



Early Season Vineyard Pest Management Focus on Disease Control 2024

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Many thanks for disease information and slides from
Dr. Wendy McFadden-Smith
OMAFRA Grape and Tender Fruit IPM Specialist

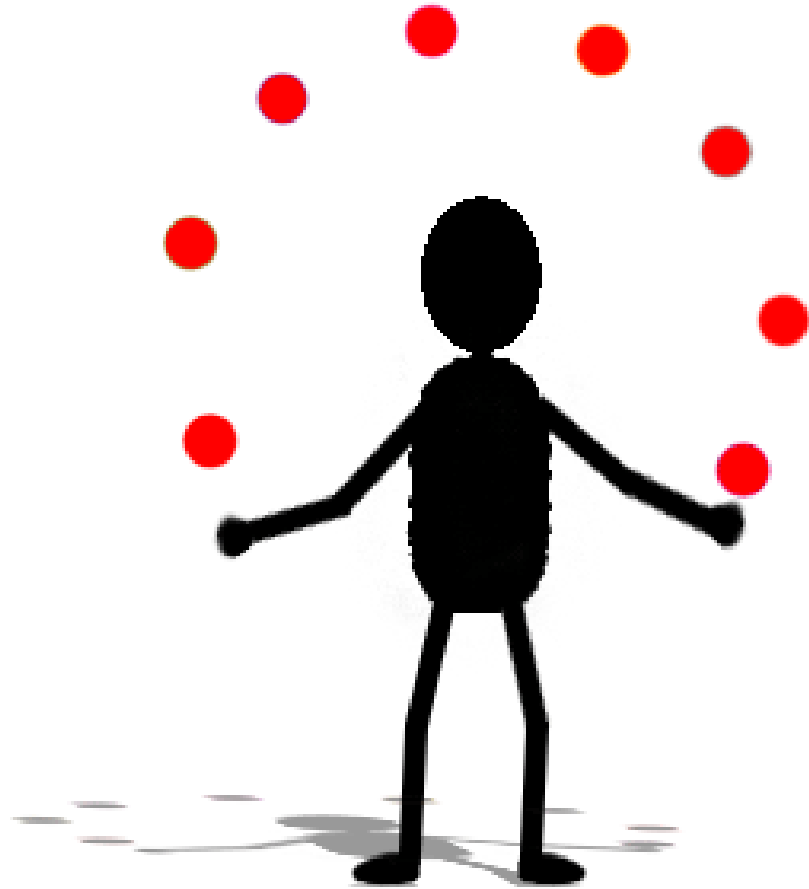
25 March 2024

What are the pests of most concern?

- Spray for those most important to you
- Recognize different cultivars have different susceptibilities
- Not all pest are present during the whole season
- How much time do I have to apply controls?
- How much do I want to spend?
- Product restrictions – re entry, Pre harvest, phtotoxicity....

Focus on Disease Control 2024

- High amount of overwintering inoculum = this makes Sanitation/Cultural practices critical
- Excess fertilization over needs can lead to too much vegetative growth and increased susceptibility
- Weakened vines coming into 2024 = more susceptible to infection
- Crown Gall – there is nothing registered for topical application OR effective for Crown Gall after infection symptom is observed (it is internal!)
- High weed pressure can modify environment to increase infection potential



Things to consider

- Rainfastness (contact vs locally systemic, systemic)
- Susceptibility periods
- Fungicide resistance/Resistance management
- Multiple diseases
- Max apps, REI/PHI
- Price

Physical Mode of Action

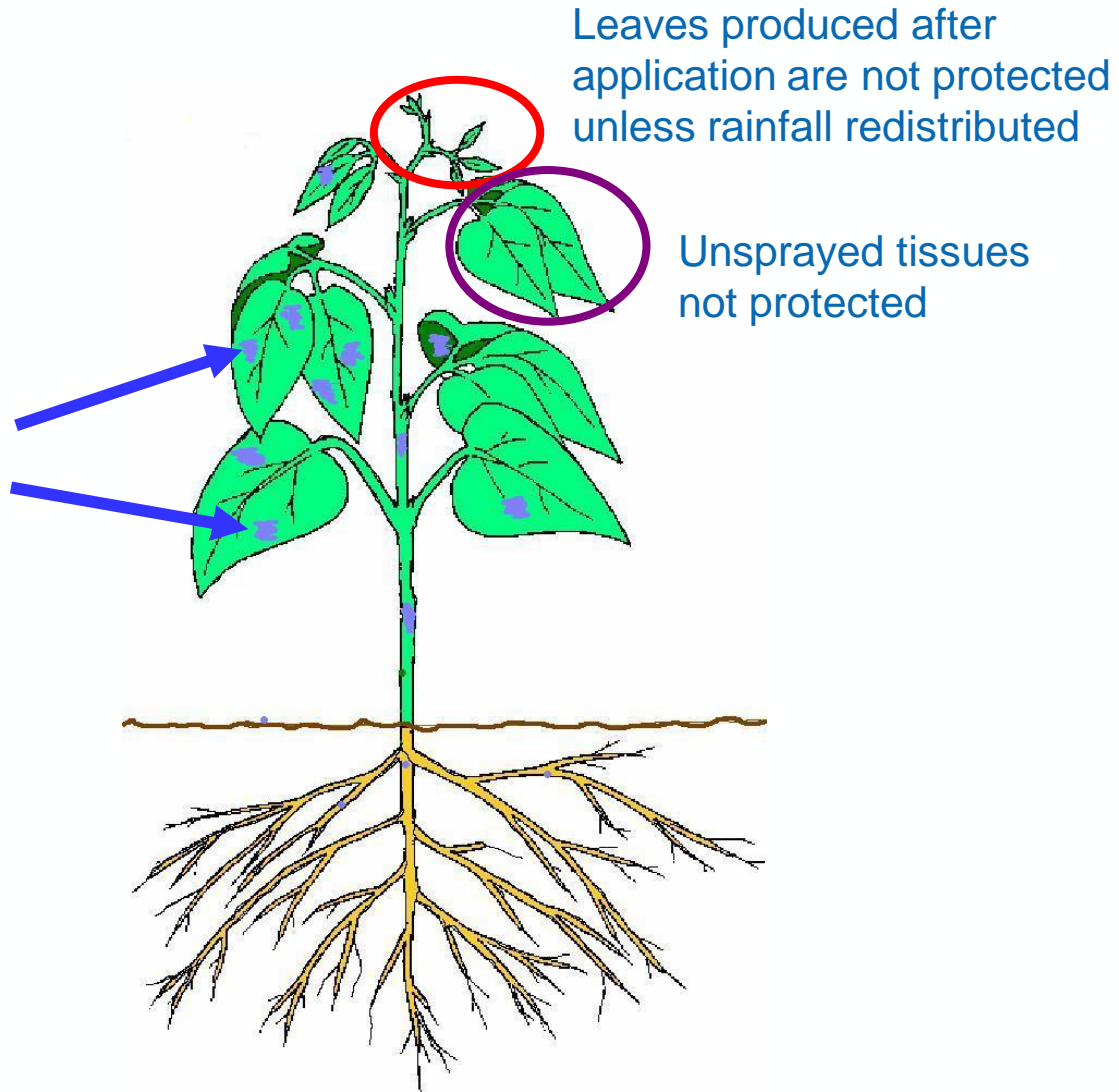
- Protectant
- Post-infection (curative)
- Anti-sporulant
- Eradicant
 - Kills all or most of fungal colony when applied after symptoms appear
 - Very few traditional fungicides have this activity
 - Topical treatments vs. powdery mildew

Mobility within the plant

- Non-systemic (“contact”)

Material remains on surface where applied

May be redistributed or removed by rainfall



Contact Fungicides

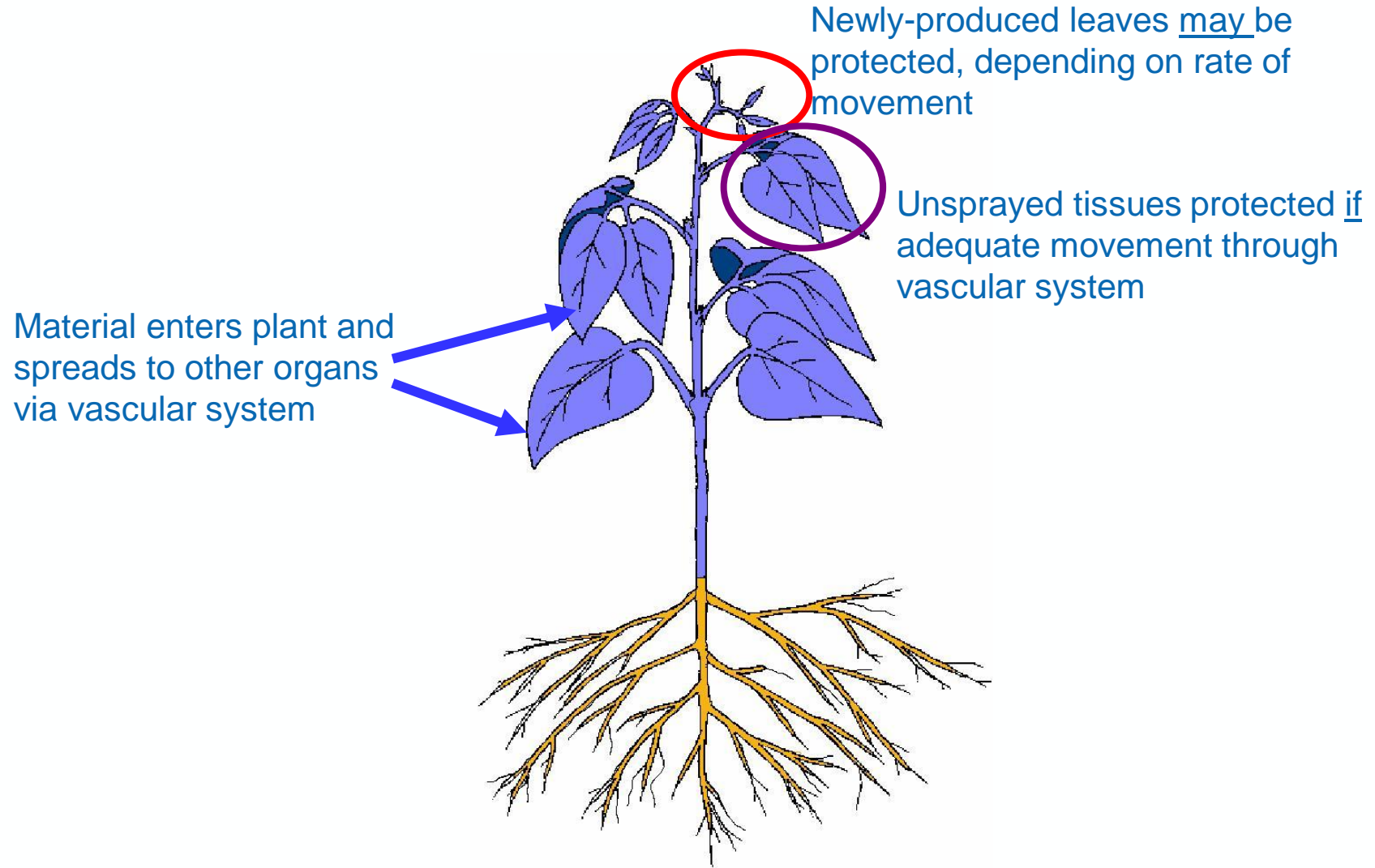
- May be **Protectant** (applied before infection) or **Eradicant** (applied after infection)
- Apply during sunny, dry conditions to allow for quick drying onto the leaves
- Better adsorption to plant surface and more rainfast over several days after application.
- Avoid protectant fungicides within several hours before rainstorm as you may lose much of it to wash-off.
- 1” of rain (25 cm) results in $\frac{1}{2}$ residual activity
- 2” (50 cm or more) rain -likely no residue left so need to reapply

Systemic and Locally Systemic Fungicides

- Apply under humid, cloudy conditions when the soil is moist (vines not under water stress).
- Moist soils promote the cuticle, or waxy layer covering the plant surface to swell and allow active ingredients to quickly pass through to interior tissues.
- Under extended hot, dry conditions, the cuticle becomes flattened and less permeable; any product that is not absorbed may remain on the plant surface and break down due to UV light or microbes or get washed off by rain.
- **Avoid applying systemic fungicides on heavily sporulating colonies** as the probability of selecting mutants/resistant populations increases with higher pathogen population densities. Use a contact fungicide first or in the tank-mix, if appropriate, to kill spores.

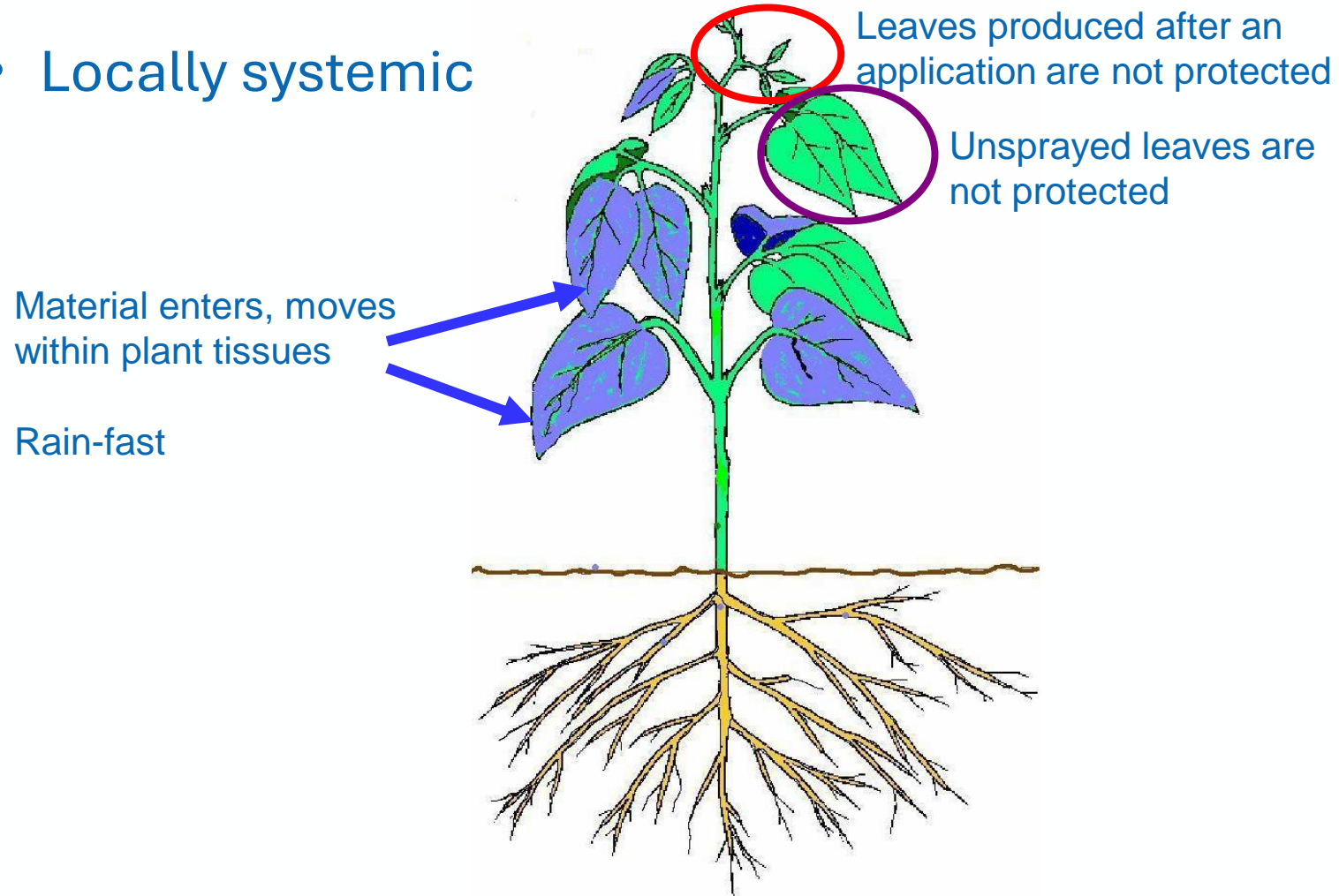
Mobility within the plant

- Systemic



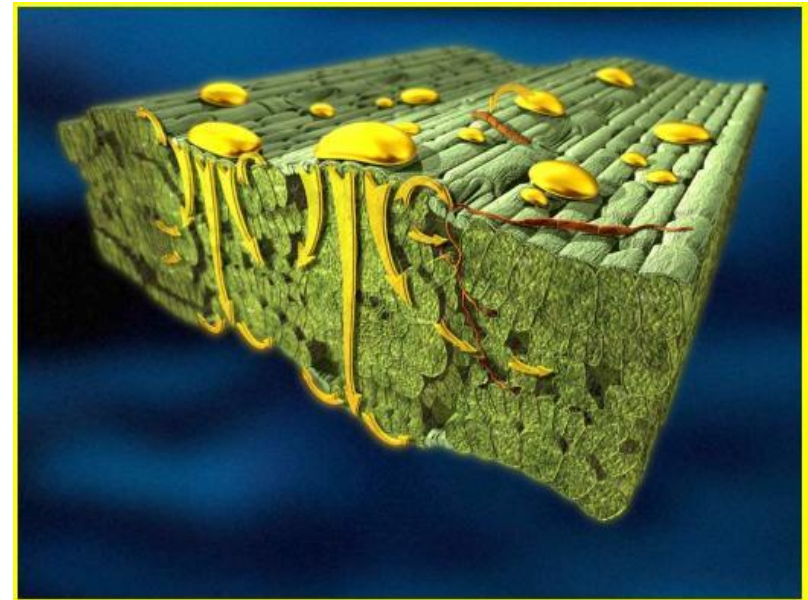
Mobility within the plant

- Locally systemic



Mobility within the plant

- Translaminar
 - Spray on one side of leaf penetrates and moves through leaf to protect unsprayed surface on the other side



Grapevine Growth Stages for Disease Control



Bud Break to 20 cm



Immediate
prebloom



Fruit Set/
Post bloom



Pea size berries



Veraison



Stage

Grapevine Fungal Diseases through the Season



Bud Break to 20 cm

Immediate
prebloom

Fruit Set/
Post bloom

Pea size berries

Veraison

Stage

Phom, PM, DM,
Bl Rot, Anth

Powdery, Downy, Black Rot, Anth

Powdery, Downy

Powdery, Downy, Black Rot, Anth

Botrytis

Botrytis

Botrytis

Botrytis

Grapevine Fungal Diseases through the Season



Bud Break to 20 cm

Immediate
prebloom

Fruit Set/
Post bloom

Pea size berries

Veraison

Stage

Phom, PM, DM,
Bl Rot, Anth

Powdery, Downy, Black Rot, Anth

Powdery, Downy

Early season disease

Apply every 7-10 days (new growth/wet weather)

| | Activity | Powdery | Downy | Phom | Bl Rot | Anth |
|-------------------------|----------|---------|-------|------|--------|------|
| sulphurs | C/E | 4* | 0 | 0 | 0 | 0 |
| oils | C/E | 4* | 0 | 0 | 0 | 0 |
| coppers | C | 1 | 4* | 0 | 1* | 0 |
| Cueva | C | 3* | 4* | 0 | 1 | 0 |
| folpets (4 apps) | C | 0 | 4* | 4* | 1* | 3 |
| mancozebs (1 prebl app) | C | 0 | 4* | 3 | 4* | 2 |
| Diplomat (3 apps) | C | 4* | 0 | 3 | 3 | ? |
| LifeGard | S+SAR | 1* | 3* | 3 | 3 | ? |
| captans (1/2 apps) | C | 0 | 4* | 4* | 1* | 3 |

Early season disease

Apply every 7-10 days (new growth/wet weather)

| | Activity | Powdery | Downy | Phom | Bl Rot | Anth | REI |
|-------------------------|----------|---------|-------|------|--------|------|----------------|
| sulphurs | C/E | 4* | 0 | 0 | 0 | 0 | 24 hrs |
| oils | C/E | 4* | 0 | 0 | 0 | 0 | 12 hrs |
| coppers | C | 1 | 4* | 0 | 1* | 0 | 48 hr |
| Cueva | C | 3* | 4* | 0 | 1 | 0 | |
| folpets (4 apps) | C | 0 | 4* | 4* | 1* | 3 | 3 days |
| mancozebs (1 prebl app) | C | 0 | 4* | 3 | 4* | 2 | 7 days |
| Diplomat (3 apps) | C | 4* | 0 | 3 | 3 | ? | 12 hrs |
| LifeGard | S+SAR | 1* | 3* | 3 | 3 | ? | 4 hrs |
| captans (1/2 apps) | C | 0 | 4* | 4* | 1* | 3 | 55 days |

Early season disease control – product costs (2023)

Apply every 7-10 days (new growth/wet weather)

| | Activity | Powdery | Downy | Phom | Bl Rot | Anth | REI | \$/ha [✦] |
|------------------------|----------|---------|-------|------|--------|------|----------------|--------------------|
| sulphurs | C/E | 4* | 0 | 0 | 0 | 0 | 24 hrs | 8 |
| oils | C/E | 4* | 0 | 0 | 0 | 0 | 12 hrs | 15-50 |
| coppers | C | 1 | 4* | 0 | 1* | 0 | 48 hrs | 56 |
| Cueva | C | 3* | 4* | 0 | 1 | 0 | 4 hrs | 44 |
| folpets (4 apps) | C | 0 | 4* | 4* | 1* | 3 | 3 days | 34 |
| mancozeb (1 prebl app) | C | 0 | 4* | 3 | 4* | 2 | 7 days | 34-45 |
| Diplomat (3 apps) | C | 4* | 0 | 3 | 3 | ? | 12 hrs | 105 |
| LifeGard | S+SAR | 1* | 3* | 3 | 3 | ? | 4 hrs | 60 |
| captans (1/2 apps) | C | 0 | 4* | 4* | 1* | 3 | 55 days | 43 |

sulphur + folpet = \$42 (PM, DM, Phom, Anth)

sulphur + mancozeb = \$42 (PM, DM, Phom, Blrot, Anth)

sulphur + LifeGard = \$68 (PM, DM, Phom, Bl rot)

oil + folpet = \$49 (PM, DM, Phom, Ant) (14 day interval)

oil + mancozeb**** = \$49 (PM, DM, Phom, Bl rot)

oil + LifeGard* = \$75 (PM, DM, Phom, Bl rot)

Cueva + folpet = \$78 (PM, DM, Phom, Anth)

Diplomat + copper = \$120 (PM, DM, Phom, Bl rot)

Diplomat + mancozeb = \$139 (PM, DM, Phom, Bl rot)

Diplomat + folpet = \$139 (PM, DM, Phom, Bl rot, Anth)

Oils will suppress erineum mite, mealybugs and scale

Intervals between oils and sulphur vary with product

and sulphur formulation – SEE LABEL

✦ **300 L/ha**

2023 retail

Grapevine Fungal Diseases through the Season



Bud Break to 20 cm

Immediate
prebloom

Fruit Set/
Post bloom

Pea size berries

Veraison

Stage

Phom, PM, DM,
Bl Rot, Anth

Powdery, Downy, Black Rot, Anth

Powdery, Downy, Black Rot, Anth

Powdery, Downy

20 cm shoots – 6 weeks post bloom

Treat every 7-10 days (new growth/wet weather)

| Group | Activity | Powdery | Downy | Phom | Bl Rot | Anth | REI | |
|-------|------------------|---------|-------|------|--------|------|-----|---------|
| 3 | Cevya | LS | 4* | 0 | 0 | 3* | ? | 12 hrs |
| 3 | Fullback | LS | 4* | 0 | 0 | 4* | ? | 7 days |
| 3 | Mettle | LS | 4* | 0 | 0 | 4* | 3 | 5 days |
| 3 | Nova | LS | 4* | 0 | 0 | 4* | 4 | 7 days |
| 3+7 | Aprovia Top | LS | 4* | 0 | 3 | 2 | 2 | 2 days |
| 3+9 | Inspire Super | LS | 4* | 0 | 0 | 4* | 4* | 7 days |
| 11 | Flint | LS | 4* | 2 | 0 | 4* | 0 | 5 days |
| 11 | Sovran | LS | 3* | 4* | 4 | 4* | 3 | 48 hrs |
| 11+7 | Pristine | LS | 4* | 4* | 4 | 4* | 4 | 21 days |

20 cm shoots - 6 wks post bloom

Treat minimum every 10 days

| Group | Activity | Powdery | Downy | Bl rot | REI | |
|-------|------------------|---------|-------|--------|-----|----------------|
| 3+9 | Inspire Super | LS | 4* | 0 | 4* | 7 days |
| 3 | Cevya | LS | 4* | 0 | 3* | 12 hrs |
| 3 | Fullback | LS | 4* | 0 | 4* | 7 days |
| 3 | Mettle | LS | 4* | 0 | 4* | 5 days |
| 3+7 | Aprovia Top | LS | 4* | 0 | 4 | 2 days |
| 7 | Aprovia | LS | 4* | 0 | 4 | 12 hrs |
| 7 | Cantus | LS | 4* | 0 | 0 | 12 hrs |
| 7 | Sercadis | LS | 4* | 0 | 0 | 12 hrs |
| 7+9 | Luna Tranquility | LS | 4* | 0 | 3 | 24 hrs |
| 7+12 | Miravis Prime | LS | 4* | 0 | 3 | 12 hrs |
| 7+11 | Merivon | LS | 4* | 0 | ? | 21 days |
| 5 | Priwen | LS | 4* | 0 | 0 | 17 days |
| 50 | Property | LS | 4* | 0 | 0 | 12 hrs |
| 50 | Vivando | LS | 4* | 0 | 0 | 12 hrs |
| U13 | Gatten | LS | 4* | 0 | 0 | 12 hrs |
| BM1 | ProBLAD (5 apps) | LS | 4* | 0 | 0 | when dry |
| M | sulphurs | C/E | 4* | 0 | 0 | 24 hrs |

20 cm shoots - 6 wks post bloom
Treat minimum every 10 days

RESISTANCE!

| Group | Activity | Powdery | Downy | Phom | Bl rot | Anth | REI |
|------------------|-------------------|---------|--------------|--------------|--------|------|---------------------|
| 3 | Cevya | LS | 4* | 0 | | 3* | ? 12 hrs |
| 3 | Fullback | LS | 4* | 0 | | 4* | ? 7 days |
| 3 | Mettle | LS | 4* | 0 | | 4* | 3 5 days |
| 3 | Nova | LS | R | 0 | | 4* | 4 7 days |
| 3+7 | Aprovia Top | LS | 4* | 0 | | 2 | 2 2 days |
| 3+9 | Inspire | LS | 4* | 0 | | 4* | 4* 7 days |
| 3+9 | Super | | | | | | |
| 11 | Flint | LS | R | R | | 4* | 0 5 days |
| 11 | Sovran | LS | R | R | | 4* | 3 48 hrs |
| 11 +7 | Merivon | LS | 4* | 0 | 3 | ? | ? 21 days |
| 11+7 | Pristine | LS | 4* | 4* | | 4* | 4 21 days |

20 cm shoots - 6 wks post bloom
Treat minimum every 10 days

RESISTANCE!

| Group | Activity | Powdery | Downy | Phom | Bl rot | Anth | REI |
|-----------------|------------------------------|---------|-------|------|--------|------|---------|
| 5 | Priwen | LS | 4* | 0 | 0 | 0 | 17 days |
| 7 | Aprovia | LS | 4* | 0 | 3 | 4 | 12 hrs |
| 7 | Cantus | LS | 4* | 0 | 0 | 0 | 12 hrs |
| 7 | Sercadis | LS | 4* | 0 | 0 | 0 | 12 hrs |
| 3+7 | Aprovia Top | LS | 4* | 0 | 3 | 4 | 2 days |
| 7+9 | Luna Tranquility | LS | 4* | 0 | 2? | 3 | 24 hrs |
| 7+12 | Miravis Prime | LS | 4* | 0 | 3 | 3 | 12 hrs |
| 7+11 | Merivon | LS | 4* | 0 | 3 | ? | 21 days |
| 7+11 | Pristine ← Cantus | LS | 4* | R | 1 | 4* | 21 days |
| 50 | Property | LS | 4* | 0 | 0 | 0 | 12 hrs |
| 50 | Vivando | LS | 4* | 0 | 0 | 0 | 12 hrs |
| U13 | Gatten | LS | 4* | 0 | 0 | 0 | 12 hrs |

20 cm shoots - 6 wks post bloom

Treat minimum every 10 days

| Group | Activity | Powdery | Downy | Bl rot | REI | |
|-------|--------------------------|---------|-------|--------|-----|--------|
| 40 | Forum | S | 0 | 4* | 0 | 12 hrs |
| 40 | Revus | LS | 0 | 4* | 0 | 12 hrs |
| 40+45 | Zampro | LS+S | 0 | 4* | 0 | 12 hrs |
| P7 | phos acids | S | 0 | 4* | 0 | 4 hrs |
| P6 | <i>LifeGard</i> | S+SAR | 1 | 3* | 3* | 4 hrs |
| M | <i>coppers</i> | C | 1 | 4* | 1 | 48 hr |
| M | <i>Cueva</i> | C | 4* | 4* | 1 | 4 hrs |
| M | folpets (4 apps) | C | 0 | 4* | 0 | 3 days |
| 19 | <i>Diplomat</i> (3 apps) | C | 4* | 4* | 0 | 12 hrs |
| 21 | Torrent 400 SC | C | 0 | 4* | 0 | 12 hrs |
| BM2 | <i>Stargus</i> | C | 0 | 3* | 3* | 4 hrs |

Grapevine Fungal Diseases through the Season



Bud Break to 20 cm

Immediate prebloom

Fruit Set/
Post bloom

Pea size berries

Veraison

Stage

Phom, PM, DM,
Bl Rot, Anth

Powdery, Downy, Black Rot, Anth

Powdery, Downy

Powdery, Downy, Black Rot, Anth

Botrytis

Botrytis

Botrytis

Botrytis

Powdery Mildew Rescue

- MilStop, Sulphur, Oils
 - Kill superficial mycelium on leaves and berries
 - MilStop should not be tank mixed with any products
- Follow up with locally systemic or systemic product
- DO NOT try to eradicate sporulating lesions with locally systemic products!

RESISTANCE!



Downy Mildew Rescue

- Phosphorus acid products
 - Kills superficial mycelium on leaves and berries
 - Moves from sprayed tissues to new growth
- DO NOT try to eradicate sporulating lesions with other systemic products!



RESISTANCE!



Grapevine Fungal Diseases through the Season



Phomopsis

Powdery, Downy, Black rot

Powdery, Downy

Powdery, Downy, Black rot

Botrytis

Botrytis

Botrytis

Botrytis

Okay - what about costs? (2023 values)

- The following are some of the costs as determined from polling distributors in Ontario and may not be the same for Nova Scotia
- Costs of product per hectare - does not include application costs (equipment, operator , fuel etc)

20 cm shoots - 6 wks post bloom

Treat minimum every 10 days

| Group | Activity | Powdery | Downy | Bl rot | REI | \$/ha [✦] | |
|-------|-------------------|---------|-------|--------|-----|--------------------|-------|
| 40 | Forum | S | 0 | 4* | 0 | 12 hrs | 47 |
| 40 | Revus | LS | 0 | 4* | 0 | 12 hrs | 49 |
| 40+45 | Zampro | LS+S | 0 | 4* | 0 | 12 hrs | 90 |
| P7 | phos acids | S | 0 | 4* | 0 | 4 hrs | 41 |
| P6 | LifeGard | S+SAR | 1 | 3* | 3* | 4 hrs | 120 |
| M | coppers | C | 1 | 4* | 1 | 48 hr | 56-74 |
| M | Cueva | C | 4* | 4* | 1 | 4 hrs | 92 |
| M | folpets (4 apps) | C | 0 | 4* | 0 | 3 days | 34 |
| 19 | Diplomat (3 apps) | C | 4* | 4* | 0 | 12 hrs | 105 |
| 21 | Torrent 400 SC | C | 0 | 4* | 0 | 12 hrs | 69 |
| BM2 | Stargus | C | 0 | 3* | 3* | 4 hrs | 41 |

✦ 600 L/ha
2023 retail

Downy mildew

| Group | Activity | Powdery | Downy | Bl rot | REI | \$/ha [✦] |
|-------|-------------------|---------|-------|--------|--------|--------------------|
| 40 | Forum | 0 | 4* | 0 | 12 hrs | 47 |
| 40 | Revus | 0 | 4* | 0 | 12 hrs | 49 |
| 40+45 | Zampro | 0 | 4* | 0 | 12 hrs | 90 |
| P7 | <i>phos acids</i> | 0 | 4* | 0 | 4 hrs | 41 |
| P6 | <i>LifeGard</i> | 1 | 3* | 3* | 4 hrs | 120 |
| M | <i>coppers</i> | 1 | 4* | 1 | 48 hr | 56-74 |
| M | Cueva | 4* | 4* | 1 | 4 hrs | 92 |
| M | folpets (4 apps) | 0 | 4* | 0 | 3 days | 34 |
| 21 | Torrent 400 SC | 0 | 4* | 0 | 12 hrs | 69 |
| BM2 | <i>Stargus</i> | 0 | 3* | 3* | 4 hrs | 41 |
| 19 | Diplomat | 4* | 4* | 0 | 12 hrs | 162 |

✦ 600 L/ha
2023 retail

Powdery Mildew

| Group | Activity | Powdery | Downy | Bot | REI | \$/ha (600L) |
|-------|-----------------|---------|-------|-----|----------------|--------------|
| 3 | Cevya | 4* | 0 | 0 | 12 hrs | 51 |
| 3 | Fullback | 4* | 0 | 0 | 7 days | 88 |
| 3 | Mettle | 4* | 0 | 0 | 5 days | 71 |
| 3+7 | Aprovia Top | 4* | 0 | 0 | 2 days | 54 |
| 7 | Aprovia | 4* | 0 | 0 | 12 hrs | 99 |
| 7 | Cantus | 4* | 0 | 0 | 12 hrs | 53 |
| 7 | Sercadis | 4* | 0 | 0 | 12 hrs | 59 |
| 7+11 | Merivon | 4* | 0 | 0 | 21 days | 73 |
| 5 | Priwen | 4* | 0 | 0 | 17 days | 57 |
| 50 | Property | 4* | 0 | 0 | 12 hrs | 75 |
| 50 | Vivando | 4* | 0 | 0 | 12 hrs | 87 |
| U13 | Gatten | 4* | 0 | 0 | 12 hrs | 94 |
| M | <i>sulphurs</i> | 4* | 0 | 0 | 24 hrs | 16 |
| M | <i>oils</i> | 4* | 0 | 0 | 12 hrs | 30-100 |



These products are all so expensive. Can I get away with just cheaper protectants instead of systemics?

Sure. If you can meet the following requirements:

- Excellent coverage.
- Able to spray entire vineyard in a day in case of heavy rain
- Can work with fewer apps/year and longer REIs
- Willing to accept some losses due to missed infection periods with extended rainfall periods

Practice resistance management

- **No more than 2 apps of any resistance-prone group/season**
- **No more than 1 app of each Botrytis specific product**
- **Using a coformulation of 2 different groups counts as 1 use of each group**
- **Don't use locally systemic products on sporulating lesions**
- **No back-to-back apps of the same group**
- **Full label rates**
- Be aware of tank mix restrictions on labels
- Keep track of the number of apps
- Ask processors for their preferred PHIs

Grapevine Fungal Diseases through the Season



Phomopsis

Powdery, Downy, Black rot

Powdery, Downy

Powdery, Downy, Black rot

Botrytis

Botrytis

Botrytis

Botrytis

Table 2: Relative Disease Susceptibility and Sensitivity To Sulphur And Copper.

| Cultivar | Susceptibility | | | | | | | Sensitivity | |
|--------------------|----------------|-----|-----|-----|------|-----|-----|-------------|-----|
| | BR | DM | PM | Bot | Phom | Eu | CG | S | Cu |
| Baco noir | +++ | + | ++ | ++ | + | ++ | +++ | No | ? |
| Cabernet Franc | +++ | +++ | +++ | + | ? | ? | +++ | No | ? |
| Cabernet Sauvignon | +++ | ++ | +++ | + | +++ | +++ | +++ | No | ? |
| Canadice | +++ | + | + | ++ | ? | ? | ++ | ? | ? |
| Chancellor | + | ++ | ++ | + | +++ | + | +++ | Yes | +++ |
| Chardonnay | ++ | +++ | +++ | +++ | +++ | ++ | +++ | No | + |
| Concord | +++ | ++ | ++ | + | +++ | +++ | + | Yes | + |
| De Chaunac | + | +++ | ++ | + | +++ | +++ | ++ | Yes | + |

Key **BR**= black rot; **DM** = downy mildew; **PM** = powdery mildew; **Bot** = Botrytis; **Phom** = Phomopsis; **Eu** = Eutypa;
CG = crown gall; **S** = sulphur; **C** = copper

Key to ratings:

- + = slightly susceptible or sensitive
- ++ = moderately susceptible or sensitive
- +++ = highly susceptible or sensitive
- No = not sensitive
- Yes = sensitive
- ? = relative susceptibility or sensitivity not established

Slight to moderate sulphur injury may occur even on tolerant cultivars when applied at temperatures of 29°C or higher, immediately prior to or after application.

Copper applied under cool, slow-drying conditions is likely to cause injury.

Table 2: Relative Disease Susceptibility and Sensitivity To Sulphur And Copper.

| Cultivar | Susceptibility | | | | | | | Sensitivity | |
|-----------------|----------------|-----|-----|-----|------|----|-----|-------------|----|
| | BR | DM | PM | Bot | Phom | Eu | CG | S | Cu |
| Einset Seedless | +++ | + | +++ | + | ? | ? | + | ? | ? |
| Frontenac | ++ | +++ | ++ | ++ | + | ? | ? | No | ? |
| Gewürztraminer | +++ | + | +++ | +++ | ? | ? | +++ | No | + |
| Himrod | ++ | +++ | ++ | + | ? | ? | ? | No | ? |
| L'Acadie | + | + | + | + | + | + | ? | ? | ? |
| Léon Millot | + | +++ | +++ | + | + | + | ? | Yes | ? |
| Lucie Kuhlmann | ++ | + | ++ | ++ | ++ | ++ | ? | ? | ? |
| Marechal Foch | ++ | + | ++ | + | ++ | ++ | ? | Yes | ? |

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|-----------------|----------------|-----|-----|-----|------|-----|-----|-------------|----|
| | BR | DM | PM | Bot | Phom | Eu | CG | S | Cu |
| NewYork Muscat | + | + | ++ | + | + | + | ? | ? | ? |
| Pinot gris | +++ | +++ | +++ | ++ | ? | +++ | +++ | No | ? |
| Pinot noir | +++ | +++ | +++ | +++ | ? | ? | +++ | No | + |
| Reliance | +++ | +++ | ++ | + | ++ | ? | ? | No | + |
| Riesling | +++ | +++ | ++ | + | ++ | ? | ? | No | + |
| Sauvignon blanc | +++ | ++ | +++ | +++ | ? | ? | +++ | No | + |
| Seyval | ++ | + | +++ | +++ | ++ | + | ++ | No | + |
| Vidal | + | ++ | +++ | + | + | + | ++ | No | ? |

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Slight to moderate sulphur injury may occur even on tolerant cultivars when applied at temperatures of 29°C or higher, immediately prior to or after application.

Copper applied under cool, slow-drying conditions is likely to cause injury.

Organic options

- Considerations
 - Application intervals
 - Rotations
 - Capacity to use regularly
 - Label instructions
- Limitations
 - Not as long lasting
 - Often washed off by precipitation
 - Compatibility with other organic materials
- Scouting critical

| <u>Group</u> | <u>Fungicide</u> | <u>Anthracnose</u> | <u>Phomopsis Cane and Leaf Spot</u> | <u>Black Rot</u> | <u>Downy Mildew</u> | <u>Powdery Mildew</u> | <u>Botrytis bunch Rot</u> | <u>Activity</u> | <u>Organic</u> |
|--------------|-----------------------------|--------------------|---|----------------------|-------------------------|---------------------------|-------------------------------|------------------|--------------------------------|
| BM2 | Serenade OPTI | 0 | 0 | 0 | 0 | 1 * | 2 * | Contact | A |
| BM2 | Serifel | 0 | 0 | 0 | 0 | 2 * | 2 * | Contact | A |
| BM2 | Stargus | 0 | 0 | 2 * | 2 * | 0 | 0 | Contact | A |
| 46 | Timorex Gold | 0 | 0 | 0 | 1 * | 2 * | 2 * | Contact | A |
| NC | Vegol Crop Oil | 0 | 0 | 0 | 0 | 2 * | 0 | Contact | A |
| BM2 | Actinovate SP | — | — | — | — | 2 * | 1 * | Contact | Soft but not certified organic |
| NC | Botector | 0 | 0 | 0 | 0 | 0 | 1 * | Contact | Soft but not certified organic |
| BM1 | ProBLAD Biofungicide | 2 | 0 | 0 | 0 | 3 * | 3 * | Locally systemic | Soft but not certified organic |

| <u>Group</u> | <u>Fungicide</u> | <u>Phomopsis</u> | | | | | <u>Activity</u> | <u>Organic</u> | |
|--------------|---------------------------------------|--------------------|---------------------------|------------------|---------------------|-----------------------|-----------------|----------------|---------------------------|
| | | <u>Anthracnose</u> | <u>Cane and Leaf Spot</u> | <u>Black Rot</u> | <u>Downy Mildew</u> | <u>Powdery Mildew</u> | | | <u>Botrytis bunch Rot</u> |
| P6 | LifeGard | -- | 3 | 3 | 3 * | 1 * | 0 | Systemic SAR | A |
| M | Lime Sulphur (dormant) | 2 | 0 | 0 | 0 | 1 * | 0 | Contact | A |
| M | Microscopic Sulphur WP | 1 | 1 | 0 | 0 | 3 * | 0 | Contact | A |
| M | Microthiol Disperss | 1 | 1 | 0 | 0 | 3 * | 0 | Contact | A |
| NC | MilStop | 0 | 0 | 0 | 1 | 2 * | 1 | Contact | A |
| NC | Oxidate 2.0 | 1 | 1 * | 1 * | 1 * | 1 * | 1 | Contact | A |
| NC | Purespray Green Spray Oil 13 E | 0 | 0 | 0 | 0 | 2 * | 0 | Contact | A |
| P5 | Regalia Maxx | 0 | 0 | 0 | 0 | 1 * | 1 * | Systemic SAR | A |

| <u>Group</u> | <u>Fungicide</u> | <u>Phomopsis</u> | | | | | <u>Botrytis</u> | <u>Activity</u> | <u>Organic</u> |
|--------------|--|--------------------|---------------------------|------------------|---------------------|-----------------------|-----------------|-----------------|----------------|
| | | <u>Anthracnose</u> | <u>Cane and Leaf Spot</u> | <u>Black Rot</u> | <u>Downy Mildew</u> | <u>Powdery Mildew</u> | | | |
| NC | Buran | 0 | 0 | 0 | 0 | 1 * | 0 | Contact | A |
| M | Copper 53 W | 0 | 1 * | 1 * | 3 * | 2 | 0 | Contact | A |
| M | Copper Spray | 0 | 1 | 1 | 2 * | 2 * | 0 | Contact | A |
| M | Cosavet DF Edge | 1 | 1 | 0 | 0 | 3 * | 0 | Contact | A |
| | Cueva | 0 | 1 | 1 | 2 * | 2 * | 0 | Contact | A |
| BM1 | Dart | 0 | * | 0 | * | * | 0 | Contact | A |
| BM2 | Double Nickel LC | 0 | 0 | 0 | 0 | 1 * | 1 * | Contact | A |
| M | Guardzman Copper Oxychloride 50 | 0 | 1 * | 1 | 2 * | 2 * | 0 | Contact | A |
| M | Kocide 2000-O | 0 | 1 | 0 | 2 * | 2 | 0 | Contact | A |
| M | Kumulus DF | 1 | 1 | 0 | 0 | 3 * | 0 | Contact | A |

Update of existing 2023 Perennia Pest Management Charts

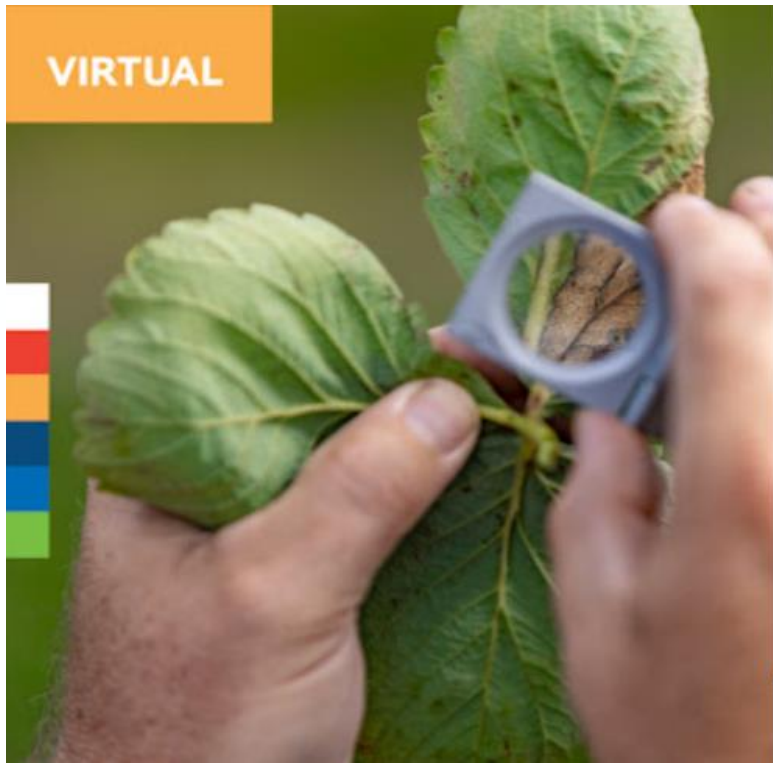
| Group | Fungicide | Anthracnose | Phomopsis | | | Downy Mildew | Powdery Mildew | Botrytis bunch Rot | Activity | Organic |
|-------|---------------------------|-------------|-----------------------|-----------|-----|-----------------|-------------------|--------------------------|--------------------------------|---------|
| | | | Cane and Leaf Spot | Black Rot | | | | | | |
| BM2 | Actinovate SP | — | — | — | — | 2 * | 1 * | Contact | Soft but not certified organic | |
| P7 | Aliette | 0 | 0 | 0 | 3 * | 0 | 0 | Systemic SAR | | |
| 29 | Allegro 500 F | 2 * | 3 * | 0 | 0 | 0 | 0 | Contact | | |
| 7 | Aprovia | 0 | 2 | 3 | 0 | 3 * | 2 | Locally systemic | | |
| 3+7 | Aprovia Top 195 EC | 1 | 0 | 1 | 0 | 3 * | 0 | Locally systemic | | |
| NC | Botector | 0 | 0 | 0 | 0 | 0 | 1 * | Contact | Soft but not certified organic | |
| NC | Buran | 0 | 0 | 0 | 0 | 1 * | 0 | Contact | A | |
| 9+12 | Button | 0 | 0 | 0 | 0 | 0 | 3 * | Locally systemic | | |
| 7 | Cantus WDG | 3 | 0 | 0 | 0 | 3 * | 1 | Locally systemic | | |
| 3 | Cevya | 0 | 0 | 3 | 0 | 3 * | 0 | Locally systemic | | |
| P7 | Confine Extra | 0 | 0 | 0 | 3 * | 0 | 0 | Systemic SAR | | |
| M | Copper 53 W | 0 | 1 * | 1 * | 3 * | 2 | 0 | Contact | A | |
| M | Copper Spray | 0 | 1 | 1 | 2 * | 2 * | 0 | Contact | A | |
| M | Cosavet DF Edge | 1 | 1 | 0 | 0 | 3 * | 0 | Contact | A | |
| M | Cueva | 0 | 1 | 1 | 2 * | 2 * | 0 | Contact | A | |
| BM1 | Dart | 0 | * | 0 | * | * | 0 | contact | | |

| | | Anth | Phom | Bl Rot | DM | PM | Bot | Activity | (organic A) |
|-----|--|------|------|--------|-----|------|-----|-------------------------|-------------|
| 19 | Diplomat 5 SC | 0 | 3* | 1 | 3 * | 3 * | 1 * | Contact | |
| M | Dithane Rainshield | 2 | 3 | 3 * | 3 * | 0 | 0 | Contact | |
| BM2 | Double Nickel LC | 0 | 0 | 0 | 0 | 1 * | 1 * | Contact | A |
| 17 | Elevate 50 WDG | 0 | 0 | 0 | 0 | 1 | 3 * | Locally systemic | |
| 11 | Flint | 0 | 1 | 3 * | 1 | 3 *R | 1 | Locally systemic | |
| M | Follow | 2 | 3 * | 1 * | 3 * | 1 * | 0 | Contact | |
| M | Folpan 80 WDG | 2 | 3 * | 1 * | 3 * | 1 | 0 | Contact | |
| 40 | Forum | 0 | 0 | 0 | 3 * | 0 | 0 | Systemic | |
| 3 | Fullback 125 SC | 0 | 0 | 3 * | 0 | 3 * | 0 | Locally systemic | |
| U13 | Gatten | 0 | 0 | 0 | 0 | 3 * | 0 | Locally systemic | |
| 22 | Gavel DF | 0 | 0 | 0 | 3 * | 0 | 0 | Contact | |
| M | Guardsman Copper Oxychloride 50 | 0 | 1 * | 1 | 2 * | 2 * | 0 | Contact | A |
| 9 | Impala | 0 | 0 | 0 | 0 | 0 | 3 * | Locally systemic | |
| 3+9 | Inspire Super | 3 * | 0 | 3 * | 0 | 3 * | 3 * | Locally systemic | |
| 11 | Intuity | 0 | 0 | 0 | 0 | 1 *R | 3 * | Locally systemic | |

| | | Anth | Phom | Bl Rot | DM | PM | Bot | Activity | Organic (A) |
|------|-------------------------------|------|------|--------|-----|------|-----|-------------------------|-------------|
| 7 | Kenja 400 SC | 0 | 0 | 0 | 0 | 2 | 3 * | Locally systemic | |
| M | Kocide 2000-O | 0 | 1 | 0 | 2 * | 2 | 0 | Contact | A |
| M | Kumulus DF | 1 | 1 | 0 | 0 | 3 * | 0 | Contact | A |
| P6 | LifeGard | -- | 3 | 3 | 3 * | 1 * | 0 | Systemic SAR | A |
| M | Lime Sulphur (dormant) | 2 | 0 | 0 | 0 | 1 * | 0 | Contact | A |
| 7+9 | Luna Tranquility | 0 | 0 | 0 | 0 | 3 * | 3 * | Locally systemic | |
| M | Maestro 80 WSP | 2 | 3 * | 1 * | 3 * | 0 | 0 | Contact | |
| 39 | Magister SC | 0 | 0 | 0 | 0 | 2 * | 0 | Contact | |
| M | Manzate Pro-Stick | 2 | 3 | 3 * | 3 * | 0 | 0 | Contact | |
| 3 | Mettle 125 ME | 3 | 0 | 3 * | 0 | 3 * | 0 | Locally systemic | |
| M | Microscopic Sulphur WP | 1 | 1 | 0 | 0 | 3 * | 0 | Contact | A |
| M | Microthiol Disperss | 1 | 1 | 0 | 0 | 3 * | 0 | Contact | A |
| NC | MilStop | 0 | 0 | 0 | 1 | 2 * | 1 | Contact | A |
| 7+12 | Miravis Prime | 0 | 0 | 0 | 0 | 3 | 3 * | Locally systemic | |
| 3 | Nova | 3 * | 0 | 3 * | 0 | 3 *R | 0 | Locally systemic | |

| | | Anth | Phom | Bl Rot | DM | PM | Bot | Activity | Organic (A) |
|------|---------------------------------------|------|------|--------|------|-----|-----|-------------------------|---------------------------------------|
| NC | Oxidate 2.0 | 1 | 1 * | 1 * | 1 * | 1 * | 1 | Contact | A |
| M | Penncozeb 75 DF Raincoat | 2 | 3 | 3 * | 3 * | 0 | 0 | Contact | |
| P7 | Phostrol | 0 | 0 | 0 | 3 * | 0 | 0 | Systemic SAR | |
| 7+11 | Pristine WG | 3 * | 1 | 3 * | 3 *R | 3 * | 1 * | Locally systemic | |
| 5 | Priwen 500 EC | 0 | 0 | 0 | 0 | 3 * | 0 | Locally systemic | |
| BM1 | ProBLAD Biofungicide | 2 | 0 | 0 | 0 | 3 * | 3 * | Locally systemic | Soft but not certified organic |
| 50 | Property 300 SC | 0 | 0 | 0 | 0 | 3 * | 0 | Locally systemic | |
| NC | Purespray Green Spray Oil 13 E | 0 | 0 | 0 | 0 | 2 * | 0 | Contact | A |
| P7 | Rampart | 0 | 0 | 0 | 3 * | 0 | 0 | Systemic SAR | |
| P5 | Regalia Maxx | 0 | 0 | 0 | 0 | 1 * | 1 * | Systemic SAR | A |
| 40 | Revus | 0 | 0 | 0 | 3 * | 0 | 0 | Locally systemic | |
| 4+M | Ridomil Gold MZ 68 WG | 0 | 1 | 1 | 3 * | 0 | 0 | Systemic | |

| | | Anth | Phom | Bl Rot | DM | PM | Bot | Activity | Organic (A) |
|-------|---------------------|------|------|--------|------|------|-----|------------------|-------------|
| 9 | Scala SC | 0 | 0 | 0 | 0 | 0 | 3 * | Locally systemic | |
| 7 | Sercadis | 0 | 0 | 0 | 0 | 3 * | 1 * | Locally systemic | |
| BM2 | Serenade OPTI | 0 | 0 | 0 | 0 | 1 * | 2 * | Contact | A |
| BM2 | Serifel | 0 | 0 | 0 | 0 | 2 * | 2 * | Contact | A |
| NC | Sirocco/Milstop | 0 | 0 | 0 | 1 | 2 * | 1 * | Contact | |
| 11 | Sovran | 3 | 1 | 3 * | 2 *R | 2 *R | 1 | Locally systemic | |
| BM2 | Stargus | 0 | 0 | 2 * | 2 * | 0 | 0 | Contact | A |
| M | Supra Captan 80 WSP | 2 | 3 * | 1 * | 3 * | 0 | 0 | Contact | |
| 9+12 | Switch 62.5 WG | 0 | 0 | 0 | 0 | 0 | 3 * | Locally systemic | |
| 46 | Timorex Gold | 0 | 0 | 0 | 1 * | 2 * | 2 * | Contact | A |
| NC | Tivano | 0 | 0 | 0 | 1 * | 0 | 0 | Contact | |
| NC | Vegol Crop Oil | 0 | 0 | 0 | 0 | 2 * | 0 | Contact | A |
| 50 | Vivando SC | 0 | 0 | 0 | 0 | 3 * | 0 | Locally systemic | |
| 40+45 | Zampro | 0 | 0 | 0 | 3 * | 0 | 0 | Systemic | |



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