



Current Report

EXTENSION

Oklahoma Cooperative Extension Fact Sheets are also available on our website at:
extension.okstate.edu

Commercial Grape Insect and Disease Control – 2022

Becky Carroll
Associate Extension Specialist,
Fruit & PecansJennifer Olson
Associate Extension SpecialistAaron Essary
Assistant Extension Specialist,
Viticulture and EnologyBrenda R. Sanders
Horticultural Communications

<i>Timing Pest/Problem</i>	<i>Material</i>	<i>MOA Group*</i>	<i>Rate/Acre</i>	<i>Comments</i>
DORMANT				
Phomopsis Powdery mildew Mealybugs	Brandt Lime Sulfur ^{OMRI}	M02	4 - 10 gal. 15 - 20 gal.	The dormant application is aimed at reducing over-wintering inoculum on canes if there has been a history of phomopsis, powdery mildew or mealybugs in the vineyard. Powdery mildew and mealybugs. Phomopsis
Trunk disease, Eutypa Canker Diseases	Topsin M 70WSB	1	3.2 oz. in 1 gal. water. OR 1.5 lbs. in 50 gpa.	Apply as a paint to wounded surfaces after pruning and before the next rain. Apply as directed spray to wounded surfaces. after pruning and before the next rain. Applicators must have a copy of the FIFRA 24 (c) Special Local Need Label when applying Topsin M. Apply as spray within 24 hours after pruning.
	Mettle 125ME	3	5 oz.	
DELAYED DORMANT TO BUD SWELL				
Anthracnose	Sulforix	M02	1 - 2 gal.	Apply as buds are beginning to swell but just before buds show green. Aimed at reducing overwintering inoculum on canes if there has been a history of anthracnose in vineyard. Scout for insects at least twice weekly as bud swell occurs. Only spray for insects if present.
European red mite, mealybug, scale insects				
Flea beetle and climbing cutworms	Baythroid XL ^r	3A	2.4 - 3.2 fl. oz.	Do not exceed 12.8 oz per acre per year. Can be used for mealybugs.
	Danitol 2.4EC ^r	3A	5.3 - 21.3 fl. oz.	Use lower rate for flea beetles, and higher rate for cutworms. Can also be used for mites. See label for specific application instructions for climbing cutworms.
	Sevin XLR Plus	1A	1 - 2 qt.	Use lower rate for flea beetles, and higher rate for cutworms. See bee precautions below.
Flea beetle	Imidan 70W Scorpion 35SL	1B 4A	1.3 - 2.1 lb. 2 - 5 fl. oz.	Do not exceed 6.5 lbs./acre per year. See bee precautions below.

<i>Timing Pest/Problem</i>	<i>Material</i>	<i>MOA Group*</i>	<i>Rate/Acre</i>	<i>Comments</i>
Climbing cutworms	Altacor	28	3 - 4.5 oz.	Do not exceed four applications per year. Do not exceed 6.4 oz./acre/season. Do not exceed 19.5 oz./acre/year.
	Brigade 2EC ^r	3A	3.2 - 6.4 fl. oz.	
	Delegate WG	5	3 - 5 oz.	Do not exceed 23 oz. or more than five applications per year. Works best against young larvae. Do not use if using later for root borer application. Do not exceed one application of Lorsban/year. Do not apply more than 24 fl. oz./acre/season.
	DiPel DF ^{OMRI}	11A	0.5 - 2 lb.	
	Entrust SC ^{OMRI}	5	4 - 8 fl. oz.	
	Lorsban Advanced ^r	1B	1 qt.	
	Mustang Maxx ^r	3A	2 - 4 fl. oz.	
BUD BREAK TO PRE-BLOOM				Leaves and shoots are produced.
Black rot				Early sprays for these diseases are advised if they have been a problem in previous years. Preventative chemicals need to be applied starting at 3-inch shoot growth. Repeat applications using 7- to 10-day intervals (or according to label instructions). Rotate fungicide modes of action (MOA) to prevent fungicide resistance in the pathogen populations. See comments on strobilins at end. Do not apply more than 12 lb of the active ingredient of Captan 50WP) or 17.5 lb of Captan 80WDG/season. Captan is not as effective on black rot as Mancozeb. Check label for interactions with oils and sulfur if using. Captan is best suited for summer applications once Dithane cannot be used due to its 66 day PHI. Captan is best used for downy mildew prevention and summer bunch rots. Mancozeb (Dithane, Manzate) would be the fungicide of choice for these early stages because it is a general protectant and has a long PHI. Do not apply these compounds within 66 days of harvest. Do not apply Flint to Concord or other American type grapes as injury may occur. Flint is not recommended for downy mildew control. See comments on strobilins at end. Rates depend on disease controlled. Black rot, use high rate for phomopsis cane and leaf spot. Not effective against downy mildew. See comment above for Dithane. See comment above for Dithane. Black rot, powdery mildew, and anthracnose. Do not apply Pristine to Concord or other American type grapes as injury may occur. See comments on strobilins at end. Black rot, powdery mildew and anthracnose. See comments on strobilins at end.
Phomopsis cane and leaf spot	Abound Flowable	11	10.0 - 15.5 fl. oz.	
Downy mildew	Captan 50WP	M04	2.0 - 4.0 lb.	
	Captan 80WDG	M04	1.2 - 2.5 lb.	
	Dithane DF, M-45	M03	1.4 - 4 lbs.	
	Dithane F-45	M03	1.2 - 3.2 qt.	
	Flint	11	1.5 - 4.0 oz.	
	Luna Experience	7+3	8.0 - 8.6 oz.	
	Manzate Flowable	M03	1.2 - 3.2 qt.	
	Manzate Max	M03	1.2 - 3.2 qt.	
	Mettle 125ME	3	3 - 5 fl. oz.	
	Pristine	11+7	8 - 12.5 oz.	
	Rally 40WSP	3	3 - 5 oz.	
	Sovran	11	3.2 - 6.4 oz.	
	Ziram 76DF	M03	3 - 4 lb.	
Powdery mildew	Abound Flowable	11	10.0 - 15.5 fl.oz.	On varieties that are highly susceptible to powdery mildew, a fungicide for powdery mildew control might be needed in these early sprays. Primary infections of powdery mildew can occur during this period. See comments on strobilins at end.
	Endura	7	4.5 - 8.0 oz.	Do not apply Flint to Concord or other American type grapes as injury may occur. See comments at end. Thorough coverage is required. No residual activity. Powdery mildew, botrytis and anthracnose. See rates above for black rot and phomopsis control. Black rot, powdery mildew and anthracnose. Do not apply Pristine to Concord or other American type grapes as injury may occur. See comments at end.
	Flint	11	1.5 - 2.0 oz.	
	Kaligreen ^{OMRI}	NC	2.5 lb.	
	Kenja 400SC	7	20 - 22 fl. oz.	
	Luna Experience	7+3	6.0 - 8.6 fl. oz.	
	Mettle 125ME	3	3 - 5 oz.	
	Pristine	11+7	8 - 12.5 oz.	

<i>Timing Pest/Problem</i>	<i>Material</i>	<i>MOA Group*</i>	<i>Rate/Acre</i>	<i>Comments</i>
	Procure 480SC Quintec Rally 40WSP SuffOil-X** ^{OMRI} Sulfur 6L Sovran Torino Vivando	3 13 3 NC M02 11 U6 U8	4 - 8 fl. oz. 4 - 6.6 fl. oz. 3 - 5 oz. 1 - 2 % conc. See label 3.2 - 4.8 oz. 3.4 oz. 10.3 - 15.4 oz.	Do not apply more than 32 fl. oz./acre/crop year. Rate varies depending on treatment interval. Do not apply more than 24 oz./acre/year 1 to 2 gal/100 gal water. See comments on sulfur at end. See comments on strobilins at end. Do not make more than two applications per year. Do not make more than three applications per year.
FOUR- TO TEN-INCH SHOOTS				When new shoots are about 10 inches long certain pests may be present. Scout early to detect insects as quickly as possible.
Flea beetle (larvae)	Baythroid XL ^r Danitol 2.4EC ^r Imidan 70W Scorpion 35SL Sevin XLR Plus	3A 3A 1B 4A 1A	2.4 - 3.2 fl. oz. 5.3 - 21.3 fl. oz. 1.3 - 2.1 lb. 2 - 5 fl. oz. 1 - 2 qt.	Do not exceed 12.8 oz. per acre per year. Can be used for mealybugs. Lower rate for flea beetles. Can also be used for mites. Do not exceed 6.5 lbs./acre per year. Foliar application. See bee precautions below. Use lower rate for flea beetles. See bee precautions below.
Rose chafer	Assail 30SG Danitol 2.4EC ^r Imidan 70W Sevin XLR Plus	4A 3A 1B 1A	2.5 – 5.3 oz. 10.7 - 21.3 fl. oz. 1.3 - 2.1 lbs. 1 - 2 qt.	Rose chafer may be present any time between 4- and 10-inch growth and bloom. Do not make more than two applications/year Do not exceed 42.7 oz. per acre per year. Do not exceed 6.5 lbs. per acre per year. See bee precautions below.
Redbanded leafroller	Danitol 2.4EC ^r Delegate WG Entrust SC ^{OMRI} Imidan 70W Intrepid 2F Sevin XLR Plus	3A 5 5 1B 18 1A	10.7 - 21.3 fl. oz. 3 - 5 oz. 4 - 8 fl. oz. 1.3 - 2.1 lb. 8 – 16 fl. oz. 1 - 2 qt.	Use of pheromone traps for redbanded leafroller will indicate their presence and help determine need for control. Do not exceed 42.7 oz. per acre per year. Do not exceed 19.5 oz./acre/year. Do not exceed 23 oz. or more than five applications per year. Do not exceed 6.5 lbs./acre per year. PHI depends on rate. See label. See bee precautions below.
European red mite (if present)	Acramite 50WS Envidor 2 SC Nealta Nexter Onager Portal XLO Vendex 50WP ^r Zeal	20D 23 25A 21A 10A 21A 12B 10B	0.75 – 1 lb. 16 - 34 fl. oz. 13.7 fl. oz. 4.4 - 10.67 oz. 12 - 24 oz. 2 pts. 1 - 2.5 lb. 2.0 – 3.0 oz.	Do not exceed one application per year. Do not exceed one application per year. Do not exceed two applications per year. Do not exceed two applications per year. Do not exceed one application per year. Do not exceed 2 pts/acre per year. (Also controls mealybugs and leafhoppers.) Do not exceed two applications or 4 lbs./acre per season. Do not exceed one application per season.
PRE-BLOOM THROUGH BLOOM				Just before bloom through the bloom period. Since bees do not pollinate grapes there is no danger to bees at this time unless they are working other blooming plants in the area being sprayed. See bee precautions below.
Black rot, Phomopsis cane and Leaf spot, powdery mildew Downy mildew				Important sprays. Same as Grape Bud Break to Pre-bloom. Pay attention to pre-harvest intervals.

<i>Timing Pest/Problem</i>	<i>Material</i>	<i>MOA Group*</i>	<i>Rate/Acre</i>	<i>Comments</i>
Rose chafer Flea beetle larvae Redbanded leafroller	Same as for 4- to 10-inch shoot spray (if needed)			Insects are often a problem in vineyards at this stage. The use of pheromone traps for grape berry moth and redbanded leafroller will indicate their presence and help determine the need for control.
Grape berry moth	See shatter spray if needed.			
Grape scale	Lorsban Advanced ^r		1 qt	Apply as a spray drench ground application using a minimum spray volume of 25 gpa. Do not exceed one application per year. Grape root borer control will affect use of Lorsban for other pests.
Grape phylloxera (leaf form)				Control the root gall form of grape phylloxera by using rootstocks derived from American grapes. Native American grapes (Eastern U.S.) are nearly immune to this pest.
	Assail 30SG	4A	2.5 - 5.3 oz.	Apply at pre-bloom and repeat 10-14 days later. Do not exceed 12.5 oz. per acre per year.
	Danitol 2.4EC ^r	3A	10.7 - 21.33 fl. oz.	Apply at pre-bloom and repeat 10 to 14 days later.
	Movento	23	6.0 – 8.0 fl. oz.	See label regarding adjuvants. Allow 30 days between applications. Do not exceed 12.5 oz./acre per year.
	Platinum	4A	8.0 - 17.0 fl. oz.	Soil-applied. Do not exceed 17 oz./acre per year. 60 day PHI.
	Platinum SG	4A	2.67 – 5.67 oz.	Soil applied. Do not exceed 5.67 oz./acre/year. 60 day PHI.
	Scorpion 35SL	4A	2.0 - 5.0 fl. oz. 9.0 - 10.5 fl. oz.	Foliar application. (1 day PHI) Soil application (28 day PHI) Do not exceed 20.25 fl. oz./acre per year. See bee precautions below.
BLOOM				When caps begin to fall.
Black rot Phomopsis cane and leaf spot Powdery mildew	Same as bud break to pre-bloom(Check PHI)			If wet weather persists during bloom, a fungicide application at mid-bloom (7 to 10 days after caps begin to fall) will be necessary. See Comments at end.
Botrytis bunch rot				While botrytis bunch rot (BBR) may not be a problem every year in Oklahoma vineyards, this spray is critical in those vineyards that have a history of BBR. It will typically be more severe on tight clustered varieties such as Vinifera and French hybrid grapes. Apply no more than 3lb./acre/season. 0-day PHI. Powdery mildew, botrytis, and anthracnose. Do not apply more than 34 fl. oz./acre/year. Rate and number of applications depend on type of grape. Rate is 18 fl. oz. by itself, 9 fl. oz. if tank mixed. Also registered for control of sour rot. Apply at first bloom (no later than 5% bloom). Use 5 to 10 oz. for tank mix.
	Elevate 50WDG	17	1.0 lb.	
	Kenja 400SC	7	20 - 22 fl. oz.	
	Luna Experience	7+3	8.0 - 8.6 fl. oz.	
	Rovral 4F	2	1.0 - 2.0 lb.	
	Scala SC	9	18 oz.	
	Switch 62.5WG	9+12	11 - 14 oz.	
	Topsin M WSB	1	1 - 1.5 lb.	
	Vanguard WG	9	10 oz.	
Downy mildew	Abound Flowable	11	10.0 - 15.5 fl. oz.	See comments at end regarding use of strobilurins.
	Captan 50WP	M04	2.0 - 4.0 lb.	Do not apply more than 12 lb. ai. Of Captan 50WP or 17.5 lb. ai. of Captan 80WDG/season. Check label for timing and interactions with oils and sulfur if using.
	Captan 80WDG	M04	1.2 - 2.5 lb.	Do not apply Pristine to Concord, Noiret or other American grape types as injury may occur.
	Forum	40	6 fl. oz.	Do not exceed 30 fl. oz./acre or five applications/season.
	Pristine	11+ 7	8.0 - 12.5 oz.	Do not apply Pristine to Concord, Noiret or other American grape types as injury may occur.
	ProPhyt	33	2 - 4 pts.	Test for varietal sensitivity before using.
	Phostrol	33	2.0 - 5.0 pts.	Test for varietal sensitivity before using.
	Ranman 400SC	21	2.1 - 2.75 fl. oz.	Do not use any surfactant for grapes.
	Reason 500SC	11	2.7 fl. oz.	
	Revus Top	3+40	7.0 fl. oz.	Do not apply to Concord or Thomcord.

<i>Timing Pest/Problem</i>	<i>Material</i>	<i>MOA Group*</i>	<i>Rate/Acre</i>	<i>Comments</i>
Downy mildew (cont'd)	Ridomil Gold Copper Ridomil Gold MZ Sovran Zampro Ziram	4+M01 4+M03 11 45+40 M03	2 lb. 2.5 lb. 4.0 - 6.4 oz. 11 - 14 fl. oz. 3 - 4 lb.	42 day PHI. 66 day PHI. See comments on strobilorins at end. Do not exceed 2 applications per season.
FRUIT SET				When unfertilized berries fall from clusters; about 7 to 10 days after bloom or 7 to 10 days after last spray. Check PHI. See comments at end.
Black rot Powdery mildew	Same as bud break to pre-bloom.			Check PHI.
Downy mildew	Same as bloom.			It is important to monitor for all insect pests after petal-fall. Pheromone traps offer help in determining the presence of redbanded leafroller and grape berry moth. Grape berry moth emergence begins late May and June. There may be three generations per year. Examining the underside of grape leaves will indicate if leafhoppers are present. Check insecticide labels for more information on specific insects.
Grape berry moth Leafhopper Rose chafer Grape mealybug Grape rootworm Redbanded leafroller Japanese beetle	Altacor Baythroid XL ^r Brigade 2EC ^r Danitol 2.4EC ^r Deliver ^{OMRI} Ecozin Plus ^{OMRI} Entrust SC ^{OMRI} Grandevo ^{OMRI} Imidan 70W Intrepid 2F Intrepid Edge Mustang-Maxx ^r Nexter Nexter SC Pyganic 5% EC ^{OMRI} Sevin XLR SpinTor 2 SC	28 3A 3A 3A 11A UN 5 1B 18 18+5 3A 21A 21A 3A 1A 5	2 - 4.5 oz. 2.4 - 3.2 fl. oz. 3.2 - 6.4 fl. oz. 5.3 - 10.7 fl. oz. (10.7 - 21.3 fl. oz.) 0.5 - 2.0 lb. 4 - 30 oz. 4 - 8 fl. oz. 1 - 3 lb 1.33 - 2.13 lb. 8 - 16 fl. oz. 6 - 12 fl. oz. 4 fl. oz. 4.4 - 10.67 oz. 7.5 - 17 oz. 4.5 - 17 fl. oz. 1 - 2 qt. 4 - 8 fl. oz.	Grape berry moth, Japanese beetle (3 to 4.5 oz. rate). Grape berry moth, leafhopper, mealybug, leafroller. Leafhopper, grape berry moth, Japanese beetle and two-spotted spider mite (higher rate for spider mite). Leafhoppers, grape berry moth, Japanese beetles, rose chafer, redbanded leafroller and mites. Higher rates to 21.3 fl. oz. may be used to control the latter four pests. B.t. product for caterpillar pests only. See label. Grape berry moth, redbanded leafroller. Works best against young larvae. Grape berry moth, grape leafroller, 2 to 3 lb. rate for leafhoppers, mealybugs and mites. Grape berry moth, leafhopper, rose chafer, mealybug, and redbanded leafroller. Do not apply more than 6.5 lbs./acre/year. REI is 14 days. PHI is 7. Caterpillar pests only – grape berry moth, leafrollers. For both 2F & Edge, PHI varies (21-30) depending on rate. Grape berry moth, leafhopper and Japanese beetle. Nexter and Nexter SC are labeled for use against leafhoppers and mites. Leafhoppers, Japanese beetle, mealybugs Sevin formulations – Leafhopper, rose chafer, Japanese beetle. Higher rate for grape berry moth, redbanded leafroller. Greater REI for grape girdling and cane turning. See bee precautions below. For caterpillar pests only.
Mites	Abacus ^r Acramite 50WS Agri-Mek SC ^r Envidor 2SC Grandevo ^{OMRI} Kanemite 15SC Nealta Nexter Onager Portal XLO Vendex ^r 50WP Zeal	6 20D 6 23 20B 25A 21A 10A 21A 12B 10B	8.0 - 16.0 fl. oz. 0.75 - 1.0 lb. 1.75 - 3.5 fl. oz. 16 - 34 fl. oz. 2 - 3 lb. 21 - 31 fl. oz. 13.7 fl. oz. 4.4 - 10.67 oz. 12 - 24 oz. 2 pt. 1 - 2.5 lb. 2.0 - 3.0 oz.	Plus a nonionic surfactant. Plus a nonionic surfactant. Only one spray per season. Must use a nonionic surfactant. Do not exceed one application/year. Do not use in tank mix. Do not exceed two applications/year. Do not exceed two applications/season. Do not exceed two applications/year. Do not exceed one application/year. Do not exceed 2 pt./acre/year. Do not exceed two applications/season. One application per season.

<i>Timing Pest/Problem</i>	<i>Material</i>	<i>MOA Group*</i>	<i>Rate/Acre</i>	<i>Comments</i>
GRAPE FRUIT SET TO VERAISON				First cover should follow shatter by 10 to 14 days. Refer to label for application timing and harvest restrictions. Veraison=berry coloring. Sprays for black rot control may be stopped after berries turn color (reach 6 to 8% sugar). See other comments at end.
Black rot Powdery mildew Downy mildew	Same as bud break to pre-bloom.			
Grape berry moth Rose chafer Leafhopper Redbanded leafroller Grape rootworm Grape mealybug Japanese beetle	Same as grape shatter sprays.			Rose chafer infestations usually subside by veraison.
Mites	Same as grape shatter sprays.			
VERAISON TO HARVEST				Refer to label directions for timing of applications and harvest restrictions (PHI).
Black rot				As berries reach full size and sugar content starts to increase, they become resistant to infection by the black rot fungus. In general, berries are no longer susceptible to black rot after veraison (6 to 8% sugar content).
Powdery mildew Downy mildew	Same as bud break to pre-bloom.			
Botrytis bunch rot	Same as bloom.			This spray is critical in vineyards or on varieties where Botrytis bunch rot has been a problem. See comments on Botrytis bunch rot at end of this section.
Ripe rot	Pristine Viathon	11+7 P07+3	8.0 - 12.5 oz. 4 pts.	Do not apply Pristine to Concord, Noiret, or other American grape types as injury may occur. Check label.
Sour rot complex	OxiDate 2.0 ^{OMRI}		1:400 dilution	Mix OxiDate in a 1:400 dilution and apply at 30 to 100 gal./acre.
Grape berry moth Grape leafhopper Japanese beetle	Same as grape shatter See recommendations at end of section.			Continue to monitor for insect and mite pests, and apply insecticide as needed. Refer to product label for specific insects, rates and harvest restrictions.
Green June beetle	Sevin XLR	1A	2 qt.	Do not concentrate spray on the bunch or visible residues may result. See bee precautions below.
Stink bugs	Danitol 2.4EC ^r	3A	10.7 - 21.3 fl. oz.	21-day PHI.
Mites	Same as grape shatter.			
POST HARVEST				To eliminate premature defoliation and decrease inoculum for next season.
Downy mildew	ProPhyt	33	2 – 4 pts.	Phosphorus acid. Other formulations exist such as Phostrol and Viathon. See labels.
Powdery mildew	OxiDate 2.0 ^{OMRI}		1:200 – 1:400	Dilution
Preventative	Mancozeb Dithane DF, M-45 Dithane F-45 Manzate Max	M03 M03 M03	1.4 - 4 lbs. 1.2 - 3.2 qt. 1.2 - 3.2 qt.	Dithane, Manzate After harvest, Mancozeb products can again be applied. Do not apply more than 19.2 lb. ai. Per season.

Residue Reminder: Visible films of spray residue are unattractive on fresh fruit and difficult to remove

r Restricted use Pesticide.

*Chemical Group Classifications can be found at the following Web sites:

Herbicides- <http://www.plantprotection.org/hrac/>, Insecticides- <http://www.irac-online.org/>, Fungicides- <http://www.frac.info/>.

**Horticultural oils are physical toxicants which act as suffocant and entrapment insecticides.

^{OMRI} Organic Materials Review Institute (OMRI) listed for organic production.

READ ALL LABELS for important restrictions or warnings about tank mix compatibility or phytotoxicity warnings BEFORE APPLYING PESTICIDES. THE LABEL IS THE LAW.

Bee Precautions

Several insecticides listed are toxic to bees. Mow the vineyard floor before application if weeds or cover crops are blooming. Read individual labels for specific bee protection measures for each product.

Grape Root Borer

This pest is not common in Oklahoma. It is generally difficult to evaluate damage from grape root borer. Injury is most often associated with a slow decline of vineyards, when it can be associated at all. If grape root borer is not a problem, there is no reason to risk destroying natural enemies (i.e., predators, parasites, pathogens). Therefore, treat with an insecticide only if necessary. Sampling is critical for several reasons: 1) The control program is relatively expensive; and 2) Use of an insecticide can create as well as solve problems. If you believe that this insect is affecting your vineyard's performance, you may wish to begin the following program:

Immediately After Harvest

Sample - 10 vines per acre (but not less than 50 vines).

Examine - A circular site (3 feet in diameter) around the base of each plant, concentrating on the inner 1 foot, looking for shed pupal skins of the grape root borer moth. If pupal skins are found beneath 5% of the vines examined, apply an insecticide next year.

35 Days Before Harvest

If previous year's sample indicates a need to spray, apply Lorsban 4E, following label instructions. Older vines are more likely to be infested. Apply an insecticide as late as the label permits, but before harvest.

Green June Beetle, Japanese Beetle and Rose Chafer

As the crop reaches maturity, these beetle pests may become more of a problem, particularly feeding on ripened fruit. When soil conditions are moist before or slightly after veraison, and organic matter in the surrounding area is high then these beetles can be quite common and difficult to control. Careful attention to beetle infestation one month prior to harvest should be given to keep populations in check. Start treatment when first noticed. Use of Danitol up to 21 days before harvest can decrease populations. Rotation to Sevin insecticide up to seven days before harvest will further aid in control.

Grasshoppers

Grasshopper control can and should be concentrated very early in the season before populations migrate into vineyard borders. Young, flightless nymphs may cause severe defoliation of border plants and progress into vineyards if left unchecked. If treatment is directed outside the vineyard, in pasture areas, then applications of Dimilin early in the season can prevent buildup of populations. When controlling grasshoppers inside the vineyard, then careful use of labeled compounds is the only recourse. Some level of effective control has been obtained using NOLO® Bait, a biological control agent containing tiny protozoan spores. This product is slow acting and does not store well, so use it early and often enough to be effective and to deplete your supply.

Botrytis Bunch Rot

Botrytis bunch rot is most commonly a problem on tight-clustered French hybrid and *Vitis vinifera* cultivars. Fungicide application should be timed to occur right before the berries enlarge to tighten clusters. Proper timing and thorough spray coverage are essential for good control. Direct the spray toward the fruit, and use a minimum of 100 gal/A of water. Include a spreader-sticker with Rovral, especially at the 1.5 lb. rate. **NOTE:** Removal of leaves around clusters on mid- or low-wire cordon-trained vines before bunch closing has been shown to reduce losses caused by Botrytis.

Strobilurins

Abound Flowable

Abound is in the same general class of chemistry as Sovran, Flint and Pristine (strobilurin) and is registered for control of black rot, downy mildew, powdery mildew and Phomopsis cane and leaf spot. (The active ingredient of Abound is azoxystrobin and there are several labeled products with the same ai. These include Aframe, Azoxystar, Azteroid, Acadia 2SC, Satori and Trevo). Abound is excellent for control of black rot and downy mildew and provides good control of powdery mildew. Abound is recommended at the rate of 10.0 to 15.5 fl. oz. per acre. In University tests, the rate of 11 to 12 fl. oz. provided good control of the above mentioned diseases.

NOTE: Abound Flowable is very phytotoxic to apples of the variety McIntosh or varieties related to McIntosh. Do not use the same sprayer to apply Abound to grapes that will be used to apply other materials to apples. Do not allow spray to drift from grapes to apples.

Sovran

Sovran is in the same general class of chemistry as Abound, Flint, and Pristine (strobilurin). It is registered for control of black rot, powdery mildew, Phomopsis cane and leaf spot, and downy mildew. The Sovran label gives different use rates for control of different diseases. For black rot and Phomopsis cane and leaf spot the rate is 3.2 to 4.8 oz./A; for powdery mildew the rate is 3.2 to 4.8 oz./A and for downy mildew the rate is 4.0 to 6.4 oz./A. Sovran is excellent for control of black rot and powdery mildew, but is less effective than Abound for downy mildew control. Under heavy disease pressure, Sovran may not provide adequate control of downy mildew even at the higher rate. Unlike Abound, Sovran is not phytotoxic on certain apple varieties. Sovran has a 14 day PHI. See label for further information and certain use restrictions.

Flint

Flint is in the same general class of chemistry as Abound, Sovran and Pristine (strobilurin). It is registered for control of black rot, powdery mildew and downy mildew. The Flint label provides different use rates for control of different diseases. For powdery mildew the rate is 1.5 to 2.0 oz./A; for black rot the rate is 2.0 oz./A and for downy mildew suppression, the rate is 4.0 oz./A. Flint is excellent for control of black rot and powdery mildew, but is not highly effective against downy mildew, and is not recommended for control of downy mildew. Unlike Abound, Flint is not phytotoxic to certain apple varieties; however, Flint is very phytotoxic to Concord grapes. The label states "Do not apply Flint to Concord grapes or crop injury may occur." See label for further information and certain use restrictions.

Pristine

Pristine contains a combination of two active ingredients (pyraclostrobin, 12.8% and boscalid, 25.2%). Pyraclostrobin is in the same general class of chemistry as Abound, Sovran and Flint (strobilurin). Boscalid has excellent activity against powdery mildew and good activity against Botrytis. With increasing resistance in powdery mildew to the sterol inhibiting fungicides and the strobilurin fungicides (Abound, Sovran and Flint). Pristine is an additional component in our resistance management programs for powdery mildew. Pristine is registered for control of anthracnose, black rot, downy mildew, powdery mildew and Phomopsis cane and leaf spot, with "suppression only" of Botrytis gray mold. A maximum of five applications may be made per season. Do not make more than two sequential applications of Pristine before alternating to a labeled fungicide with a different mode of action. The label also states "DO NOT use on Concord or Noiret due to foliar injury. Possible foliar injury could occur to Worden, Fredonia, Niagara, Steuben, Rougeon or related grape varieties."

Resistance Management For Strobilurin Fungicides

Strobilurin fungicides are highly susceptible to resistance development. Do not apply sequential sprays of Abound (or other labeled products with an ai. of azoxystrobin), Sovran, Flint or Pristine before alternating with a fungicide that has a different mode of action. Apply according to the label and no more than two times per year. Always read the label.

Important Note on Powdery Mildew:

In some locations, the powdery mildew fungus has developed resistance to the sterol-inhibiting fungicides such as Procure and the strobilurin fungicides (Abound, Sovran and Flint). All of these materials were highly effective for control of powdery mildew when they were first introduced, however in vineyards where these materials have been used for several years, reduced sensitivity or resistance may be present. For this reason, it is recommended that these materials not be used alone when powdery mildew needs to be controlled. To provide adequate control of powdery mildew, they should be mixed with sulfur, SuffOil-X, Quintec, Endura or potassium salts. Pristine is a combination of a strobilurin fungicide plus Endura; therefore, it can be used alone. Sulfur is an inexpensive and very effective fungicide for powdery mildew control. Unfortunately, some varieties are extremely sensitive to sulfur. On sulfur tolerant varieties, the use of sulfur should be considered.

Sulfur

There are many formulations of sulfur labeled for use on grapes with several options that are OMRI listed for use in organic growing. Sulfur is available in dry flowable (DF) and flowable (F) formulations, as well as wettable powder (WP) and dusts (D). The dry flowable and flowable formulations greatly reduce the applicator's exposure as compared to wettable powders and dusts. Use rates are different for different formulations as well as time of application. See the label for specific use rates. Some grape varieties, such as Concord and other Labrusca (American) types, are extremely sensitive to sulfur. Any product with calcium polysulfide or sulfur should never be applied to Chambourcin or Norton once it has broken bud. For other varieties, you can apply sulfur products to foliage at appropriate rate but temperatures need to remain below 85 F during or immediately following application or scorching may occur. Consult label for best time of day to apply. Sulfur loses efficacy for powdery mildew control at temperatures below 65 F. If using Captan, check label for sulfur interaction issues.

Additional Pesticide Information

<i>Insecticides</i>	<i>MOA</i>	<i>Chemical Name</i>	<i>REI</i>	<i>PHI</i>	<i>Signal Word</i>
Abacus ^r	6	Abamectin	12 hours/4 days	28 days	Warning
Acramite 50WS	20D	Bifenazate	12 hours	14 days	Caution
Agri-Mek SC ^r	6	Abamectin	12 hrs/4 days	28 days	Warning
Altacor	28	Chlorantraniliprole	4 hours	14 days	Caution
Assail 30SG	4A	Acetamiprid	12 hours	3 days	Caution
Baythroid XL ^r	3A	Cyfluthrin	12 hours	3 days	Warning
Brigade 2EC ^r	3A	Bifenthrin	12 hours	30 days	Warning
Danitol 2.4EC ^r	3A	Fenpropathrin	24 hours	21 days	Warning
Delegate WG	5	Spinetoram	4 hours	7 days	Caution
Deliver ^{OMRI}	11A	<i>Bt</i> ssp. <i>Kurstaki</i>	4 hours	0 days	Caution
DiPel DF ^{OMRI}	11A	<i>Bt</i> ssp. <i>Kurstaki</i>	4 hours	0 days	Caution
Ecozin Plus ^{OMRI}	UN	Azadirachtin	4 hours	0 days	Caution
Entrust SC ^{OMRI}	5	Spinosad	4 hours	7 days	Caution
Envidor 2 SC	23	Spirodiclofen	12 hours	14 days	Caution
Grandevo ^{OMRI}		Chromobacterium	4 hours	0 days	Caution
Imidan 70-W	1B	Phosmet	14 days	14 days	Warning
Intrepid 2F	18	Methoxyfenozide	4 hours	30 days	Caution
Intrepid Edge	18+5	Methoxyfenozide, Spinetoram	4 hours	30/21 days	Caution
Kanemite 15 SC	20B	Acequinocyl	12 hours	7 days	Caution
Lorsban 4E ^r	1B	Chlorpyrifos	24 hours	35 days	Warning
Lorsban Advanced ^r	1B	Chlorpyrifos	24 hours	35 days	Warning
Movento	23	Spirotetramat	24 hours	7 days	Caution
Mustang-Maxx ^r	3A	Zeta-cypermethrin	12 hours	1 day	Warning
Nealta	25A	Cyflumetofen	12 hours	14 days	Caution
Nexter	21A	Pyridaben	12 hours	7 days	Warning
Nexter SC	21A	Pyridaben	12 hours	7 days	Caution
Onager	10A	Hexythiazox	12 hours	7 days	Caution
Pasada 1.6F	4A	Imidacloprid	12 hours	0 days	Caution
Platinum, Platinum SG	4A	Thiamethoxam	12 hours	60 days	Caution
Portal XLO	21A	Fenpyroximate	12 hours	14 days	Warning
Provado 1.6 F	4A	Imidacloprid	12 hours	0 days	Caution
Pyganic EC 1.4 ^{OMRI}	3A	Pyrethrins	12 hours	0 days	Caution
Sevin 4F, XLR Plus	1A	Carbaryl	12 hours	7 days	Caution
Scorpion 35SL	4A	Dinotefuran	12 hours	1 day	Caution
Superior Oil					
SpinTor 2SC ^{OMRI}	5	Spinosad	4 hours	7 days	Caution
Vendex 50WP ^r	12B	Fenbutatin-oxide	48 hours	28 days	Danger
Zeal Miticide-1	10B	Etoxazole	12 hours	14 days	Caution

Fungicides	MOA	Chemical Name	REI	PHI	Signal Word
Abound Flowable	11	Azoxystrobin	4 hours	14 days	Caution
Captan 50WP 80WDG	M04	Captan	48/72 hours	0 days	Warning
Elevate 50 WDG	17	Fenhexamid	12 hours	0 days	Caution
Endura	7	Boscalid	12 hours	14 days	Warning
Flint	11	Trifloxystrobin	12 hours	14 days	Caution
Forum	40	Dimethomorph	12 hours	14 days	Caution
Kaligreen ^{OMRI}	NC	Potassium bicarbonate	4 hours	1 days	Caution
Kenja 400SC	7	Isofetamid	12 hours	14 days	Caution
Lime Sulfur	M02		48 hours	0 days	Danger
Luna Experience	7+3	Fluopyram, Tebuconazole	12 hours/5 days	14 days	Caution
Mancozeb	M03	Mancozeb	24 hours	66 days	Caution
Dithane, Manzate					
Mettle 125 ME	3	Tetraconazole	12 hours/7 days	14 days	Caution
OxiDate 2.0 ^{OMRI}		Hydrogen peroxide, Peroxyacetic acid	1 hour	0 days	Danger
Phostrol	P07	Phosphorous acid	4 hours	0 days	Caution
Pristine	11+7	Pyraclostrobin, Boscalid	12 hours/5 days	14 days	Caution
Procure 480SC	3	Triflumizole	12 hours/ 1 day	7 days	Caution
ProPhyt	P07	Phosphorous acid	4 hours	0 days	Caution
Quintec	13	Quinoxifen	12 hours	21 days	Caution
Rally 40WSP	3	Myclobutanil	24 hours	14 days	Warning
Ranman 400 SC	21	Cyazofamid	12 hours	30 days	Caution
Reason 500 SC	11	Fenamidon	12 hours	30 days	Caution
Revus Top	40+3	Mandipropamid, Difenoconazole	12 hours	14 days	Caution
Ridomil Gold Copper	4+M01	Mefenoxam, Copper hydroxide	48 hours	42 days	Danger
Ridomil Gold MZ WG	4+M03	Mefenoxam, Mancozeb	48 hours	66 days	Caution
Rovral 4F	2	Iprodione	48 hours	7 days	Caution
Scala SC	9	Pyrimethanil	12 hours	7 days	Caution
Sovran	11	Kresoxim-methyl	12 hours	14 days	Caution
SuffOil-X ^{OMRI}	NC	Mineral Oil	4 hours		Caution
Sulfur ^{OMRI}	M02		24 hours	14 days	Caution
Switch 62.5 WG	9+12	Cyprodinil, Fludioxonil	12 hours	7 days	Caution
Topsin M 70 WSB	1	Thiophanate-methyl	2 days	7 days	Caution
Torino	U6	Cyflufenamid	4 hours	3 days	Caution
Vanguard WG	9	Cyprodinil	12 hours	7 days	Caution
Viathon	P07+3	Potassium phosphite, Tebuconazole	12 hours	14 days	Caution
Vivando	50	Metrafenone	12 hours	14 days	Caution
Zampro	45+40	Ametoctradin, Dimethomorph	12 hours	14 days	Caution
Ziram 76DF	M03	Ziram	48 hours	21 days	Danger

The Oklahoma Cooperative Extension Service

Education Everywhere for Everyone

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

The pesticide information presented in this publication was current with federal and state regulations at the time of printing. The user is responsible for determining that the intended use is consistent with the label of the product being used. Use pesticides safely. Read and follow label directions. The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.

Oklahoma State University, as an equal opportunity employer, complies with all applicable federal and state laws regarding non-discrimination and affirmative action. Oklahoma State University is committed to a policy of equal opportunity for all individuals and does not discriminate based on race, religion, age, sex, color, national origin, marital status, sexual orientation, gender identity/expression, disability, or veteran status with regard to employment, educational programs and activities, and/or admissions. For more information, visit <https://eeo.okstate.edu>.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President for Agricultural Programs and has been prepared and distributed at a cost of 40 cents per copy. Revised December 2022 KG.