapes

Vignoles, 2000, Leland, 4 sprays

% All berries infected

Untreated | Rovral | Serenade | Elevate
----------|--------|----------|-------
a         | b      | bc       | c    
Powdery mildew severity in grapes

Vidal, Lawton, 2000, season-long

% Total leaf area infected

- Untreated
- Serenade
- Flint/Elite

Legend:
- a
- b
- c
Downy mildew severity in grapes

Niagara, Fennville, 2001

% Leaf area diseased

Untreated
Serenade
Penncozeb
Mummy berry shoot strike incidence in blueberries

Grand Junction, 2002

Number of shoot strikes per bush

- Untreated
- Serenade
- Indar

0 20 40 60 80

(a)
Powdery mildew severity in grapes

Vignoles, Clarksville, 2002,
6 sprays starting Jun 10
Powdery mildew severity in grapes

Vidal, 2000, season-long program

% Total leaf area infected

- Untreated
- Armicarb
- Flint/Elite

The graph shows the percentage of total leaf area infected by powdery mildew under different conditions. Untreated grapes have significantly higher infection levels compared to treated ones.
Black rot severity in grapes

Concord, Fennville, 2001

% Rotten berries

- Untreated
- Armicarb
- Nova

Untreated: a
Armicarb: b
Nova: b
Leaf spot severity in strawberries

Red Chief, Onondaga, 2003

% Leaf area diseased

Untreated  Kaligreen  Serenade  Standard fungicide program

a  b  bc  c
Powdery mildew severity in grapes

Chardonel, Clarksville, 2004

5 sprays every two weeks

% Berries affected

Untreated  JMS Stylet Oil  Elite 4 oz

1.5% v/v

a

b

c

0  1  2  3  4  5  6  7  8  9  10  11  12

Untreated JMS Stylet Oil Elite 4 oz

1.5% v/v
Leaf spot severity in raspberries

Tulameen, South Lyon, 2001

5 sprays every 7-10 days

% Leaf area diseased

Untreated | Compost tea | Captan/Nova

- Untreated: a
- Compost tea: b
- Captan/Nova: b
Downy mildew severity in grapes

Niagara, Fennville, 2001

5 sprays every 2 weeks

% Leaf area diseased

Untreated | Compost tea | Pristine

a

b

c
Effect of single dormant sprays on Phomopsis

Niagara, Clarksville, 2006

Dormant spray applied at budswell with no other fungicides applied throughout season

% Berries infected

Untreated  Kumulus 10 lb  Microthiol Sulfur 10 lb  Copper Sulfate 3.8 lb  Nordox 1.25 lb

a

b

c

cd

d
Conclusions:

- OMRI-approved fungicides work but may not be as effective as conventional fungicides, especially under high disease pressure.
- They are mostly protectants: need good coverage and are subject to wash-off by rain.
- Compost tea is promising but needs more research and standardization.
- Dormant sprays can reduce the need for seasonal copper or sulfur sprays.
Conclusions:

• More efficacy trials are needed against a wide variety of diseases

• Disease monitoring is important to decide whether and when sprays are needed

• A correct diagnosis is critical for good disease control

• Cultural and other disease management strategies need to be utilized before relying on fungicides