

### GRAPE CALENDAR

#### In this section:

- Read the product label and follow all safety precautions. Labels for registered pest control products are available at the Pest Management Regulatory Agency (PMRA) website at <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>.
- For preharvest intervals, restricted entry intervals and maximum number of applications, see Table 4–1. *Products Used on Grapes*, page 232.
- Some grape varieties are sensitive to sulphur, copper, Flint, Pristine, or other products. See Table 4–2. *Relative Susceptibility of Grape Cultivars to Diseases*, page 236, for specific information.
- **Products are listed by chemical group and in alphabetical order within each group. The order does not reflect efficacy.** See Table 4–3. *Activity of Fungicides on Grape Diseases and Honeybees*, page 238 and Table 4–4. *Activity of Insecticides on Grape Insect Pests and Honeybees*, page 241, for efficacy ratings.
- Where a product in the calendar is followed by a “\*”, it is potentially acceptable for organic use based on *Ministère de l’Agriculture, des Pêcheries et de l’Alimentation du Québec publication Bulletin D’Information No. 6, 2 juin 2017* or a letter of certification provided by the registrant. Check with your certifying body to verify the acceptability of any product prior to using it.

**Resistance Management**

To delay development of resistance to insecticides, miticides and fungicides, follow resistance management guidelines outlined in *Resistance Management Strategies*, page 393. The chemical group is indicated in the column labelled “Group” before the “Product” column. Products belonging to the same chemical group are grouped together in the calendar. Multi-site (M) fungicides are not prone to resistance and do not have to be rotated. Some products are not classified to mode of action (NC) and others have unknown modes of action (U or UN). Group 44 and 46 fungicides are not known to be prone to resistance.

**Fungicide resistance management**

Take the following steps to avoid rapid development of fungicide resistance:

- Do not reduce rates below those specified on the label.
- Do not use products containing the same chemical group in consecutive applications.
- Use co-formulations or products that must be tank-mixed with another chemical group no more than 3 times per season.
- Use products containing only one chemical family no more than twice per season.
- Use sufficient water to provide thorough coverage.
- Do not use Rovral, Fullback, Mettle, Nova, Inspire Super, Priwen, Aprovia Top, Cantus, Kenja, Sercadis, Luna Tranquility, Pristine, Scala, Switch, Flint, Intuity, Sovran, Quintec, Elevate, Forum, Revus, Zampro or Vivando when sporulating lesions of the target disease are present.

**Insecticide resistance management**

Take the following steps to avoid development of insecticide resistance:

- For pests with discrete generations (grape berry moth), do not use insecticides from the same group for more than one generation. Within a generation, if more than one spray is required, use a product from the same chemical group.
- For pests with rapidly building and overlapping generations (mites, leafhoppers, phylloxera), do not use products containing the same chemical group in consecutive applications.

**Bee Toxicity**

Some insecticides are toxic to bees and other pollinating insects. Use of insecticides on flowering crops requires careful management to avoid negative effects on pollinators. Do not apply insecticides during bloom. Before and after bloom, bees may still be present on flowering cover crops and weeds—do not allow drift of insecticides onto these or other flowering crops. Always follow label precautions regarding avoiding impacts on bees. For more information, see *Bee Poisoning*, page 5, and honeybee toxicity ratings in Table 4–3. *Activity of Fungicides on Grape Diseases and Honeybees*, page 238 and Table 4–4. *Activity of Insecticides on Grape Insect Pests and Honeybees*, page 241.

### Buffer Zones

Leave a suitable buffer zone between treatment area and adjacent sensitive areas, such as hedgerows, woodlots and freshwater habitats. Zones may vary depending on the product used, growth stage of the crop and method of application including the use of drift-reducing technology. Check the pesticide label for requirements.

Use Health Canada's online spray drift calculator to modify the buffer zone specified on the label based on weather conditions, category of spray equipment and droplet size. For more information, see the Buffer Zone Calculator at [www.hc-sc.gc.ca/cps-spc/pest/agri-commerce/drift-derive/calculator-calculatrice-eng.php](http://www.hc-sc.gc.ca/cps-spc/pest/agri-commerce/drift-derive/calculator-calculatrice-eng.php). Unfortunately, this model does not account for carrier volume, travel speed or crop stage.

Observing buffer zones is a legal requirement. A record of the buffer zone modification, if any, must be retained for at least one year from the time of application.

### Preharvest Intervals

**Contact the processors and wineries directly in regard to their preharvest interval policy.** Preharvest intervals listed in Table 4–1. *Products Used on Grapes*, page 232, are taken from product labels. In some cases, regulations on residues in finished products are much more stringent. Many processors require longer preharvest intervals than stated on product labels. Some processors and wineries also have special restrictions for certain pest control products regarding number of applications or application after a certain crop stage. Consult the grape purchaser for more details.

### Spray Water Volumes

Sufficient water volumes are necessary to provide complete coverage with grape fungicides, miticides and insecticides. Increased water volumes are necessary as the season progresses and canopies grow. Canopy management through hedging, leaf-pulling and shoot thinning, as well as proper sprayer calibration, is critical to ensure proper spray coverage. Sufficient coverage and efficacy are not possible if water volumes are inadequate. Some types of sprayers are able to provide sufficient coverage with less water than others. Consult equipment dealers or professional crop consultants about the amount of water needed to ensure adequate coverage. Where the product rate is listed in amount per 1,000 L and if a water volume is not provided on the label, use enough water to wet the foliage. Read and follow water volume requirements on all product labels.

### Crop Nutrition

Crop nutrition is important for plant growth and fruit quality on berry crops. Soil testing, plant tissue analysis and visual deficiency symptoms all play an important role in assessing and monitoring the crop's nutritional status. For more information, visit <http://www.omafra.gov.on.ca/english/crops/hort/grape.html> (click on *Soil Management, Fertilizer Use, Crop Nutrition and Cover Crops for Fruit Production*) and see OMAFRA Publication 611, *Soil Fertility Handbook*. For soil testing and plant tissue analysis services, see Appendix E: *Accredited Soil-Testing Laboratories in Ontario*, page 435.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Dormant to bud swell</b>						
Powdery mildew	M	Lime sulphur *	73 L/1,000 L water	48 hours	120 days	Apply in a high-volume spray to ensure thorough coverage of canes, head and trunk. Suppression of overwintering inoculum. May also suppress anthracnose and scale insects. Do not use later than delayed dormant.
Scale	<b>General Comments:</b> <ul style="list-style-type: none"> <li>If grape leafroll-associated virus has been confirmed by an accredited lab and scale has been confirmed in the vineyard, this spray may reduce insect vector pressure and spread of the virus.</li> <li>Examine female scales and apply when crawlers are present among the eggs under scales. Controls only exposed scale not under bark.</li> </ul>					
	NC	Vegol Crop Oil *	2% v/v	12 hours	0 days	Apply in a high-volume spray to ensure thorough coverage at a rate of 2% v/v (20 L/1,000 L water). Tolerance has not been determined for all varieties. Test a small area of each variety prior to spraying the whole block. Do not apply within 48 hours of freezing temperatures, when temperatures are high (above 30°C), prior to rain or to heat- or moisture-stressed vines. Do not use within 14 days of Supra Captan, Maestro, Folpan or copper and 30 days of sulphur. Do not apply to wet foliage.
<b>Bud burst to first leaf</b>						
Climbing cutworm	<b>General Comments:</b> <ul style="list-style-type: none"> <li>Apply in the evening at first sign of cutworm feeding on buds.</li> <li>Apply in a high-volume spray to ensure thorough coverage on trunks, cordons, canes, unopened buds and tender shoots.</li> </ul>					
	3	Pounce 384 EC	180 mL/ha	when dry	21 days	Increase rate to 360 mL/ha if cutworms are large (2–3 cm). Apply in a minimum of 450 L of water/ha. Spray trunk and soil surface within 0.5 m of the trunk. Do not disturb the soil for 5 days after spraying.
	18	Intrepid	600 mL/ha	12 hours	30 days	Maximum of 2 applications per season.
	28	Altacor	285 g/ha	12 hours	14 days	Maximum of 2 applications per season.
Scale	NC	Vegol Crop Oil *	2% v/v	12 hours	0 days	See comments on this product for Scale at <b>Dormant</b> .
<b>First leaf, 1.25–5 cm shoot length</b>						
Anthracnose	<b>General Comments:</b> <ul style="list-style-type: none"> <li>Apply in a high-volume spray to ensure thorough coverage.</li> <li>Alternate row spraying will not give adequate protection from anthracnose.</li> </ul>					
	3	Nova	340 g/ha	12 hours <sup>1</sup> /7 days <sup>2</sup>	14 days	<b>Suppression only.</b>
	3+9	Inspire Super	836–1,161 mL/ha	7 days	14 days	Use high rate under high disease pressure.

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments	
<b>First leaf, 1.25–5-cm shoot length</b>							
Phomopsis cane and leaf spot	<b>General Comments:</b>						
	<ul style="list-style-type: none"> <li>Spray susceptible varieties, especially if the weather is wet and there is a history of phomopsis in the vineyard.</li> <li>Alternate row spraying will not give adequate protection from phomopsis. See Table 4–2. <i>Relative Susceptibility of Grape Cultivars to Diseases</i>, page 236.</li> </ul>						
	M	Folpan 80 WDG	1.25 kg/ha	24 hours	1 day	No product specific comments.	
		Maestro 80 DF or Supra Captan 80 WDG	2 kg/ha 1.2 kg/1,000 L water	72 hours	7 days	Do not use within 14 days of oil or as a tank-mix or sequential application with products such as Timorex Gold.	
<b>3–5 leaves unfolded, 10–15-cm shoot length</b>							
Erineum mite	<b>General Comments:</b>						
	<ul style="list-style-type: none"> <li>Apply immediately after the first evidence of erineum mite activity and again at mid-season.</li> <li>Do not use on Concord, Foch or deChaunac varieties.</li> </ul>						
	NC	Cosavet DF Edge * or Kumulus DF * or Microthiol Disperss *	3.4 kg/ha	24 hours	1 day/21 days <sup>3</sup>	Do not use within 14 days of Purespray Green Spray Oil and 30 days of Vegol Crop Oil.	
Phomopsis cane and leaf spot	Use one of the products listed for Phomopsis cane and leaf spot at <b>First leaf, 1.25–5-cm shoot length</b> .						
Anthracnose	3	Nova	340 g/ha	12 hours <sup>1</sup> /7 days <sup>2</sup>	14 days	<b>Suppression only.</b>	
	3+9	Inspire Super	836–1,161 mL/ha	7 days	14 days	Use high rate under high disease pressure. May cause damage to Concord.	
	7+11	Pristine WG	735 g/ha	when dry <sup>1</sup> /21 days <sup>2</sup>	14 days	Do not use on Concord, Fredonia or related varieties or on table grapes.	
Black rot	<b>General Comments:</b>						
	<ul style="list-style-type: none"> <li>Spray susceptible varieties, especially where there is a history of black rot and conditions are wet.</li> <li>Alternate row spraying will not give adequate protection from black rot.</li> </ul>						
	M	Copper 53 W *	3 kg + 6 kg lime/ 1,000 L water	48 hours	2 days <sup>4</sup>	<b>Suppression only.</b> Do not apply to Vidal, Concord or Niagara varieties.	
		Ferbam 76 WDG	2 kg/1,000 L water	12 hours	7 days	No product specific comments.	
		Manzate Pro-Stick or Penncozeb 75 DF Raincoat	7.2 kg/ha	24 hours	30 days	No product specific comments.	
		Polyram DF	2 kg/1,000 L water	12 hours	45 days	No product specific comments.	
3	Mettle 125 ME	292–365 mL/ha	12 hours <sup>1</sup> /15 days <sup>2</sup>	15 days	These products are locally systemic. Consult labels for information on drying time required before rain.		
	Nova	200 g/ha	12 hours <sup>1</sup> /7 days <sup>2</sup>	14 days			

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>3–5 leaves unfolded, 10–15-cm shoot length</b>						
Black rot (cont'd)	3+9	Inspire Super	1.48 L/ha	7 days	14 days	May cause damage to Concord. This product is locally systemic. Consult label for information on drying time required before rain.
Powdery mildew	<p><b>General Comments:</b></p> <ul style="list-style-type: none"> <li>Unless otherwise indicated, apply at 7–10-day intervals to protect expanding leaves and developing fruit clusters before symptoms appear. Apply at 7-day intervals if weather is conducive to disease or if rapid shoot growth is occurring.</li> <li>Alternate row spraying will not give adequate protection from powdery mildew.</li> <li>Group 3, 7, 9, 11, 13 and U8 fungicides are locally systemic. Consult labels for information on drying time required before rain.</li> </ul>					
	M	Cosavet DF Edge * or Kumulus DF * or Microscopic Sulphur WP * or Microthiol Disperss *	12.6 kg/ha 12.6 kg/ha 4.5 kg/1,000 L water 12.6 kg/ha	24 hours	1 day/21 days <sup>3</sup>	Do not use within 14 days of Purespray Green Spray Oil and 30 days of Vegol Crop Oil.
		Cueva	1% v/v in 470–940 L water/ha	4 hours	1 day	No product specific comments.
		Fracture	1.7–3.3 L/ha	when dry	0 days	<b>Suppression only.</b> Use high rate with high disease pressure. Do not mix with foliar fertilizers.
	3	Fullback 125 SC	585–731 mL/ha	12 hours <sup>1</sup> /7 days <sup>2</sup>	14 days	No product specific comments.
		Mettle 125 ME	219–365 mL/ha	12 hours <sup>4</sup> /15 days <sup>2</sup>	15 days	No product specific comments.
		Nova	200 g/ha	12 hours <sup>4</sup> /7 days <sup>2</sup>	14 days	No product specific comments.
	3+7	Aprovia Top 195 EC	643 mL/ha	48 hours	21 days	No product specific comments.
	3+9	Inspire Super	836 mL/ha	7 days	14 days	May cause damage to Concord.
	7	Cantus WDG	315 g/ha	12 hours	14 days	No product specific comments.
		Sercadis	250 mL/ha	12 hours	14 days	No product specific comments.
	7+9	Luna Tranquility	600 mL/ha	12 hours <sup>1</sup> / 24 hours <sup>2</sup>	7 days	No product specific comments.
	11	Intuity	439–877 mL/ha	12 hours	10 days	<b>Suppression only.</b>
	13	Quintec	300 mL/ha	12 hours	14 days	No product specific comments.
	44	Double Nickel LC *	2.5–5.0 L/ha	when dry	0 days	<b>Suppression only.</b> Use 5.0–10 L/ha with high disease pressure.
		Serenade OPTI *	1.7–3.3 kg/ha	when dry	0 days	<b>Suppression only.</b>
	46	Timorex Gold *	1.5–2.0 L/ha	4 hours	2 days	Do not tank-mix or alternate with Supra Captan, Maestro or sulphur products. See label for precautions on compatibility.

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>3–5 leaves unfolded, 10–15-cm shoot length</b>						
Powdery mildew (cont'd)	NC	Actinovate SP *	425–840 g/ha	when dry	—	<b>Suppression only.</b> Apply in 500–1,000 L water/ha. Do not combine with other pesticides (especially copper products), adjuvants, surfactants or foliar fertilizers.
		Buran *	1.8% v/v	when dry	0 days	<b>Suppression only.</b> This is a new product in Ontario and little evidence of its efficacy is available. Apply no more than 18 L/ha per spray. Reapply every 7–10 days if needed. Do not apply if rain is forecast within 48 hours.
		MilStop * or Sirocco *	2.8–5.6 kg/ha	4 hours	0 days	Work as eradicants and have little protective activity. Use the lower rate in 500 L of water and the higher rate in 1,000 L of water. Create a mildly alkaline solution. Do not tank-mix with pH adjusters, oil or products not compatible with mild alkaline solutions.
		Purespray Green Spray Oil 13 E *	10 L/1,000 L water	12 hours	14 days <sup>4,5</sup>	Apply in a high-volume spray to ensure thorough coverage. Tolerance has not been determined for all varieties. Test a small area of each variety prior to spraying the whole block. Do not use within 14 days of Captan, Maestro, Folpan, Ambush, Perm-Up, Pounce or sulphur products. Do not apply within 48 hours of freezing temperatures, when temperatures are high (above 30°C), just prior to rain or to crops under moisture stress. Multiple applications, especially after cluster closure, may cause Brix reduction.
	Vegol Crop Oil *	2% v/v	12 hours	0 days	<b>Suppression only.</b> Apply in a high-volume spray to ensure thorough coverage at a rate of 2% v/v (20 L/1,000 L water). Tolerance has not been determined for all varieties. Test a small area of each variety prior to spraying the whole block. Do not apply within 48 hours of freezing temperatures, when temperatures are high (above 30°C), prior to rain or to heat- or moisture-stressed vines. Do not use within 14 days of Supra Captan, Maestro, Folpan or copper and 30 days of sulphur. Do not apply to wet foliage.	
	P5	Regalia Maxx *	0.125–0.25% v/v in 500–1,500 L water	when dry	0 days	<b>Suppression only.</b> Apply before symptoms develop. Use 0.125% (1.25 L in 1,000 L water) in a tank-mix with other powdery mildew fungicides or 0.25% (2.5 L in 1,000 L water) in rotation with other powdery mildew fungicides.
	U8	Vivando SC	750 mL/ha	12 hours	14 days	Do not apply at intervals of less than 14 days.
	Property 300 SC	300–366 mL/ha	12 hours	0 days		

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

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Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Special sprays</b>						
Scale	<b>General Comments:</b>					
	<ul style="list-style-type: none"> <li>If grape leafroll-associated virus has been confirmed by an accredited lab and scale has been confirmed in the vineyard, this spray may reduce insect vector pressure and spread of the virus.</li> <li>Examine female scales and apply when crawlers are present among the eggs under scales. Control only exposed scales, not those under bark.</li> </ul>					
	1B	Malathion 85 E	880 mL/1,000 L water	12 hours <sup>1</sup> /4 days <sup>2</sup>	3 days	No product specific comments.
	NC	Kopa * or Opal *	2% v/v 1% v/v	12 hours	0 days	Begin applications when populations are low and reapply every 1–3 weeks as needed. Test a small area of each variety prior to spraying the whole block. Applying soaps more than 3 times may cause plant injury. See label for details. Avoid application in direct sunlight or to vines under stress. Application within 3 days of sulphur may increase plant injury on sensitive varieties.
Vegol Crop Oil *		2% v/v	12 hours	0 days	See comments on this product for Scale at <b>Dormant</b> .	
<b>Shoot length 20–25 cm</b>						
Erineum mite	Use one of the products listed for Erineum mite at <b>3–5 leaves unfolded, 10–15-cm shoot length</b> .					
Grape berry moth	NC	Isomate-GBM Plus *	500 dispensers/ha	—	—	Reduces mating of grape berry moth. Apply prior to first flight. Border sprays of insecticide or higher rates of pheromone (1,000 dispensers/ha) may be required where pressure is high. Dispensers last up to 150 days. For more information on mating disruption, see OMAFRA Factsheet 03–079, <i>Mating Disruption for Management of Insect Pests</i> .
Phylloxera (leaf form)	<b>General Comments:</b>					
	<ul style="list-style-type: none"> <li>Apply when galls are first observed.</li> </ul>					
	4A	Assail 70 WP	80 g/ha	12 hours <sup>1</sup> /5 days <sup>2</sup>	3 days/5 days <sup>6</sup>	No product specific comments.
	23	Movento 240 SC	365 mL/ha	12 hours	7 days	Will redistribute to young leaves as they develop. Control may not be apparent for 2–3 weeks. Consecutive applications should be at least 30 days apart. Tank-mix with a non-ionic surfactant at 0.2% v/v (2 L/ 1,000 L). See label and Table 4–5. <i>Adjuvants Used in Ontario</i> , page 243, for further details. Do not apply to table grapes. This timing will also control mealy bug and suppress scale. Refer to mealy bug and scale at <b>Immediate prebloom</b> .
Phomopsis cane and leaf spot	Use one of the products listed for Phomopsis cane and leaf spot at <b>First leaf, 1.25–5-cm shoot length</b> .					
Anthracnose	Use one of the products listed for Anthracnose at <b>3–5 leaves unfolded, 10–15-cm shoot length</b> .					

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

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Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments	
<b>Shoot length 20–25 cm</b>							
Black rot	<b>General Comments:</b>						
	<ul style="list-style-type: none"> <li>Spray susceptible varieties, especially where there is a history of black rot and conditions are wet.</li> <li>Alternate row spraying will not give adequate protection from black rot.</li> <li>Group 3, 7, 9 and 11 fungicides are locally systemic. Consult labels for information on drying time required before rain.</li> </ul>						
	M	Copper 53 W *	3 kg + 6 kg lime/ 1,000 L water	48 hours	2 days <sup>4</sup>	<b>Suppression only.</b> Do not apply to Vidal, Concord or Niagara varieties.	
		Dithane Rainshield or Manzate Pro-Stick or Penncozeb 75 DF Raincoat	7.2 kg/ha	12 hours 24 hours 24 hours	30 days	No product specific comments.	
		Polyram DF	2 kg/1,000 L water	12 hours	45 days	No product specific comments.	
	3	Fullback 125 SC	585–731 mL/ha	12 hours <sup>1</sup> /7 days <sup>2</sup>	14 days	No product specific comments.	
		Mettle 125 ME	292–365 mL/ha	12 hours <sup>1</sup> /15 days <sup>2</sup>	15 days	Use high rate under high disease pressure.	
		Nova	200 g/ha	12 hours <sup>1</sup> /7 days <sup>2</sup>	14 days	No product specific comments.	
	3+9	Inspire Super	1.48 L/ha	7 days	14 days	May cause damage to Concord.	
	7+11	Pristine WG	735 g/ha	when dry <sup>1</sup> /21 days <sup>2</sup>	14 days	When used as directed, will help reduce anthracnose. Do not use on Concord, Fredonia or related varieties or on table grapes.	
	11	Flint	140 g/ha	12 hours <sup>1</sup> /5 days <sup>2</sup>	14 days	Do not apply to Concord grapes.	
Sovran		240 g/ha	48 hours	14 days	Phytotoxic to some cherry varieties. See label for details. Do not allow product drift onto sensitive crops.		
Powdery mildew	<b>General Comments:</b>						
	<ul style="list-style-type: none"> <li>Unless otherwise indicated, apply at 7–10-day intervals to protect expanding leaves and developing fruit clusters before symptoms appear. Apply at 7-day intervals if weather is conducive to disease or if rapid shoot growth is occurring.</li> <li>Alternate row spraying will not give adequate protection from powdery mildew.</li> <li>Group 3, 5, 7, 9, 11, 13 and U8 fungicides are locally systemic. Consult labels for information on drying time required before rain.</li> </ul>						
	M	Cosavet DF Edge * or Kumulus DF * or Microscopic Sulphur WP * or Microthiol Disperss *	12.6 kg/ha 12.6 kg/ha 4.5 kg/1,000 L water 12.6 kg/ha	24 hours	1 day/21 days <sup>3</sup>	Do not use within 14 days of Purespray Green Spray Oil and 30 days of Vegol Crop Oil.	
		Cueva	1% v/v in 470–940 L water/ha	4 hours	1 day	No product specific comments.	
Fracture		1.7–3.3 L/ha	when dry	0 days	<b>Suppression only.</b> Use high rate under high disease pressure. Do not mix with foliar fertilizers.		
<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes. <sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest. — = Information not applicable or not specified on product label. * = Potentially organic. Check with certifying body.							

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Shoot length 20–25 cm</b>						
Powdery mildew (cont'd)	3	Fullback 125 SC	585–731 mL/ha	12 hours <sup>1</sup> /7 days <sup>2</sup>	14 days	No product specific comments.
		Mettle 125 ME	219–365 mL/ha	12 hours <sup>1</sup> /15 days <sup>2</sup>	15 days	No product specific comments.
		Nova	200 g/ha	12 hours <sup>1</sup> /7 days <sup>2</sup>	14 days	No product specific comments.
	3+7	Aprovia Top 195 EC	643 mL/ha	48 hours	21 days	No product specific comments.
	3+9	Inspire Super	836 mL/ha	7 days	14 days	May cause damage to Concord.
	5	Priwen	400–600 mL/ha	12 hours <sup>1</sup> /17 days <sup>2</sup>	35 days	No product specific comments.
	7	Cantus WDG	315 g/ha	12 hours	14 days	No product specific comments.
		Sercadis	250 mL/ha	12 hours	14 days	No product specific comments.
	7+9	Luna Tranquility	600 mL/ha	12 hours <sup>1</sup> /24 hours <sup>2</sup>	7 days	No product specific comments.
	7+11	Pristine WG	420–735 g/ha	when dry <sup>1</sup> /21 days <sup>2</sup>	14 days	When used as directed, will help reduce anthracnose. Do not use on Concord, Fredonia or related varieties or on table grapes.
	11	Flint	140 g/ha	12 hours <sup>1</sup> /5 days <sup>2</sup>	14 days	Do not apply to Concord grapes.
		Intuity	439–877 mL/ha	12 hours	10 days	<b>Suppression only.</b> Rainfast after 2 hours. Do not use with organosilicate surfactants. Under high disease pressure, use high rate and shorten interval between applications.
		Sovran	300 g/ha	48 hours	14 days	Phytotoxic to some cherry varieties. See label for details. Do not allow product drift onto sensitive crops.
	13	Quintec	300 mL/ha	12 hours	14 days	No product specific comments.
	44	Double Nickel LC *	2.5–5.0 L/ha	when dry	0 days	<b>Suppression only.</b> Use 5–10 L/ha under high disease pressure.
Serenade OPTI *		1.7–3.3 kg/ha	when dry	0 days	<b>Suppression only.</b>	
46	Timorex Gold *	1.5–2.0 L/ha	4 hours	2 days	Do not tank-mix or alternate with Supra Captan, Maestro or sulphur products. See label for precautions on compatibility.	
NC	Actinovate SP *	425–840 g/ha	when dry	—	<b>Suppression only.</b> Apply in 500–1,000 L water/ha. Do not combine with other pesticides (especially copper products), adjuvants, surfactants or foliar fertilizers.	
	Buran *	1.8% v/v	when dry	0 days	<b>Suppression only.</b> This is a new product in Ontario and little evidence of its efficacy is available. Apply no more than 18 L/ha per spray. Reapply every 7–10 days if needed. Do not apply if rain is forecast within 48 hours.	
	MilStop * or Sirocco *	2.8–5.6 kg/ha	4 hours	0 days	See comments on these products for Powdery mildew at <b>3–5 leaves unfolded, 10–15-cm shoot length.</b>	

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Shoot length 20–25 cm</b>						
Powdery mildew (cont'd)	NC	Purespray Green Spray Oil 13 E *	10 L/1,000 L water	12 hours	14 days <sup>4,5</sup>	<b>Suppression only.</b> See comments on this product for Powdery mildew at <b>3–5 leaves unfolded, 10–15-cm shoot length.</b>
		Vegol Crop Oil *	2% v/v	12 hours	0 days	<b>Suppression only.</b> See comments on this product for Powdery mildew at <b>3–5 leaves unfolded, 10–15-cm shoot length.</b>
	P5	Regalia Maxx *	0.125–0.25% v/v in 500–1,500 L water	when dry	0 days	<b>Suppression only.</b> Apply before symptoms develop. Use 0.125% (1.25 L in 1,000 L water) in a tank-mix with other powdery mildew fungicides or 0.25% (2.5 L in 1,000 L water) in rotation with other powdery mildew fungicides.
	U8	Vivando SC	750 mL/ha	12 hours	14 days	Do not apply at intervals of less than 14 days.
		Property 300 SC	300–366 mL/ha	12 hours	0 days	No product specific comments.
Downy mildew	<b>General Comments:</b>					
	• Apply at 7–10-day intervals to protect expanding leaves and developing fruit clusters. Apply at shorter intervals if weather is conducive to disease. Consult label for information on dry time required before rain.					
	M	Copper 53 W *	3 kg + 6 kg lime/1,000 L water	48 hours	2 days <sup>4</sup>	Do not apply to Vidal, Concord or Niagara varieties.
		Copper Spray * or Guardsman Copper Oxychloride 50 *	3 kg + 6 kg lime/1,000 L water 3 kg + 6 kg lime/ha	48 hours	2 days <sup>4</sup>	
		Cueva	1% v/v in 470–940 L water/ha	4 hours	1 day	Do not mix with lime.
		Dithane Rainshield or Manzate Pro-Stick or Penncozeb 75 DF Raincoat	7.2 kg/ha	12 hours 24 hours 24 hours	30 days	No product specific comments.
		Folpan 80 WDG	1.25 kg/ha	24 hours	1 day	No product specific comments.
		Kocide 2000 *	1.6 kg/ha	48 hours	2 days	Always test for sensitivity. The addition of 454–1,360 g hydrated lime/454 g of Kocide may reduce phytotoxicity.
		Maestro 80 DF or Supra Captan 80 WDG	2 kg/ha 1.5 kg/1,000 L water	72 hours	7 days	Do not use within 14 days of oil or as a tank-mix or sequential application with products such as Timorex Gold.
		Polyram DF	2 kg/1,000 L water	12 hours	45 days	No product specific comments.
4+M	Ridomil Gold MZ 68 WG	2.5 kg/ha	24 hours	66 days	This product is fully systemic and will redistribute to young leaves and fruit as they develop.	

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Shoot length 20–25 cm</b>						
Downy mildew (cont'd)	7+11	Pristine WG	675–735 g/ha	when dry <sup>1</sup> /21 days <sup>2</sup>	14 days	Do not use on Concord, Fredonia or related varieties or on table grapes. This product is locally systemic.
	11	Sovran	300 g/ha	48 hours	14 days	Phytotoxic to some cherry varieties. See label for details. Do not let product drift onto sensitive crops. This product is locally systemic.
	21	Torrent 400 SC	150–200 mL/ha	12 hours	30 days	Do not use with a surfactant. Spray volume to be used will vary with the amount of plant growth and should be at least 400 L/ha.
	22+M	Gavel 75 DF	2.25 kg/ha	48 hours	66 days	No product specific comments.
	33	Aliette	3.75 kg/ha	6 days	15 days	This product is fully systemic and will redistribute to young leaves as they develop.
		Confine Extra or Phostrol or Rampart	2.9–5.8 L/ha	12 hours	1 day	Use the lower rate in 500 L of water and the higher rate in 1,000 L of water. Phytotoxicity may occur if concentration is increased above the label rate or tank-mixed with a surfactant. Apply at 1–3-week intervals, using the high rate and short interval under high disease pressure. These products are fully systemic and will redistribute to young leaves and fruit as they develop. Do not apply Phostrol to vines that are heat-stressed, within 20 days of copper or when conditions favour prolonged wet periods (>4 hours).
			2.9–5.8 L/ha	12 hours	0 days	
	2.5–5.0 L/ha		4 hours	1 day		
	40	Forum	450 mL/ha	12 hours <sup>1</sup> /12 days <sup>2</sup>	14 days	Tank-mix with another protectant downy mildew fungicide from Group M. Do not use less than 200 L water/ha. This product is fully systemic and will redistribute to young leaves and fruit as they develop.
		Revus	500 mL/ha	12 hours	14 days	Use with a non-ionic adjuvant at 0.125% v/v (1.25 L/1,000 L water). See Table 4–5. <i>Adjuvants Used in Ontario</i> , page 243. Do not use Revus plus adjuvant tank-mixed with sulphur on sulphur-sensitive varieties. This product is locally systemic.
40+45	Zampro	0.8–1.0 L/ha	12 hours <sup>1</sup> /12 days <sup>2</sup>	14 days	Do not use less than 200 L water/ha. This product is fully systemic and will redistribute to young leaves as they develop.	
46	Timorex Gold *	3.0 L/ha	4 hours	2 days	<b>Suppression only.</b> Do not tank-mix or alternate with Supra Captan, Maestro or sulphur products. See label for precautions on compatibility.	

**Immediate prebloom**

Erineum mite Use one of the products listed for Erineum mite at **3–5 leaves unfolded, 10–15-cm shoot length.**

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments	
<b>Immediate prebloom</b>							
Japanese beetle	<b>General Comments:</b>						
	<ul style="list-style-type: none"> <li>Japanese beetle is a sporadic pest in Ontario.</li> <li>Monitor presence and extent of feeding damage. Where damage is localized, spot treatment may be adequate.</li> </ul>						
	1	Imidan WP	1.36 kg/ha	14 days <sup>1</sup> /30 days <sup>2</sup>	14 days	No product specific comments.	
	4	Assail 70 WP	80 g/ha	12 hours <sup>1</sup> /5 days <sup>2</sup>	3 days/5 days <sup>6</sup>	No product specific comments.	
	28	Altacor	285 g/ha	12 hours	14 days	<b>Suppression only.</b> Apply when feeding is first observed and reapply in 10–14 days, if needed.	
Leafhoppers	<b>General Comments:</b>						
	<ul style="list-style-type: none"> <li>Grape leafhopper, potato leafhopper, three-banded leafhopper and Virginia creeper leafhopper are the main species of leafhoppers that feed on grapes.</li> </ul>						
	3	Ambush 500 EC or Perm-Up EC or Pounce 384 EC	140 mL/ha 175 mL/ha 175 mL/ha	when dry	7 days 21 days 21 days		No product specific comments.
		Pyganic EC 1.4 II *	2.32–4.65 L/ha	12 hours	—		Apply when pests are first observed. Do not wait until plants are heavily infested. Reapply if necessary after 7 days. For best results, use high rate, adjust spray solution to pH of 5.5–7.0, and apply promptly after mixing. If possible, apply in the early morning or evening hours. Before making widespread applications, treat a small area and observe for phytotoxicity over a 10-day period.
		Up-Cyde 2.5 EC	240 mL/ha	12 hours	7 days		No product specific comments.
	4A	Admire 240 Flowable	200 mL/ha	24 hours	0 days		No product specific comments.
		Assail 70 WP	80 g/ha	12 hours <sup>1</sup> /5 days <sup>2</sup>	3 days/5 days <sup>6</sup>		No product specific comments.
		Clutch 50 WDG	100–140 g/ha	12 hours	1 day		No product specific comments.
	4C	Closer	200–240 mL/ha	12 hours	7 days		<b>Suppression only.</b> Where possible, rotate with products outside of Group 4.
	4D	Sivanto Prime	500–750 mL/ha	12 hours	0 days		Where possible, rotate with products outside of Group 4.
NC	Surround WP *	50 kg/ha	12 hours	0 days		Apply at first sign of leafhoppers. Use 50 kg/ha for the initial 2 applications to establish the protectant layer, followed by 25 kg/ha in subsequent sprays. Light to moderate rain will help distribute product. Reapply after heavy rain, strong wind or overhead irrigation. Do not use with anti-foaming agents, spreader/stickers or oil. Closely monitor harvest parameters to determine best time to harvest. Do not apply postbloom on table grapes.	

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Immediate prebloom</b>						
Phylloxera (leaf form)	4A	Assail 70 WP	80 g/ha	12 hours <sup>1</sup> /5 days <sup>2</sup>	3 days/5 days <sup>6</sup>	No product specific comments.
		Clutch 50 WDG	140–210 g/ha	12 hours	1 day	No product specific comments.
	23	Movento 240 SC	365 mL/ha	12 hours	7 days	Will redistribute to young leaves as they develop. Control may not be apparent for 2–3 weeks. Consecutive applications should be at least 30 days apart. Tank-mix with an adjuvant/additive having spreading and penetrating properties at a suggested rate of 0.2% v/v (2L/1,000 L water). See label and Table 4–5. <i>Adjuvants Used in Ontario</i> , page 243, for further details. Do not use on table grapes.
Mealy bug, Scale	23	Movento 240 SC	365–585 mL/ha	12 hours	7 days	This timing is appropriate if phylloxera is a problem in the vineyard. <b>Suppression only</b> for scale. If grape leafroll-associated virus has been confirmed by an accredited lab and mealy bugs or scale has been confirmed in the vineyard, this spray may reduce insect vector pressure and spread of the virus. Reapply 30 days later. Tank-mix with a non-ionic surfactant at 0.2% v/v (2 L/1,000 L water). See label and Table 4–5. <i>Adjuvants Used in Ontario</i> , page 243, for further details. Do not apply to table grapes.
<b>Trace bloom (first cap fall)</b>						
<b>DO NOT APPLY INSECTICIDES WHILE GRAPES ARE IN BLOOM. SEE BEE POISONING, PAGE 5.</b>						
Black rot	Use one of the products listed for Black rot at <b>Shoot length 20–25 cm</b> . Fruit clusters are highly susceptible to black rot from bloom to 4 weeks postbloom. Apply at 7–10-day intervals to protect expanding leaves and developing fruit clusters. Apply at shorter intervals if weather is conducive to disease.					
Anthracnose	Use one of the products listed for Anthracnose at <b>3–5 leaves unfolded, 10–15-cm shoot length</b> .					
Downy mildew	Use one of the products listed for Downy mildew at <b>Shoot length 20–25 cm</b> . Rotate among groups for resistance management. Fruit clusters are very susceptible to infection by powdery mildew from bloom to 4–6 weeks postbloom. Unless otherwise indicated, spray at 7–10-day intervals to protect developing leaves and fruit clusters. Spray at 7-day intervals if weather is conducive to disease, unless otherwise specified on label.					
Powdery mildew	Use one of the products listed for Powdery mildew at <b>Shoot length 20–25 cm</b> . Rotate among fungicide groups for resistance management. Fruit clusters are very susceptible to infection by powdery mildew from bloom to 4–6 weeks postbloom. Unless otherwise indicated, spray at 7–10-day intervals to protect developing leaves and fruit clusters. Spray at 7-day intervals if weather is conducive to disease, unless otherwise specified on label.					
Botrytis bunch rot	<b>General Comments:</b>					
	<ul style="list-style-type: none"> <li>If the bloom/postbloom period is wet, spray immediately to control latent infections in susceptible varieties (Baco Noir, Foch, Gamay Noir, Pinot Noir, Pinot Gris, Riesling, Chardonnay, Gewurztraminer, Sauvignon Blanc and Seyval Blanc). Direct this spray at the fruiting zone.</li> <li>Group 2, 3, 7, 9, 11 and 17 fungicides are locally systemic. Consult labels for information on drying time required before rain.</li> </ul>					
	M	Fracture	1.7–3.3 L/ha	when dry	0 days	<b>Suppression only.</b> Use high rate for high disease pressure. Do not mix with foliar fertilizers.

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Trace bloom (first cap fall)</b>						
<b>DO NOT APPLY INSECTICIDES WHILE GRAPES ARE IN BLOOM. SEE BEE POISONING, PAGE 5.</b>						
Botrytis bunch rot (cont'd)	2	Rovral WP	1.5 kg/ha	12 hours	before bunch closure <sup>4</sup>	Do not use after bunch closure.
	3+9	Inspire Super	1.03–1.48 L/ha	7 days	14 days	May cause damage to Concord.
	7	Kenja 400 SC	1.46–1.61 L/ha	12 hours	14 days	No product specific comments.
	7+9	Luna Tranquility	1.2 L/ha	12 hours <sup>1</sup> / 24 hours <sup>2</sup>	7 days	No product specific comments.
	7+11	Pristine WG	420–735 g/ha	when dry <sup>1</sup> /21 days <sup>2</sup>	14 days	<b>Suppression only.</b>
	9	Scala SC	2 L/ha	12 hours <sup>1</sup> / 24 hours <sup>2</sup>	7 days	No product specific comments.
	9+12	Switch 62.5 WG	775–975 g/ha	12 hours <sup>1</sup> / 48 hours <sup>2</sup>	7 days	No product specific comments.
	11	Intuity	439–877 mL/ha	12 hours	10 days	Do not use surfactants containing organosilicone.
	17	Elevate 50 WDG	1.12 kg/ha	4 hours	7 days	No product specific comments.
	44	Double Nickel LC *	3.0–6.25 L/ha	when dry	0 days	<b>Suppression only.</b> Under high disease pressure, use 6.25–25 L/ha
		Serenade OPTI *	1.7–3.3 kg/ha	when dry	0 days	<b>Suppression only.</b>
NC	Botector *	400 g/ha in 400 L water	4 hours	0 days	<b>Suppression only.</b> Not compatible with some fungicides, such as Flint, Kumulus and Switch. See <a href="http://www.bio-ferm.com">www.bio-ferm.com</a> for product compatibilities. For products that are not compatible, keep a 3-day interval before and after application. Avoid application when heavy rain is forecast.	
P5	Regalia Maxx *	0.25% v/v in 500 L water	when dry	0 days	<b>Suppression only.</b> Apply before symptoms develop. Use 0.25% (1.25 L in 500 L water) in rotation with other fungicides.	
<b>Immediate postbloom to early fruit set</b>						
Leafhoppers	Use one of the products listed for Leafhoppers at <b>Immediate prebloom</b> . Surround may reduce Brix accumulation.					
Japanese beetle	Use one of the products listed for Japanese beetle at <b>Immediate prebloom</b> .					
Phylloxera (leaf form)	Use one of the products listed for Phylloxera at <b>Immediate prebloom</b> . Do not apply Movento within 30 days of first application.					
<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes. <sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest. — = Information not applicable or not specified on product label. * = Potentially organic. Check with certifying body.						

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Immediate postbloom to early fruit set</b>						
Mealy bug, Scale	23	Movento 240 SC	365–585 mL/ha	12 hours	7 days	This is the preferred timing if phylloxera is not a problem in the vineyard. <b>Suppression only for scale.</b> If grape leafroll-associated virus has been confirmed by an accredited lab and mealy bugs or scale has been confirmed in the vineyard, this spray may reduce insect vector pressure and spread of the virus. Reapply 30 days later. Tank-mix with a non-ionic surfactant at 0.2% v/v (2 L/1,000 L water). See label and Table 4–5. <i>Adjuvants Used in Ontario</i> , page 243 for further details. Do not apply to table grapes.
Black rot	Use one of the products listed for Black rot at <b>Shoot length 20–25 cm</b> . Fruit clusters are highly susceptible to black rot from bloom to 4 weeks postbloom. Apply at 7–10-day intervals to protect expanding leaves and developing fruit clusters. Apply at shorter intervals if weather is conducive to disease unless otherwise specified on label.					
Powdery mildew	Use one of the products listed for Powdery mildew at <b>Shoot length 20–25 cm</b> . Rotate among fungicide groups for resistance management. Fruit clusters are highly susceptible to powdery mildew from bloom to 4–6 weeks postbloom. Unless otherwise indicated, spray at 7–10-day intervals to protect developing leaves and fruit clusters. Spray at 7-day intervals if weather is conducive to disease unless otherwise specified on label.					
Downy mildew	Use one of the products listed for Downy mildew at <b>Shoot length 20–25 cm</b> . Rotate among fungicide groups for resistance management. Fruit clusters are highly susceptible to downy mildew until 4–6 weeks after bloom. Unless otherwise indicated, spray at 7–10-day intervals to protect developing leaves and fruit clusters. Spray at 7-day intervals if weather is conducive to disease unless otherwise specified on label.					
Botrytis bunch rot	Apply if a Botrytis spray was not applied at <b>Trace bloom</b> . Rotate among fungicide groups for resistance management. If the bloom/postbloom period is wet, spray immediately to control latent infections in susceptible varieties (Baco Noir, Foch Gamay Noir, Pinot Noir, Pinot Gris, Riesling, Chardonnay, Gewurztraminer, Sauvignon Blanc and Seyval Blanc). Direct this spray at the fruiting zone.					
<b>Berries pea-sized</b>						
Grape berry moth (second generation)	<b>General Comments:</b>					
	<ul style="list-style-type: none"> <li>• Where mating disruption is in place and monitoring indicates good control, an insecticide is not needed at this time.</li> <li>• Where there is a history of damage, apply at the appropriate timing listed in product specific comments below. Reapply if flight is extended.</li> <li>• Direct spray at the fruiting zone.</li> </ul>					
	1	Imidan WP	2.2 kg/ha	14 days <sup>1</sup> /30 days <sup>2</sup>	14 days	Apply at upswing in moth numbers caught in pheromone traps.
	3	Ambush 500 EC or Perm-Up EC or Pounce 384 EC	275 mL/ha 360 mL/ha 360 mL/ha	when dry	7 days 21 days 21 days	Apply at upswing in moth numbers caught in pheromone traps.
		Up-Cyde 2.5 EC	240 mL/ha	12 hours	7 days	
	5	Delegate	280 g/ha	12 hours	7 days	Apply at first sustained trap catch.
Entrust * or Success		364 mL/ha 182 mL/ha	when dry <sup>1</sup> /7 days <sup>2</sup>	7 days	<b>Suppression only.</b> Apply at first sustained trap catch.	
<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes. <sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest. — = Information not applicable or not specified on product label. * = Potentially organic. Check with certifying body.						



Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Berries pea-sized</b>						
Grape berry moth (second generation) (cont'd)	11	BioProtec CAF * or Dipel 2X DF *	2.8 L/ha 1.125 kg/ha	12 hours	0 days	Apply in a high-volume spray to ensure thorough coverage on both sides of the leaf. Apply at first sustained trap catch. Reapply 7–10 days later, if needed. Acidify spray mix to below pH 7.0 and apply on cloudy days or in the evening.
	18	Intrepid	600 mL/ha	12 hours	30 days	Apply at first sustained trap catch.
	28	Altacor	285 g/ha	12 hours	14 days	Apply at first sustained trap catch.
Japanese beetle	Use one of the products listed for Japanese beetle at <b>Immediate prebloom</b> .					
Mealy bug, Scale	Use one of the products listed for Mealy bug at <b>Immediate prebloom</b> . Do not apply Movento within 30 days of first application.					
Phylloxera (leaf form)	Use one of the products listed for Phylloxera at <b>Immediate prebloom</b> .					
Powdery mildew	Use one of the products listed for Powdery mildew at <b>Shoot length 20–25 cm</b> . Rotate among fungicide groups for resistance management. Fruit clusters are highly susceptible to powdery mildew from bloom to 4–6 weeks postbloom. Unless otherwise indicated, spray at 7–10-day intervals to protect developing leaves and fruit clusters. Spray at 7-day intervals if weather is conducive to disease. Increase rate of Microscopic Sulphur to 6 kg/1,000 L water. Purespray Green Spray Oil may remove the waxy bloom on grape berries.					
Downy mildew	Use one of the products listed for Downy mildew at <b>Shoot length 20–25 cm</b> . Rotate among fungicide groups for resistance management. Fruit clusters are highly susceptible to downy mildew until 4–6 weeks postbloom. Unless otherwise indicated, spray at 7–10-day intervals to protect developing leaves and fruit clusters. Spray at 7-day intervals if weather is conducive to disease.					
Black rot	Use one of the products listed for Black rot at <b>Shoot length 20–25 cm</b> . Fruit clusters are highly susceptible to black rot from bloom to 4 weeks postbloom.					
<b>Berry touch to cluster closure</b>						
Check product labels and Table 4–1. <i>Products Used on Grapes</i> , page 232, for preharvest intervals.						
European red mite, Two-spotted spider mite	<b>General Comments:</b>					
	<ul style="list-style-type: none"> <li>• Monitor where there has been a history of mite damage.</li> <li>• Apply a miticide when 3–5 mites are found per mid-shoot leaf. Thorough spray coverage is essential for good control.</li> <li>• For resistance management, do not use any product more than once per season.</li> <li>• Two spotted spider mite is a problem only in very hot, dry growing seasons when cover crops die off.</li> </ul>					
	6	Agri-Mek SC	130–265 mL/ha	12 hours <sup>1</sup> /13 days <sup>2</sup>	28 days	Apply when mites first appear. Use low rate for low to moderate infestations and high rate for severe infestations. Use with a non-ionic surfactant in a minimum of 470 L of water/ha. See Table 4–5. <i>Adjuvants Used in Ontario</i> , page 243. Do not apply within 10 days of Supra Captan, Maestro or Folpan. Monitor and evaluate control 7–10 days after application.
21	Nexter	300 g/ha	24 hours	25 days	Effective against nymphs only.	

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Berry touch to cluster closure</b> Check product labels and Table 4–1. <i>Products Used on Grapes</i> , page 232, for preharvest intervals.						
European red mite, Two-spotted spider mite (cont'd)	23	Envidor 240 SC	750 mL/ha	12 hours	14 days	Control may not be apparent for 2–3 weeks. Active on all life stages, including eggs, nymphs and adults.
	25	Nealta	1 L/ha	12 hours	14 days	Provides knock-down and residual control. The addition of a surfactant registered on the crop may improve activity. Active on all life stages, including eggs, nymphs and adults.
	UN	Acramite 50 WS	851 g/ha	12 hours <sup>1</sup> /24 hours <sup>2</sup>	14 days	If two-spotted spider mite is a problem, use 567 g/ha.
	NC	Vegol Crop Oil *	2% v/v	12 hours	0 days	<b>Suppression only.</b> Apply in a high-volume spray to ensure thorough coverage at a rate of 2% v/v (20 L/1,000 L water). Tolerance has not been determined for all varieties. Test a small area of each variety prior to spraying the whole block. Do not use within 48 hours of freezing temperatures, when temperatures are high (above 30°C), prior to rain or to heat- or moisture-stressed vines. Do not apply to wet foliage. Do not use within 14 days of Supra Captan, Maestro, Folpan or copper and 30 days of sulphur.
Powdery mildew	Use one of the products listed for Powdery mildew at <b>3–5 leaves unfolded, 10–15-cm shoot length</b> . Rotate among fungicide groups for resistance management. Fruit clusters are highly susceptible to powdery mildew from bloom to 4–6 weeks postbloom. Increase rate of Microscopic Sulphur to 6 kg/1,000 L water. Purespray Green Spray Oil and Vegol Crop Oil may remove the waxy bloom on grape berries.					
Downy mildew	Use one of the products listed for Downy mildew at <b>Shoot length 20–25 cm</b> . Rotate among fungicide groups for resistance management. Fruit clusters are highly susceptible to downy mildew until 4–6 weeks after bloom.					
Black rot	Use one of the products listed for Black rot at <b>Shoot length 20–25 cm</b> . This spray is necessary only if black rot is severe and new infections continue to occur.					
Botrytis bunch rot	Use one of the products listed for Botrytis bunch rot at <b>Trace bloom</b> , ensuring rotation among groups for resistance management. This is a critical spray for Botrytis bunch rot. Many of the vinifera and French hybrid varieties with tight clusters are susceptible to botrytis bunch rot (e.g., Baco Noir, Foch, Gamay Noir, Pinot Noir, Pinot Gris, Riesling, Chardonnay, Gewurztraminer, Sauvignon Blanc and Seyval Blanc). Direct spray at the fruiting zone. Ensure complete coverage of berries before clusters close. Do not use Rovral after cluster closure.					
<b>Beginning of ripening (veraison) through harvest</b> Check product labels and Table 4–1. <i>Products Used on Grapes</i> , page 232, for preharvest intervals.						
Grape berry moth (about mid to late August)	In blocks without mating disruption, use one of the products listed for Grape berry moth at <b>Berries pea-sized</b> . Rotate among insecticide groups between generations for resistance management. Border sprays of conventional insecticides may be very effective. Direct spray at fruiting zone. Where mating disruption is in place and monitoring indicates good control, an insecticide may not be needed at this time.					
Powdery mildew	Use one of the products listed for Powdery mildew at <b>Shoot length 20–25 cm</b> . Rotate among fungicide groups for resistance management. Foliage of vinifera and some French hybrid varieties are more susceptible and may require extra sprays. Increase rate of Microscopic Sulphur to 6 kg/1,000 L water. Purespray Green Spray Oil and Vegol Crop Oil may remove the waxy bloom on grape berries; not recommended for table grapes.					
Downy mildew	Use one of the products listed for Downy mildew at <b>Shoot length 20–25 cm</b> . Rotate among fungicide groups for resistance management. Foliage of vinifera and some French hybrid varieties are more susceptible and may require extra sprays.					
<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes. <sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest. — = Information not applicable or not specified on product label.   * = Potentially organic. Check with certifying body.						

Disease or Insect	Group	Product	Rate	Restricted Entry Interval	Preharvest Interval	Product Specific Comments
<b>Beginning of ripening (veraison) through harvest</b>						
Check product labels and Table 4–1. <i>Products Used on Grapes</i> , page 232, for preharvest intervals.						
Botrytis bunch rot		Use one of the products listed for Botrytis bunch rot at <b>Trace bloom</b> . Rotate among fungicide groups for resistance management. Many of the vinifera and French hybrid varieties with tight clusters are susceptible to botrytis bunch rot (e.g., Baco Noir, Foch, Gamay Noir, Pinot Noir, Pinot Gris, Riesling, Chardonnay, Gewurztraminer, Sauvignon Blanc and Seyval Blanc). Direct spray at the fruiting zone. Do not use Rovral after cluster closure.				
Slug snail	NC	Sluggo Professional	25 kg/ha	12 hours	—	Apply 50 kg/ha if population is very high. Apply when infestation begins. Reapply as the bait is consumed or at least every 2 weeks if slugs and snails continue to be a problem.
<b>Special sprays (when monitoring indicates the need)</b>						
Multi-coloured Asian lady beetle	<b>General Comments:</b>					
	<ul style="list-style-type: none"> <li>Lady beetles are not a problem until very close to harvest. Begin monitoring around mid-August and continue for each cultivar until harvested.</li> <li>Early presence of lady beetles is not an immediate concern because they can arrive and leave an area rapidly. Discuss beetle thresholds and product restrictions with the proposed purchaser of grapes before taking action. Continue to monitor after treatment.</li> <li>Re-infestation may occur before harvest.</li> </ul>					
	1	Malathion 85 E	880 mL/ha	12 hours <sup>1</sup> /4 days <sup>2</sup>	3 days	No product specific comments.
	3	Mako	150 mL/ha	12 hours <sup>1</sup> /6 days <sup>2</sup>	2 days/6 days <sup>6</sup>	Cannot be used on juice grapes destined for export to the United States. Do not use on table grapes
Yellow jacket wasps	3	Mako	150 mL/ha	12 hours <sup>1</sup> /6 days <sup>2</sup>	2 days/6 days <sup>6</sup>	Cannot be used on juice grapes destined for export to the United States. Do not use on table grapes.
Spotted wing drosophila	3	Mako	150 mL/ha	12 hours <sup>1</sup> /6 days <sup>2</sup>	2 days/6 days <sup>6</sup>	Spotted wing drosophila has not been identified as a significant pest of grapes in Ontario. Do not use on juice grapes destined for export to the United States or on table grapes. See Table 4–4. <i>Activity of Insecticides on Grape Insect Pests and Honeybees</i> , page 241, for other products that have activity on spotted wing drosophila.
Brown marmorated stink bug	<b>General Comments:</b>					
	<ul style="list-style-type: none"> <li>Breeding populations of this pest are present in Ontario. Check <a href="http://ontario.ca/stinkbug">ontario.ca/stinkbug</a> for updates on pest development, registered products and management strategies.</li> <li>There are currently no thresholds established. Apply when insects are first detected or early damage found.</li> </ul>					
	4	Clutch 50 WDG	210 g/ha	12 hours	1 day	<b>Suppression only.</b> This product is toxic to beneficial insects and should be used only when necessary.
Botrytis bunch rot		Use one of the products listed for Botrytis bunch rot at <b>Trace bloom</b> . Rotate among fungicide groups for resistance management. This spray is necessary for tight-clustered, thin-skinned varieties. If conditions are warm and wet through the preharvest period, a second spray may be needed. Direct this spray to the fruiting zone. Do not use Rovral after cluster closure.				

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes.

<sup>4</sup> Check with processor and winery for wine grapes. <sup>5</sup> Preharvest interval is 14 days for table grapes. <sup>6</sup> Preharvest interval for mechanical harvest / hand harvest.

— = Information not applicable or not specified on product label. \* = Potentially organic. Check with certifying body.

**Preharvest Intervals**

**Contact the processors and wineries directly in regard to their preharvest interval policy.** Preharvest intervals listed in Table 4–1. *Products Used on Grapes*, on this page, are taken from product labels. In some cases, regulations on residues in finished products are much more stringent. Many processors require longer preharvest intervals than stated on product labels. Some processors and wineries also have special restrictions for certain pest control products regarding number of applications or application after a certain crop stage. Consult the grape purchaser for more details.

**Table 4–1.** Products Used on Grapes

Use this table as a guide, but refer to product label for specific information.

The **preharvest interval** is the number of days between the last spray and first harvest.

The **restricted entry interval** is the minimum interval that must be observed between the application of the pesticide and work in the treated crop without protective equipment. If no re-entry period is stated on the label, assume it is 12 hours.

The **maximum applications** is the labelled maximum number or product amount applied for the growing season and may be higher than what is recommended for resistance management or for the preservation of beneficial insects.

Products listed as **potentially organic** may be acceptable for organic use based on *Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec publication Bulletin D'Information No. 6, 2 juin 2017* or a letter of certification provided by the registrant. Check with certifying body to verify the acceptability of any product prior to using it.

Product Name	Registration Number	Common Name	Group	Preharvest Interval	Restricted Entry Interval	Maximum Applications	Potentially Organic
<b>Products used for insect and mite control or suppression</b>							
Acramite 50 WS	27925	bifenazate	UN	14 days	12 hours <sup>1</sup> /24 hours <sup>2</sup>	1	—
Admire 240 Flowable	24094	imidacloprid	4A	0 days	24 hours	2	—
Agri-Mek SC	31607	abamectin	6	28 days	12 hours <sup>1</sup> /13 days <sup>2</sup>	2	—
Altacor	28981	chlorantraniliprole	28	14 days	12 hours	3 (max. 645 g/ha)	—
Ambush 500 EC	14882	permethrin	3	7 days	when dry	—	—
Assail 70 WP	27128	acetamiprid	4A	3 days/5 days <sup>3</sup>	12 hours <sup>1</sup> /5 days <sup>2</sup>	2	—
BioProtec CAF	26854	<i>Bacillus thuringiensis</i>	11	0 days	12 hours	6	✓
Closer	30826	sulfoxaflor	4C	7 days	12 hours	2	—
Clutch 50 WDG	29382	clothianidin	4A	1 day	12 hours	1 (max. 210 g/ha)	—
Delegate	28778	spinetoram	5	7 days	12 hours	3	—
Dipel 2X DF	26508	<i>Bacillus thuringiensis</i>	11	0 days	12 hours	6	✓
Entrust	30382	spinosad	5	7 days	when dry <sup>1</sup> /7 days <sup>2</sup>	3	✓
Envidor 240 SC	28051	spirodiclofen	23	14 days	12 hours	1	—
Imidan WP	29064	phosmet	1B	14 days	14 days <sup>1</sup> /30 days <sup>2</sup>	3	—

M = Multi-site fungicides. NC = Not classified by FRAC/IRAC, or group not indicated on product label. P = Plant extract.

U/UN = Mode of action has not been determined. — = Information is not specified on the product label. ✓ = Potentially organic. Check with certifying body.

<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval for mechanical harvest / hand harvest. <sup>4</sup> Maximum 3 applications per year for mechanical harvest or 2 applications for hand harvest. <sup>5</sup> Check with processor and winery for wine grapes. <sup>6</sup> Preharvest interval is 14 days for table grapes. <sup>7</sup> Maximum 6 applications per season with no more than 2 dormant applications. <sup>8</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes. <sup>9</sup> Depends on rate. See label. <sup>10</sup> For use on wine grapes only.

Table 4–1. Products Used on Grapes (cont'd)

Product Name	Registration Number	Common Name	Group	Preharvest Interval	Restricted Entry Interval	Maximum Applications	Potentially Organic
<b>Products used for insect and mite control or suppression</b>							
Intrepid	27786	methoxyfenozide	18	30 days	12 hours	3	—
Isomate-GBM Plus	27525	pheromone, grape berry moth	NC	—	—	1	✓
Kopa	31433	potassium salts of fatty acids	NC	0 days	12 hours	—	✓
Lime Sulphur	16465	calcium polysulphide	UN	120 days	48 hours	1 (delayed dormant)	✓
Malathion 85 E	8372	malathion	1B	3 days	12 hours <sup>1</sup> /4 days <sup>2</sup>	1	—
Mako <sup>10</sup>	30316	cypermethrin	3	2 days/6 days <sup>3</sup>	12 hours <sup>1</sup> /6 days <sup>2</sup>	3/2 <sup>4</sup>	—
Movento 240 SC	28953	spirotetramat	23	7 days	12 hours	2 (max. 920 mL/ha)	—
Nealta	31284	cyflumetofen	25	14 days	12 hours	2	—
Nexter	25135	pyridaben	21	25 days	24 hours	1	—
Opal	28146	potassium salts of fatty acids	NC	0 days	12 hours	—	✓
Perm-Up EC	28877	permethrin	3	21 days	12 hours	2	—
Pounce 384 EC	16688	permethrin	3	21 days	when dry	2	—
Purespray Green Spray Oil 13 E	27666	mineral oil	NC	14 days <sup>5,6</sup>	12 hours	8 (summer)	✓
Pyganic EC 1.4 II	30164	pyrethrins	3	—	12 hours	8	✓
Sivanto Prime	31452	flupyradifurone	4D	0 days	12 hours	max. 2 L/ha	—
Sluggo Professional	30025	ferric phosphate	NC	—	12 hours	—	—
Success	26835	spinosad	5	7 days	when dry <sup>1</sup> /7 days <sup>2</sup>	3	—
Surround WP	27469	kaolin	NC	0 days	12 hours	—	✓
Up-Cyde 2.5 EC	28795	cypermethrin	3	7 days	12 hours	3	—
Vegol Crop Oil	32408	canola oil	NC	0 days	12 hours	2/4 <sup>7</sup>	✓
<b>Products used for disease control or suppression</b>							
Actinovate SP	28672	<i>Streptomyces lydicus</i>	NC	—	when dry	—	✓
Aliette	27688	fosetyl-al	33	15 days	6 days	7	—
Aprovia Top 195 EC	31526	difenoconazole + benzovindiflupyr	3+7	21 days	48 hours	max. 3.9 L/ha	—
Botector	31248	<i>Aureobasidium pullulans</i>	NC	0 days	4 hours	4	✓
Buran	30601	garlic powder	NC	0 days	when dry	—	✓
Cantus WDG	30141	boscalid	7	14 days	12 hours	5	—
Confine Extra	30648	mono- and di-basic salts of phosphorus acid	33	1 day	12 hours	9	—

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<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval for mechanical harvest / hand harvest. <sup>4</sup> Maximum 3 applications per year for mechanical harvest or 2 applications for hand harvest. <sup>5</sup> Check with processor and winery for wine grapes. <sup>6</sup> Preharvest interval is 14 days for table grapes. <sup>7</sup> Maximum 6 applications per season with no more than 2 dormant applications. <sup>8</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes. <sup>9</sup> Depends on rate. See label. <sup>10</sup> For use on wine grapes only.

**Table 4–1. Products Used on Grapes (cont'd)**

Product Name	Registration Number	Common Name	Group	Preharvest Interval	Restricted Entry Interval	Maximum Applications	Potentially Organic
<b>Products used for disease control or suppression</b>							
Copper 53 W	9934	tri-basic copper sulphate	M	2 days <sup>5</sup>	48 hours	7	✓
Copper Spray	19146	copper oxychloride	M	2 days <sup>5</sup>	48 hours	7	✓
Cosavet DF Edge	31869	sulphur	M	1 day/21 days <sup>8</sup>	24 hours	8	✓
Cueva	31825	copper octanoate	M	1 day	4 hours	15	—
Dithane Rainshield	20553	mancozeb	M	30 days	12 hours	1 (prebloom) 3 (postbloom)	—
Double Nickel LC	31887	<i>Bacillus amyloliquefaciens</i>	44	0 days	when dry	—	✓
Elevate 50 WDG	25900	fenhexamid	17	7 days	4 hours	3	—
Ferbam 76 WDG	20136	ferbam	M	7 days	12 hours	—	—
Flint	30619	trifloxystrobin	11	14 days	12 hours <sup>1</sup> /5 days <sup>2</sup>	4	—
Folpan 80 WDG	27733	folpet	M	1 day	24 hours	2	—
Forum	32026	dimethomorph	40	14 days	12 hours <sup>1</sup> /12 days <sup>2</sup>	4	—
Fracture	32139	BLAD polypeptide	M	0 days	when dry	5	—
Fullback 125 SC	31679	flutriafol	3	14 days	12 hours <sup>1</sup> /7 days <sup>2</sup>	2/3 <sup>9</sup>	—
Gavel 75 DF	26842	zoxamide + mancozeb	22+M	66 days	48 hours	6	—
Guardman Copper Oxychloride 50	13245	copper oxychloride	M	2 days <sup>5</sup>	48 hours	7	✓
Inspire Super	30827	difenoconazole + cyprodanil	3+9	14 days	7 days	2	—
Intuity	32288	mandestrobin	11	10 days	12 hours	3/4 <sup>9</sup>	—
Kenja 400 SC	31758	isofetamid	7	14 days	12 hours	3	—
Kocide 2000	27348	copper hydroxide	M	2 days	48 hours	7	✓
Kumulus DF	18836	sulphur	M	1 day/21 days <sup>8</sup>	24 hours	8	✓
Lime Sulphur	16465	calcium polysulphide	M	120 days	48 hours	1 (delayed dormant)	✓
Luna Tranquility	30510	fluopyram + pyrimethanil	7+9	7 days	12 hours <sup>1</sup> /24 hours <sup>2</sup>	2/3 <sup>9</sup>	—
Maestro 80 DF	26408	captan	M	7 days	72 hours	—	—
Manzate Pro-Stick	28217	mancozeb	M	30 days	24 hours	4	—
Mettle 125 ME	30673	tetraconazole	3	15 days	12 hours <sup>1</sup> /15 days <sup>2</sup>	2	—
Microscopic Sulphur WP	14653	sulphur	M	1 day/21 days <sup>8</sup>	24 hours	8	✓
Microthiol Disperss	29487	sulphur	M	1 day/21 days <sup>8</sup>	24 hours	8	✓
MilStop	28095	potassium bicarbonate	NC	0 days	4 hours	10	✓

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<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval for mechanical harvest / hand harvest. <sup>4</sup> Maximum 3 applications per year for mechanical harvest or 2 applications for hand harvest. <sup>5</sup> Check with processor and winery for wine grapes. <sup>6</sup> Preharvest interval is 14 days for table grapes. <sup>7</sup> Maximum 6 applications per season with no more than 2 dormant applications. <sup>8</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes. <sup>9</sup> Depends on rate. See label. <sup>10</sup> For use on wine grapes only.

Table 4–1. Products Used on Grapes (cont'd)

Product Name	Registration Number	Common Name	Group	Preharvest Interval	Restricted Entry Interval	Maximum Applications	Potentially Organic
<b>Products used for disease control or suppression</b>							
Nova	22399	myclobutanil	3	14 days	12 hours <sup>1</sup> /7 days <sup>2</sup>	5	—
Penncozeb 75 DF Raincoat	30241	mancozeb	M	30 days	24 hours	4	—
Phostrol	30449	mono- and di-basic sodium, potassium and ammonium phosphites	33	0 days	12 hours	4	—
Polyram DF	20087	metiram	M	45 days	12 hours	3	—
Pristine WG	27985	boscalid + pyraclostrobin	7+11	14 days	when dry <sup>1</sup> / 21 days <sup>2</sup>	2/6 <sup>9</sup>	—
Priwen <sup>10</sup>	31959	spiroxamine	5	35 days	12 hours <sup>1</sup> /17 days <sup>2</sup>	2/3 <sup>9</sup>	—
Property 300 SC	32534	pyriofenone	U8	0 days	12 hours	3/4 <sup>9</sup>	—
Purespray Green Spray Oil 13 E	27666	mineral oil	NC	14 days <sup>5,6</sup>	12 hours	8 (summer)	✓
Quintec	29755	quinoxifen	13	14 days	12 hours	5	—
Rampart	30654	mono and dipotassium salts of phosphorous acid	33	1 day	4 hours	5	—
Regalia Maxx	30199	extract of <i>Reynoutria sachalinensis</i>	P5	0 days	when dry	—	✓
Revus	29074	mandipropamid	40	14 days	12 hours	4	—
Rovral	15213	iprodione	2	before bunch closure <sup>5</sup>	12 hours	2	—
Ridomil Gold MZ 68 WG	28893	metalaxyl + mancozeb	4+M	66 days	24 hours	1 (prebloom) 1 (postbloom)	—
Scala SC	28011	pyrimethanil	9	7 days	12 hours <sup>1</sup> /24 hours <sup>2</sup>	3	—
Sercadis	31697	fluxapyroxad	7	14 days	12 hours	6	—
Serenade OPTI	31666	<i>Bacillus subtilis</i>	44	0 days	when dry	—	✓
Sirocco	31091	potassium bicarbonate	NC	0 days	4 hours	10	✓
Sovran	26257	kresoxim-methyl	11	14 days	48 hours	4	—
Supra Captan 80 WDG	24613	captan	M	7 days	72 hours	—	—
Switch 62.5 WG	28189	cyprodinil + fludioxonil	9+12	7 days	12 hours <sup>1</sup> /48 hours <sup>2</sup>	2	—
Timorex Gold	30910	tea tree oil	46	2 days	4 hours	—	✓
Tivano	30468	citric acid + lactic acid	NC	—	when dry	—	✓
Torrent 400 SC	30392	cyazofamid	21	30 days	12 hours	6	—
Vegol Crop Oil	32408	canola oil	NC	0 days	12 hours	2/4 <sup>7</sup>	✓
Vivando SC	29765	metrafenone	U8	14 days	12 hours	6	—
Zampro	30321	ametoctradin + dimethomorph	40+45	14 days	12 hours <sup>1</sup> /12 days <sup>2</sup>	4	—

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<sup>1</sup> General re-entry. <sup>2</sup> Hand labour (e.g., training, thinning, leaf pulling, hand harvest). <sup>3</sup> Preharvest interval for mechanical harvest / hand harvest. <sup>4</sup> Maximum 3 applications per year for mechanical harvest or 2 applications for hand harvest. <sup>5</sup> Check with processor and winery for wine grapes. <sup>6</sup> Preharvest interval is 14 days for table grapes. <sup>7</sup> Maximum 6 applications per season with no more than 2 dormant applications. <sup>8</sup> Preharvest interval is 1 day for table grapes or 21 days for wine grapes. <sup>9</sup> Depends on rate. See label. <sup>10</sup> For use on wine grapes only.

## Notes on Grape Pests

**In this section:**

- Table 4–2.** *Relative Susceptibility of Grape Cultivars to Diseases*, on this page.
- Table 4–3.** *Activity of Fungicides on Grape Diseases and Impact on Honeybees*, page 238.
- Table 4–4.** *Activity of Insecticides on Grape Insect Pests and Impact on Honeybees*, page 241.

**Table 4–2.** Relative Susceptibility of Grape Cultivars to Diseases<sup>A</sup>

Cultivar	Phomopsis cane blight	Black rot	Downy mildew	Powdery mildew	Botrytis bunch rot	Phytotoxic chemical sensitivity
<b>Vinifera wine<sup>B</sup></b>						
Auxerrois	MS	MS	MS	HS	HS	—
Cabernet Franc	MS	HS	MS	HS	SS	—
Cabernet Sauvignon	MS	HS	MS	HS	SS	—
Chardonnay	MS	HS	ES	ES	HS	—
Gamay	SS	MS	MS	HS	MS	—
Gewurztraminer	SS	HS	MS	HS	HS	—
Merlot	SS	HS	MS	HS	MS	2
Pinot Blanc	UN	HS	MS	HS	HS	—
Pinot Gris	SS	HS	MS	HS	HS	—
Pinot Noir	SS	HS	MS	HS	HS	—
Riesling	SS	HS	MS	HS	HS	—
Sauvignon Blanc	SS	MS	MS	MS	HS	—
Zweigeltrebe	MS	HS	MS	HS	SS	—

UN = Relative susceptibility is unknown. R = Resistant. SS = Slightly susceptible. MS = Moderately susceptible. HS = Highly susceptible. ES = Extremely susceptible. L = Leaves. F = Fruit.

<sup>A</sup> These notes are based on based on observations in Ontario and northeast United States under average conditions. Under adverse weather conditions, such as extended cool weather, any given variety may be more seriously affected.

<sup>B</sup> Vinifera varieties not included in this chart are considered susceptible to powdery mildew, downy mildew and black rot.

<sup>C</sup> Based on ratings in from D. Jones, Michigan State University and P McManus, Minnesota State University (pers comm).

<sup>D</sup> All juice and table varieties are Labrusca species, with exception of Himrod (American hybrid).

1 = Sulphur-sensitive. 2 = Copper-sensitive. 3 = Flint- and Pristine-sensitive. 4= Inspire Super-sensitive. — = No chemical sensitivity has been observed. † No more than 2 apps/season.



**Table 4–2.** Relative Susceptibility of Grape Cultivars to Diseases<sup>A</sup> (cont'd)

Cultivar	Phomopsis cane blight	Black rot	Downy mildew	Powdery mildew	Botrytis bunch rot	Phytotoxic chemical sensitivity
<b>French hybrid wine</b>						
Baco Noir	MS	SS	SS	MS	HS	1
Chambourcin	SS	MS	MS	MS	SS	1
De Chaunac	HS	SS	SS	MS	SS	1
Marechal Foch	MS	SS	SS	MS	SS	1
Seyval Blanc	MS	MS	MS	HS	HS	—
S.V. 23-512	SS	SS	MS	MS	SS	—
Vidal 256	SS	SS	MS	MS	HS	2
<b>American hybrid wine<sup>C</sup></b>						
Frontenac	SS	MS (L) / HS (F)	SS (L) / R (F)	MS	SS	2 <sup>†</sup>
Frontenac gris	SS	MS (L) / HS (F)	SS (L) / R (F)	MS	SS	2 <sup>†</sup>
La Crescent	SS	SS (L) / R (F)	HS (L) / R (F)	SS	SS	1 <sup>†</sup>
Marquette	SS	MS (L) / HS (F)	SS (L) / R (F)	HS	SS	2 <sup>†</sup>
St. Croix	HS	SS (L) / SS (F)	HS (L) / R (F)	SS	SS	1, 2 <sup>†</sup>
<b>Juice and table grapes<sup>D</sup></b>						
Concord	MS	MS	MS	MS	SS	1, 2, 3, 4
Elvira	HS	MS	SS	MS	MS	3
Fredonia	MS	MS	HS	MS	SS	3
Himrod	SS	MS	SS	MS	MS	—
Niagara	MS	HS	HS	MS	SS	2
N.Y. Muscat	SS	SS	SS	MS	SS	—
Sovereign Coronation	SS	SS	HS	HS	MS	—

UN = Relative susceptibility is unknown. R = Resistant. SS = Slightly susceptible. MS = Moderately susceptible. HS = Highly susceptible. ES = Extremely susceptible. L = Leaves. F = Fruit.

<sup>A</sup> These notes are based on observations in Ontario and northeast United States under average conditions. Under adverse weather conditions, such as extended cool weather, any given variety may be more seriously affected.

<sup>B</sup> Vinifera varieties not included in this chart are considered susceptible to powdery mildew, downy mildew and black rot.

<sup>C</sup> Based on ratings in from D. Jones, Michigan State University and P McManus, Minnesota State University (pers comm).

<sup>D</sup> All juice and table varieties are Labrusca species, with exception of Himrod (American hybrid).

1 = Sulphur-sensitive. 2 = Copper-sensitive. 3 = Flint- and Pristine-sensitive. 4= Inspire Super-sensitive. — = No chemical sensitivity has been observed. <sup>†</sup> No more than 2 apps/season.

**Table 4–3. Activity of Fungicides on Grape Diseases and Impact on Honeybees**

See the product label or crop calendars for registered uses. Use fungicides only for diseases listed on the product label for the crop. The information provided in this table is based on information from other areas. It is intended to assist the grower in choosing the best fungicide for control of pests listed on the product label, while managing resistance and avoiding unnecessary sprays for non-target pests. Efficacy can be affected by rate of the product.

Group	Fungicide	Anthraco	Phomopsis cane and leaf spot	Black rot	Downy mildew	Powdery mildew	Botrytis bunch rot	Honeybee Toxicity <sup>1</sup>	Activity
M	Copper 53 W	0	1 *	1 *	3 *	2	0	MT	Contact
M	Copper Spray	0	1	1	2 *	2 *	0	NT	Contact
M	Cosavet DF Edge	1	1	0	0	3 *	0	NT	Contact
M	Cueva	0	1	1	2 *	2 *	0	NT	Contact
M	Dithane Rainshield	2	3	3 *	3 *	0	0	NT	Contact
M	Ferbam 76 WDG	2	3	3 *	2	0	0	NT	Contact
M	Folpan 80 WDG	2	3 *	1 *	3 *	0	0	NT	Contact
M	Fracture	0	0	0	0	1 *	1 *	NT	Contact
M	Guardsman Copper Oxychloride 50	0	1 *	1	2 *	2 *	0	NT	Contact
M	Kocide 2000	0	1	0	2 *	2	0	NT	Contact
M	Kumulus DF	1	1	0	0	3 *	0	NT	Contact
M	Lime Sulphur	2	0	0	0	1 *	0	NT	Contact
M	Maestro 80 DF	2	3 *	1 *	3 *	0	0	MT	Contact
M	Manzate Pro-Stick	2	3	3 *	3 *	0	0	NT	Contact
M	Microscopic Sulphur	1	1	0	0	3 *	0	NT	Contact
M	Microthiol Disperss	1	1	0	0	3 *	0	NT	Contact
M	Penncozeb 75 DF Raincoat	2	3	3 *	3 *	0	0	NT	Contact
M	Supra Captan 80 WDG	2	3 *	1 *	3 *	0	0	MT	Contact

M = Multi-site fungicides. NC = Not classified by FRAC, or group not indicated on product label. P = Plant extract. U = Mode of action has not been determined.

MT = Moderately toxic to bees. Can be used around bees if dosage, timing and method of application are correct, but do not apply them directly on bees, in the field or at the colonies.

NT = Relatively non-toxic to bees.

<sup>1</sup> Source: PMRA Environmental Assessment Division. For more detailed information on the toxicity of specific pesticides to honeybees, refer to the pesticide label.

Contact = Stays on the surface of plant. Locally systemic = Moves into plant but does not move to other plant parts. Systemic = Moves into plant and to unsprayed plant parts as they develop. Fungicide activity adapted from New York and Pennsylvania *Pest Management Guidelines for Grapes*.

0 = Ineffective. 1 = Slightly effective/suppression, not recommended for very susceptible varieties or at critical stages of infection. 2 = Moderately effective. 3 = Very effective.

— = No information is available. \* (shaded area) = The disease is listed on the product label for control or suppression.

**Table 4–3.** Activity of Fungicides on Grape Diseases and Impact on Honeybees (cont'd)

Group	Fungicide	Anthraco	Phomopsis cane and leaf spot	Black rot	Downy mildew	Powdery mildew	Botrytis bunch rot	Honeybee Toxicity <sup>1</sup>	Activity
2	Rovral WP	0	0	0	0	0	2 *	NT	Locally systemic
3	Fullback 125 SC	0	0	3 *	0	3 *	0	MT	Locally systemic
3	Mettle 125 ME	3	0	3 *	0	3 *	0	NT	Locally systemic
3	Nova	3 *	0	3 *	0	3 *	0	NT	Locally systemic
3+7	Aprovia Top 195 EC	1	0	1	0	3 *	0	NT	Locally systemic
3+9	Inspire Super	3 *	0	3 *	0	3 *	3 *	NT	Locally systemic
4+M	Ridomil Gold MZ 68 WG	0	1	1	3 *	0	0	NT	Systemic
5	Priwen	0	0	0	0	3 *	0	NT	Locally systemic
7	Cantus WDG	0	0	0	0	3 *	1	NT	Locally systemic
7	Kenja 400 SC	0	0	0	0	2	3 *	NT	Locally systemic
7	Sercadis	0	0	0	0	3 *	1 *	NT	Locally systemic
7+9	Luna Tranquility	0	0	0	0	3 *	3 *	NT	Locally systemic
7+11	Pristine WG	3 *	1	3 *	3 *	3 *	1 *	NT	Locally systemic
9	Scala SC	0	0	0	0	0	3 *	NT	Locally systemic
9+12	Switch 62.5 WG	0	0	0	0	0	3 *	NT	Locally systemic
11	Flint	0	1	3 *	1	3 *	1	NT	Locally systemic
11	Intuity	0	0	0	0	3 *	0	NT	Locally systemic
11	Sovran	0	1	3 *	2 *	2 *	1	NT	Locally systemic
13	Quintec	0	0	0	0	3 *	0	MT	Locally systemic
17	Elevate 50 WDG	0	0	0	0	1	3 *	NT	Locally systemic
21	Torrent 400 SC	0	0	0	3 *	0	0	NT	Locally systemic
22	Gavel 75DF	0	0	0	3 *	0	0	NT	Contact
33	Aliette	0	0	0	3 *	0	0	NT	Systemic
33	Confine Extra	0	0	0	3 *	0	0	NT	Systemic

M = Multi-site fungicides. NC = Not classified by FRAC, or group not indicated on product label. P = Plant extract. U = Mode of action has not been determined.

MT = Moderately toxic to bees. Can be used around bees if dosage, timing and method of application are correct, but do not apply them directly on bees, in the field or at the colonies.

NT = Relatively non-toxic to bees.

<sup>1</sup> Source: PMRA Environmental Assessment Division. For more detailed information on the toxicity of specific pesticides to honeybees, refer to the pesticide label.

Contact = Stays on the surface of plant. Locally systemic = Moves into plant but does not move to other plant parts. Systemic = Moves into plant and to unsprayed plant parts as they develop.

Fungicide activity adapted from New York and Pennsylvania *Pest Management Guidelines for Grapes*.

0 = Ineffective. 1 = Slightly effective/suppression, not recommended for very susceptible varieties or at critical stages of infection. 2 = Moderately effective. 3 = Very effective.

— = No information is available. \* (shaded area) = The disease is listed on the product label for control or suppression.

**Table 4–3.** Activity of Fungicides on Grape Diseases and Impact on Honeybees (cont'd)

Group	Fungicide	Anthraco	Phomopsis cane and leaf spot	Black rot	Downy mildew	Powdery mildew	Botrytis bunch rot	Honeybee Toxicity <sup>1</sup>	Activity
40	Forum	0	0	0	3 *	0	0	NT	Systemic
40	Revus	0	0	0	3 *	0	0	NT	Locally systemic
44	Double Nickel LC	0	0	0	0	1 *	1 *	NT	Contact
44	Serenade OPTI	0	0	0	0	1 *	2 *	NT	Contact
46	Timorex Gold	0	0	0	1 *	2 *	0	NT	Contact
40+45	Zampro	0	0	0	3 *	0	0	NT	Systemic
NC	Actinovate SP	—	—	—	—	2 *	1 *	NT	Contact
NC	Botector	0	0	0	0	0	1 *	NT	Contact
NC	Buran	0	0	0	0	1 *	0	NT	Contact
NC	MilStop	0	0	0	0	2 *	1	NT	Contact
NC	Purespray Green Spray Oil 13 E	0	0	0	0	2 *	0	—	Contact
NC	Sirocco	0	0	0	0	2 *	1	NT	Contact
NC	Tivano	0	0	0	1 *	0	0	NT	Contact
NC	Vegol Crop Oil	0	0	0	0	2 *	0	—	Contact
P5	Regalia Maxx	0	0	0	0	1 *	1 *	NT	Systemic
U8	Vivando SC	0	0	0	0	3 *	0	NT	Locally systemic

M = Multi-site fungicides. NC = Not classified by FRAC, or group not indicated on product label. P = Plant extract. U = Mode of action has not been determined.  
 MT = Moderately toxic to bees. Can be used around bees if dosage, timing and method of application are correct, but do not apply them directly on bees, in the field or at the colonies.  
 NT = Relatively non-toxic to bees.

<sup>1</sup> Source: PMRA Environmental Assessment Division. For more detailed information on the toxicity of specific pesticides to honeybees, refer to the pesticide label.  
 Contact = Stays on the surface of plant. Locally systemic = Moves into plant but does not move to other plant parts. Systemic = Moves into plant and to unsprayed plant parts as they develop.  
 Fungicide activity adapted from New York and Pennsylvania *Pest Management Guidelines for Grapes*.

0 = Ineffective. 1 = Slightly effective/suppression, not recommended for very susceptible varieties or at critical stages of infection. 2 = Moderately effective. 3 = Very effective.  
 — = No information is available. \* (shaded area) = The disease is listed on the product label for control or suppression.

**Table 4–4.** Activity of Insecticides on Grape Insect Pests and Impact on Honeybees

Use insecticides only for insects listed on the product label for the crop. The information provided in this table is based on information from other areas. It is intended to assist the grower in choosing the best insecticide for control of pests listed on the product label, while managing resistance and avoiding unnecessary sprays for non-target pests. Efficacy can be affected by rate of the product.

Group	Product Name	Grape berry moth	Leafhoppers	Phylloxera	Japanese beetle	Erineum mite	MALB	Wasps	European red mite	Climbing cutworm	Flea beetle	Grape mealy bug	Scale	Spotted wing drosophila	Honeybee Toxicity <sup>1</sup>
1B	Imidan WP	3 *	3	—	2 *	—	—	—	—	—	1	—	2 exp	3	HT
1B	Malathion 85 E	1	2 *	—	—	—	3 *	3	2 *	—	—	2 *exp	2 *exp	3 *	HT
3	Ambush 500 EC	3 *	2 *	—	—	—	—	—	0	3	3	—	2 exp	2	HT
3	Mako	—	—	—	—	—	3 *	3 *	0	—	—	—	2 exp	2	HT
3	Perm-Up EC	3 *	2 *	—	2	—	—	—	0	3	3	—	2 exp	2	HT
3	Pounce 384 EC	3 *	2 *	—	2	—	—	—	0	3 *	3	—	2 exp	2	HT
3	Pyganic EC 1.4 II	2	2 *	—	1	—	—	—	0	—	—	—	—	2	HT
3	Up-Cyde 2.5 EC	3 *	2 *	—	—	—	—	—	0	—	—	—	2 exp	2	HT
4A	Admire 240 Flowable	—	3 *	2	—	—	—	—	0	—	—	2 exp	2 exp	2	HT
4A	Assail 70 WP	1 *	3 *	2 *	2 *	—	—	—	0	—	—	2 exp	2 exp	2	MT
4A	Clutch 50 WDG	—	3 *	2 *	—	—	—	—	0	—	2	2 *exp	2 exp	2	HT
4C	Closer	—	1 *	—	—	—	—	—	0	—	—	—	0	2	HT
4D	Sivanto Prime	—	3 *	—	—	—	—	—	—	—	—	—	—	—	MT
5	Delegate	3 *	—	—	—	—	—	—	0	3	2	—	0	3	HT
5	Entrust	2 *	—	—	—	—	—	—	0	—	2	—	0	2	HT
5	Success	2 *	—	—	—	—	—	—	0	—	2	—	0	3	HT
6	Agri-Mek SC	0	—	—	—	1	—	—	2 *	—	—	—	0	3	HT

NC = Not classified by IRAC, or group not indicated on product label. UN = Mode of action has not been determined.

HT = Highly toxic to bees. Severe losses may be expected if used when bees are present at treatment time or within a few days thereafter.

MT = Moderately toxic to bees. Can be used around bees if dosage, timing and method of application are correct, but do not apply them directly on bees, in the field or at the colonies.

NT = Relatively non-toxic to bees.

I = Irritant. White film barrier on plant tissue may act as a repellent to bees when foraging.

<sup>1</sup> Source: PMRA Environmental Assessment Division. For more detailed information on the toxicity of specific pesticides to honeybees, refer to the pesticide label.

<sup>2</sup> May be toxic to bee colonies exposed to direct treatment, drift or residues on flowering crops or weeds.

Insecticide activity adapted from New York and Pennsylvania *Pest Management Guidelines for Grapes*, Michigan State University and BC Ministry of Agriculture recommendations, *Arthropod Management Tests*, and other sources.

0 = Ineffective. 1 = Slightly effective/suppression, not recommended for very susceptible varieties or at critical stages of infection. 2 = Moderately effective. 3 = Very effective.

— = No information is available. \* (shaded area) = The pest is listed on the product label for control or suppression. exp = Works only on exposed early instars, not on any growth stage under bark.

**Table 4–4.** Activity of Insecticides on Grape Insect Pests and Impact on Honeybees (cont'd)

Group	Product Name	Grape berry moth	Leafhoppers	Phylloxera	Japanese beetle	Erineum mite	MALB	Wasps	European red mite	Climbing cutworm	Flea beetle	Grape mealy bug	Scale	Spotted wing drosophila	Honeybee Toxicity <sup>1</sup>
11	BioProtec CAF	2 *	0	0	0	0	0	0	0	—	0	0	0	3	NT
11	Dipel 2X DF	2 *	0	0	0	0	0	0	0	—	0	0	0	0	NT
18	Intrepid	3 *	—	—	—	—	—	—	0	3 *	—	—	0	0	NT
21	Nexter	0	0	0	0	1	0	0	2 *	0	0	0	0	0	HT
23	Envidor 240 SC	0	0	0	0	—	0	0	3 *	0	0	—	0	0	MT
23	Movento 240 SC	0	—	3 *	0	2	0	0	—	0	0	3 *	1 *	0	HT <sup>2</sup>
25	Nealta	0	0	0	0	0	0	0	3 *	0	0	0	0	0	NT
28	Altacor	3 *	—	—	1 *	0	—	—	0	3 *	—	—	0	0	NT
NC	Kopa	0	1	—	0	0	0	0	1 *	0	0	1 *exp	1 *exp	0	NT
NC	Kumulus DF	0	0	0	0	2 *	0	0	—	0	0	0	0	0	NT
NC	Lime Sulphur	—	—	—	—	2	—	—	—	—	—	1 exp	1 exp	0	NT
NC	Microthiol Disperss	0	0	0	0	2 *	0	0	—	0	0	0	0	0	NT
NC	Opal	0	1	—	0	0	0	0	1 *	0	0	1 *exp	1 *exp	0	NT
NC	Purespray Green Spray Oil 13 E	0	—	—	—	1 *	0	0	2 *	—	—	1 exp	1 exp	0	—
NC	Surround WP	—	2 *	—	1	—	—	—	—	—	1	—	0	0	I
NC	Vegol Crop Oil	—	1 *	1 *	—	1 *	—	—	2 *	—	—	1 *exp	1 *exp	—	—
UN	Acramite 50 WS	0	0	0	0	—	0	0	2 *	0	0	0	0	0	MT

NC = Not classified by IRAC, or group not indicated on product label. UN = Mode of action has not been determined.

HT = Highly toxic to bees. Severe losses may be expected if used when bees are present at treatment time or within a few days thereafter.

MT = Moderately toxic to bees. Can be used around bees if dosage, timing and method of application are correct, but do not apply them directly on bees, in the field or at the colonies.

NT = Relatively non-toxic to bees.

I = Irritant. White film barrier on plant tissue may act as a repellent to bees when foraging.

<sup>1</sup> Source: PMRA Environmental Assessment Division. For more detailed information on the toxicity of specific pesticides to honeybees, refer to the pesticide label.

<sup>2</sup> May be toxic to bee colonies exposed to direct treatment, drift or residues on flowering crops or weeds.

Insecticide activity adapted from New York and Pennsylvania *Pest Management Guidelines for Grapes*, Michigan State University and BC Ministry of Agriculture recommendations, *Arthropod Management Tests*, and other sources.

0 = Ineffective. 1 = Slightly effective/suppression, not recommended for very susceptible varieties or at critical stages of infection. 2 = Moderately effective. 3 = Very effective.

— = No information is available. \* (shaded area) = The pest is listed on the product label for control or suppression. exp = Works only on exposed early instars, not on any growth stage under bark.

## Adjuvants Used in Fruit Crops

Spray adjuvants are tank-mix additives used to modify and enhance the effectiveness of the pesticide. They include surfactants, spreader/stickers, crop oils, anti-foaming agents, buffering agents, etc. Unless the product label specifies an adjuvant be added to the tank, growers do not need to use them.

A label may specify a particular name brand, or generalize a category of adjuvant. In the latter case, the grower is free to use any adjuvant in that category, provided it is registered for use on the crop. Always use adjuvants as directed on the product label. See Table 4–5. *Adjuvants Used in Ontario*, on this page, for common adjuvants used in fruit crops.

**Table 4–5.** Adjuvants Used in Ontario

Some pesticides used together or in close succession to crop oils or other adjuvants can cause crop injury. Do not use Supra Captan, Maestro, Folpan, Bravo, Echo or sulphur-based products with crop oils or adjuvants which are used to increase pesticide uptake. Crop safety issues can also occur around some formulations of copper or specific products, such as Group 11 fungicides. Read product labels closely for additional precautions around product compatibility with surfactants or crop oils. For more information on adjuvants, see [sprayers101.com](http://sprayers101.com) or Purdue Extension, *Adjuvants and the Power of the Spray* at [ppp.purdue.edu/wp-content/uploads/2016/08/PPP-107.pdf](http://ppp.purdue.edu/wp-content/uploads/2016/08/PPP-107.pdf).

Trade Name	Registration Number	Adjuvant Type	Characteristics
Agral 90	11809 24725	non-ionic surfactant	<ul style="list-style-type: none"> <li>wetter-spreader</li> <li>compatible with most pesticides<sup>1</sup></li> <li>helps pesticide penetrate plant cuticle</li> </ul>
Ipco Ag-Surf	15881	non-ionic surfactant	<ul style="list-style-type: none"> <li>wetter-spreader</li> <li>compatible with most pesticides<sup>1</sup></li> <li>helps pesticide penetrate plant cuticle</li> </ul>
LI 700	23026	non-ionic surfactant	<ul style="list-style-type: none"> <li>wetter-spreader</li> <li>compatible with most pesticides<sup>1</sup></li> <li>helps pesticide penetrate plant cuticle</li> <li>additional properties: pH adjuster, sticker</li> </ul>
Purespray Green Spray Oil 13 E	27666	crop oil (mineral)	<ul style="list-style-type: none"> <li>helps pesticide penetrate plant cuticle or insect exoskeleton</li> </ul>
Xiameter OFX-0309	23078	silicone surfactant (organosilicone)	<ul style="list-style-type: none"> <li>wetter-spreader</li> <li>helps pesticide penetrate plant cuticle</li> <li>reduces surface tension</li> <li>improves rainfastness</li> </ul>

<sup>1</sup> Check product label for precautions around surfactant compatibility before using.

