



Current Report

Division of Agricultural Sciences and Natural Resources • Oklahoma State University

Commercial Grape Insect and Disease Control — 2002

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PEST/PROBLEM	MATERIAL	RATE/ACRE	COMMENTS
Dormant			Apply before buds swell.
Anthracnose	Lime sulfur solution	10 gal	This dormant application is aimed at reducing overwintering inoculum on canes. See end of section for further information.
Eutypa dieback	Benlate 50 WP		See end of section for further information. Benlate is registered for use as a paint or spray for pruning wounds to prevent infection by Eutypa.
Bud Swell			Apply just before buds show green.
European red mite and/or scale insects (if present)	Superior oil (70-sec)	4 gal	
Flea beetle	Sevin 80S	2.5 lb	Scout at least twice weekly as bud swell occurs.
Climbing cutworm	Sevin 50WP	4 lb	
Bud Break to Bloom			Begin after 1/2-inch new shoot growth; repeat at 7-14 day intervals or according to label instructions and environmental conditions for disease development.
Black rot Phomopsis cane and leaf spot Downy Mildew	Mancozeb 75DF	3-4 lb	Early sprays for black rot are especially critical where this disease has been a problem in previous years. Mancozeb is sold under the trade names Dithane M-45, Manzate 200, and Penncozeb. If black rot is a problem in the vineyard, Mancozeb would be the fungicide of choice. Captan is less effective than Mancozeb for black rot control.
	Captan 50WP	3-4 lb	The 4-day reentry interval for Captan on grapes has been reduced to 72 hrs. (3 days). See note at back of section. Captan is also available as 80WP and Captec 4L.
	Abound 2.08F	11-15.4 fl oz	See notes on Abound at back of section.
	Sovran 50WG	3.2-6.4 oz	See notes on Sovran at back of section.
Powdery mildew	Nova 40WP	3-5 oz	On varieties that are highly susceptible to powdery mildew, a fungicide for powdery mildew control should be included in these early sprays. Primary infections of powdery mildew can occur during this period.
	Rubigan 1EC	3 fl oz	Refer to Rubigan label for information on recommended rates.
	Procure 50WS	4-8 oz	
	Elite 45DF	4 oz	
	Sulfur		See notes at end of this section.

COMMERCIAL GRAPE INSECT AND DISEASE CONTROL (CONT'D)

<i>PEST/PROBLEM</i>	<i>MATERIAL</i>	<i>RATE/ACRE</i>	<i>COMMENTS</i>
Bud Break to Bloom (cont'd)			
Powdery mildew (cont'd)	JMS Stylet Oil	1-2% Conc.	Do not use Captan or Sulfur within 2 weeks of a stylet oil application, or stylet oil within 2 weeks of a Captan or Sulfur application. Mixing Captan or Sulfur with oil can result in severe damage to the vine.
	Abound 2.08F	11-15.4 fl oz	See notes at end of this section.
	Sovran 50WG	3.2-6.4 oz	See notes at end of this section.
	Flint 50WG	1.5-4.0 oz	Do not apply Flint to Concord grapes or crop injury may occur.
Black rot Phomopsis cane and Leaf spot Powdery Mildew Downy Mildew	Mancozeb 75DF Plus Sulfur	3 lb	See note on Sulfur at end of this section.
	JMS Stylet Oil	1-2% Conc.	Do not use Captan or Sulfur within 2 weeks of a stylet oil application, or stylet oil within 2 weeks of a Captan or Sulfur application. Mixing Captan or Sulfur with oil can result in severe damage to the vine.
	Bayleton 50DF	2-6 oz	Bayleton has reduced efficacy against powdery mildew and is not recommended for control of powdery mildew. It is still effective against black rot.
	Nova 40WP	3-5 oz	
	Rubigan 1EC	3 fl oz	
	Procure 50WS	4-8 oz	
	Elite 45 DF Plus Mancozeb 75DF	4 oz 3 lb	
	Captan 50WP	3 lb	
	Abound 2.08F	11-15.4 fl oz	See note on Abound at end of this section.
	Sovran 50WG	3.2-6.4 oz	See note on Sovran at end of this section.
	Flint 50WG	1.5-4.0 oz	See note on Flint at end of this section.
Flea beetle Climbing cutworm	Same as for bud swell spray		Use only when necessary.
Ten-Inch Shoot			When new shoots are about 10 inches long.
Flea beetle larvae	Same as for bud swell spray		Flea beetle larvae, redbanded leafroller, and rose chafer may be present anytime between 4- to 10-inch shoot growth and bloom.
Redbanded leafroller Rose chafer	Guthion 50WP ^r Sevin 50WP Sevin 80S	1.5-2 lb 4 lb 2.5 lb	Limit: 3 applications of Guthion per season.
European red mite (if present)	Vendex 50WP ^r Kelthane 50WP	1-2.5 lb 2.5 lb	
Pre-Bloom			Just before bloom.
Flea beetle larvae Rose chafer Redbanded leafroller Grape berry moth	Same as for 10-inch shoot spray (if needed)		Insects are often a problem in vineyards. The use of pheromone traps for grape berry moth and redbanded leafroller will indicate their presence and help determine the need for control.
	Danitol 2.4EC ^r	10.66 fl oz	Labeled for use against grape berry moth.

COMMERCIAL GRAPE INSECT AND DISEASE CONTROL (CONT'D)

<i>PEST/PROBLEM</i>	<i>MATERIAL</i>	<i>RATE/ACRE</i>	<i>COMMENTS</i>
Pre-Bloom (cont'd)			
Downy mildew	Ridomil Gold MZ	2.5 lb	See comments on the use of Ridomil for downy mildew control at end of this section.
Bloom			
			When caps begin to fall.
Black rot Phomopsis cane and leaf spot Powdery mildew	Same as bud break to bloom		If wet weather persists during bloom or if the time interval between the pre-bloom and shatter spray is greater than 7 to 10 days, a fungicide application during bloom may be necessary.
Downy mildew	Ridomil Gold Copper	2 lb	See comments on the use of Ridomil Gold and Ridomil Gold MZ for downy mildew control at end of this section.
	Ridomil Gold MZ	2.5 lb	
	Abound 2.08F	11-15.4 fl oz	See note on Abound at end of this section.
Botrytis bunch rot			This spray is critical in vineyards or on varieties (especially French hybrids or Vinifera) where Botrytis bunch rot has been a problem. See note on Botrytis bunch rot at end of this section.
	Benlate 50WP	1-1.5 lb	Apply Benlate at 1 to 1.5 lb per acre at first bloom (no later than 5% bloom), and repeat 14 days later if severe disease conditions persist. Do not apply Benlate within 50 days of harvest.
	Rovral 50WP	1.5-2 lb	Rovral may be applied at 1.5-2 lb per acre four times: 1) early to midbloom; 2) prior to bunch closing; 3) beginning of fruit ripening; and 4) prior to harvest if needed. Note: do not make more than 4 applications of Rovral per season. Do not apply within 7 days of harvest.
	Vanguard 75WG	10 oz	Vanguard is registered for use at 10 oz per acre when used alone, or at 5 to 10 oz per acre when used in a tank mix. Timing of application is approximately the same as for Rovral. No more than 20 oz of Vanguard may be applied per acre per crop season. Vanguard cannot be applied within 7 days of harvest.
	Elevate 50WG	1.0 lb	Elevate may be applied at 1 lb per acre and the timing of application is approximately the same as Rovral and Vanguard. No more than 3 lb of Elevate may be applied per acre per season. Elevate can be applied up to and including the day of harvest (0 day PHI).
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.
	Thiodan 50WP	2 lb	Apply Thiodan at the correct rate per acre at bloom, and repeat 10 to 14 days later. Since bees do not pollinate grapes there is no danger to bees at this time unless they are working on other blooming plants in the area being sprayed. Mow before spraying to eliminate blooms on weeds. Note: Concord, Baco Noir, Chancellor, Colobel, Cascade, and other cultivars may have severe injury if treated with Thiodan. Refer to product label.
	Thiodan 3EC	1.33 qt	Although the product label does not list phylloxera, data indicate that Danitol also is effective against the leaf form of grape phylloxera if applied during bloom.
Shatter			
			When unfertilized berries fall from clusters; about 7 to 10 days after bloom or 7 to 10 days after last spray.
Black rot*	Captan 50WP Plus	3 lb	If Nova, Rubigan, Procure, Abound, Sovran, Flint or Sulfur is not being used and powdery mildew starts to develop, incorporate one of these fungicides into the spray program.
	Ferbam 76WP or	3 lb	No more than 3 applications of Ferbam may be made per season on grapes. See label for additional information.
	Mancozeb 75DF or	4 lb	

COMMERCIAL GRAPE INSECT AND DISEASE CONTROL (CONT'D)

<i>PEST/PROBLEM</i>	<i>MATERIAL</i>	<i>RATE/ACRE</i>	<i>COMMENTS</i>
Shatter (cont'd)			
Black rot* (cont'd)	Abound 2.08F or	11-15.4 fl oz	See notes on Abound at end of this section.
	Sovran 50WG	3.2-6.4 oz	See notes on Sovran at end of this section.
Black rot* Downy mildew Powdery mildew	Bayleton 50DF	2-6 oz	A maximum of 18 oz of Bayleton may be applied per acre per season. Bayleton is not recommended for control of powdery mildew.
	Nova 40WP	3-5 oz	A maximum of 24 oz of Nova may be applied per season per acre.
	Rubigan 1EC	4-5 oz	
	Procure 50WS	4-8 oz	
	Elite 4S DF	4 oz	
	Sulfur		See note on Sulfur at end of this section.
	JMS Stylet Oil Plus	1-2% Conc.	Do not use Captan or Sulfur within 2 weeks of a stylet oil application, or stylet oil within 2 weeks of a Captan or Sulfur application. Mixing Captan or Sulfur with oil can result in severe damage to the vine. Stylet oil should not be used on table grapes, because it removes the bloom or waxy coating and affects appearance of the berry.
	Mancozeb 75DF	4 lb	
	Captan 50W	3 lb	
	Abound 2.08F	11-15.4 oz	See note on Abound at end of this section.
	Sovran 50WG	3.2-6.4 oz	See note on Sovran at end of this section.
	Flint 50WG	1.5-4.0 oz	See note on Flint at end of this section. Do not apply Flint to Concord grapes or crop injury may occur. Flint is not recommended for downy mildew control.
	Grape berry moth Leafhopper Rose chafer Grape mealybug Grape rootworm Redbanded leafroller	Guthion 50WP ^r	1.5-2.0 lb
Sevin 50WP		4 lb	
Sevin 80S		2.5 lb	
Methoxychlor 50WP		6 lb	
Imidan 70WP		1.33-2.13 lb	Examining the underside of grape leaves will indicate if leafhoppers are present. Check insecticide labels for more information on specific insects.
Diazinon 50 WP ^r		2 lb	
Diazinon AG500 ^r		1-2 pt	
Provado Solupak 75WP		0.75-1.0 oz	A maximum of 2.0 oz of Provado may be applied per acre per season. Provado is labeled for use against leafhoppers and mealybugs.
Danitol 2.4EC		5.3-10.7 fl oz	Danitol is labeled for use against leafhoppers, grape berry moth, and Japanese beetles.
Pyramite 60WP		4.4-6.6 oz (1-1.5 bags)	Pyramite is labeled for use against leafhoppers and mites.
Isomate GBM		400 ties	Isomate GBM is useful for grape berry moth only. See comments on Grape Berry Moth at end of this section. This strategy should be considered only for vineyards that are at least 5 acres in size.

COMMERCIAL GRAPE INSECT AND DISEASE CONTROL (CONT'D)

PEST/PROBLEM	MATERIAL	RATE/ACRE	COMMENTS
Shatter (cont'd)			
Mites	Vendex 50WP Kelthane 50WP Pyramite 60WP	1-2.5 lb 2.5 lb 4.4-13.2 oz (1-3 bags)	
<p>*Growers who wish to use an after-infection or eradicator spray program for black rot control should use the higher rates of Bayleton (at least 4 oz per acre) or Nova (4 to 5 oz). Research has shown that at these rates good control can be obtained if these fungicides are applied within 72 hours (3 days) after the initiation of an infection period.</p> <p>Bayleton and Nova will not control downy mildew; therefore, they should be applied in combination with Mancozeb or Captan. The addition of these fungicides will give additional protectant activity against black rot in addition to controlling downy mildew.</p> <p>Special Note: Unless growers are prepared and/or equipped to identify black rot infection periods, an eradicator type program is not recommended. Instead, a good protectant program should be maintained.</p>			
First Cover to Veraison (Berry coloring)			First cover should follow shatter by 7-10 days. Thereafter sprays should be applied every 10-14 days until veraison. If heavy rainfall occurs, the interval between sprays may need to be shortened. Refer to label for application timing and harvest restrictions.
Black rot Downy mildew	Captan 50WP Plus Ferbam 76WP	3 lb 3 lb	Sprays for black rot control may be stopped after berries turn color (reach 6-8% sugar). No more than 3 applications of Ferbam may be made per season on grapes.
	Mancozeb 75DF	4 lb	Mancozeb cannot be applied within 66 days of harvest.
	Abound 2.08F	11-15.4 fl oz	See notes on Abound at end of this section.
	Sovran 50WG	3.2-6.4 oz	See notes on Sovran at end of this section.
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Black rot Downy mildew Powdery mildew	Bayleton 50DF	2-6 oz	
	Nova 40WP	3-5 oz	
	Rubigan 1EC	4-5 fl oz	
	Procuire 50WS	4-8 oz	
	Elite 4S DF	4 oz	
	Sulfur		See note on Sulfur at end of this section.
	JMS Stylet Oil Plus Mancozeb 75DF	1-2% Conc. 4 lb	Do not use Captan or Sulfur within 2 weeks of a stylet oil application, or stylet oil within 2 weeks of a Captan or Sulfur application. Mixing Captan or Sulfur with oil can result in severe damage to the vine.
	Captan 50WG	4 lb	
	Abound 2.08F	11-15.4 fl oz	See note on Abound at end of this section.
	Sovran 50WG	3.2-6.4 oz	See note on Sovran at end of this section.
	Flint 50WG	1.5-4.0 oz	See note on Flint at end of this section. Do not apply Flint to Concord grapes or crop injury may occur. Flint is not recommended for control of downy mildew.
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Downy mildew	Ridomil Gold Copper	2 lb	Do not apply Ridomil Gold Copper or Ridomil Gold MZ within 66 days of harvest. Other restrictions apply. Read the label for more information. Fixed copper fungicides provide excellent control of downy mildew, but only moderate to slight control of black rot and powdery mildew. There are many fixed copper fungicides currently labeled for use on grapes. The use of copper may result in damage to leaves and fruit, especially under cool temperatures and slow drying conditions. Some varieties are more sensitive to copper damage than others. Do not tank mix Nova, Bayleton, or Rubigan with copper fungicides. Read the label.
	Ridomil Gold MZ	2.5 lb	
	Fixed copper (consult label for use instructions)		
	Abound 2.08F	11-15.4 lb	

COMMERCIAL GRAPE INSECT AND DISEASE CONTROL (CONT'D)

<i>PEST/PROBLEM</i>	<i>MATERIAL</i>	<i>RATE/ACRE</i>	<i>COMMENTS</i>
First Cover to Veraison (Berry coloring) (cont'd)			
Mites	Vendex 50WP ^r	1-2.5 lb	
	Kelthane 50WP ^r	2.5 lb	
Grape berry moth Rose chafer Leafhopper Redbanded leafroller Grape rootworm Grape mealybug	Guthion 50WP ^r	1.5-2 lb	See comment on insect control at shatter. Do not use Guthion more than three times in one season.
	Sevin 50WP	4 lb	Do not use Sevin with copper-lime.
	Sevin 80S	2.5 lb	
	Methoxychlor 50WP	6 lb	
	Imidan 70WP	1.33-2.13 lb	
	Diazinon 50WP	2 lb	
	Diazinon AG500 ^r Danitol 2.4EC ^r	1-2 pt 5.3-10.7 fl oz	Danitol is labeled for use against leafhoppers, grape berry moths, and Japanese beetle.
	Pyramite 60WP	4.4-6.6 oz (1-1.5 bags)	Pyramite is labeled for use against leafhoppers and mites.
	Provado Solupak 75WP	0.75-1 oz	A maximum of 2.0 oz of Provado may be applied per acre per season. Provado is labeled for use against leafhoppers and mealybugs.
Veraison to Harvest		Refer to label directions for timing of applications and harvest restrictions.	
Botrytis bunch rot	Same as bloom		See comments under Bloom Spray relative to use of Rovral, Vanguard, and Benlate on page 358, and comments on Botrytis at end of this section.
Powdery mildew	Nova 40WP	3-5 oz	Do not apply more than 1.5 lb Nova per acre per year.
	Rubigan 1EC	5-6 fl oz	Do not apply more than 6 fl oz of Rubigan EC per acre per application or more than 19 fl oz per season.
	Procure 50WS	4-8 oz	
	Elite 45DF	4 oz	
	Sulfur		See note on Sulfur at end of this section.
	JMS Stylet Oil	1-2% Conc.	Do not use Captan or Sulfur within 2 weeks of a stylet oil application, or stylet oil within 2 weeks of a Captan or Sulfur application. Mixing Captan or sulfur with oil can result in severe damage to the vine.
	Abound 2.08F	11-15.4 fl oz	See notes on Abound at end of this section.
	Sovran 50WG	3.2-6.4 oz	See notes on Sovran at end of this section.
	Flint 50WG	1.5-4.0 oz	See notes on Flint at end of this section. Do not apply Flint to Concord grapes or crop injury may occur.
Downy mildew	Captan 50WP	3-4 lb	If downy mildew is a problem and wet weather persists at this time period, a fungicide for downy mildew control may be required. Consult the label for days from last application to harvest.
	Fixed cooper		See label for use instructions.
	Abound 2.08F	11-15.4 fl oz	See note on Abound at end of this section.
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 (6-8% sugar content).

COMMERCIAL GRAPE INSECT AND DISEASE CONTROL (CONT'D)

PEST/PROBLEM	MATERIAL	RATE/ACRE	COMMENTS
Veraison to Harvest (cont'd)			
Grape berry moth Grape leafhopper Grape rootworm Japanese beetle Redbanded leafroller Rose chafer	Same as first cover to veraison		Continue to monitor for insect and mite pests, and apply insecticide as needed. Refer to product label for specific insects, rates, and harvest restrictions.
Mites	Same as post bloom to veraison		

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

Additional Comments

GRAPE ROOT BORER

It is difficult to evaluate damage from the 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 the natural control processes (predators, parasites, diseases). Treat with an insecticide only if necessary. If this insect affects the vineyard's performance, begin the following program. 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.

Immediately After Harvest

Sample - 10 vines/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.

GRAPE BERRY MOTH - Mating Disruption Strategy

A new use of pheromones is for insect control using the strategy of mating disruption; this expands the use of sex-attractant pheromones beyond their traditional role in insect monitoring.

The pheromone is imbedded in 8-inch long plastic twist-ties. The atmosphere of the vineyard is saturated with the scent of the pheromone by attaching twist-ties to vines, with 400 twist-ties per acre. The pheromone confuses the male moths so that they are unable to locate and mate with females. Females are unaffected by the pheromone and can lay unfertilized eggs, but these eggs are unable to develop. This strategy should be considered only for vineyards that are at least 5 acres in size.

For grape berry moth, the product is called Isomate-GBM, manufactured by Shinetsu Chemical Company and distributed by Pacific Biocontrol of Davis, California. It is distributed in the Midwest by Great Lakes IPM, Vestaburg, Michigan (phone 517.268.5693).

GRAPE BITTER ROT

Unlike black rot, which does not infect berries once they are past 8% sugar content, bitter rot attacks only mature berries. Both diseases result in black, shriveled (mummified) fruit, and some growers have mistaken bitter rot for black rot. A "rule of thumb" is that

if a rot resembling black rot develops on mature berries (8% sugar or above), the cause is probably not black rot. This late season rot is likely to be bitter rot. The new systemic fungicides (Nova, Bayleton, and Rubigan) are not effective against bitter rot. If bitter rot is a problem, pre-harvest applications of Captan may be beneficial. Observe all preharvest restrictions.

BOTRYTIS BUNCH ROT

Use Rovral 50 WP at the rate of 1.5 to 2 lb per acre, Vanguard 75WG at 10 oz per acre, or Elevate 50 WG at 1 lb per acre. Botrytis bunch rot is most commonly a problem on tight-clustered French hybrid and *Vitis vinifera* cultivars. Proper timing and thorough spray coverage are essential for good control. Direct the spray toward the fruit, and use a minimum of 100 gallons per acre of water. Include a spreader-sticker with Rovral, especially at the 1.5 lb rate. NOTE: Growers in Europe and Canada have experienced loss of disease control due to the development of fungicide resistance when more than 3 sprays/year of Rovral were applied over a period of 3-5 years. Vanguard and Elevate are also at risk for fungicide resistance development. It is therefore strongly recommended that Rovral, Elevate, and Vanguard use be limited to a maximum of 3 applications per year to reduce the probability of developing strains of *Botrytis* that are resistant to these materials. In addition, growers should consider alternating applications of Rovral, Elevate, and Vanguard during the growing season. 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*.

BERRY SIZING SPRAYS

Gibberellic acid (GA3), commercially available as Pro-Gibb 4%, can be applied at 1.2 liters (2.54 pts) Pro-Gibb per 100 gallons water, approximately 10 to 14 days after bloom (at shatter) to increase the size of the grape berries. It is more effective on seedless than on seeded berries.

DOWNY MILDEW - Use of Ridomil Gold MZ and Ridomil Gold Copper

Ridomil is very effective for control of downy mildew on grapes. The current labels for Ridomil Gold MZ and Ridomil Gold Copper read as follows.

Ridomil Gold MZ: Apply 2.5 lb per acre of Ridomil Gold MZ. Make up to 4 applications beginning before bloom; do not apply within 66 days of harvest. For late season downy mildew control, apply other registered fungicides. Note: Other restrictions also apply. Always read the label.

Ridomil Gold Copper: Apply 2 lb of Ridomil Gold Copper per acre. Make up to 4 applications beginning before bloom; do not make an application within 66 days of harvest. For late season downy mildew control, apply other registered fungicides. NOTE: Always obtain and read the most current label.

ANTHRACNOSE

Especially in the more southern regions of the Midwest, anthracnose can be quite severe. Benlate 50 WP is registered for anthracnose control on grapes. The label rate is 24 oz per acre. The label states "Apply at 4 to 10 inch shoot growth. Repeat at 10 to 14 day intervals. After harvest, apply to vines at 4 week intervals." The dormant application of lime sulfur solution is important for anthracnose control.

SULFUR

There are many formulations of sulfur labeled for use on grapes. 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. See the label for specific use rates. Some grape varieties, such as Concord and other Labrusca (American) types, are extremely sensitive to sulfur. Do not apply when temperature during or immediately following application will exceed 85°F. Sulfur loses efficacy for powdery mildew control at temperatures below 65°F.

ABOUND FLOWABLE (2.08F)

Abound is in the same general class of chemistry as Sovran and Flint (strobilurin) and is registered for control of black rot, downy mildew, powdery mildew, and Phomopsis cane and leaf spot. Abound is excellent for control of black rot and downy mildew, and provides good control of powdery mildew.

None of the strobilurins (Abound, Flint or Sovran) are highly effective for control of Phomopsis cane and leaf spot. Abound is recommended at the rate of 11 to 15.4 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 50% WG

Sovran 50% WG is in the same general class of chemistry as Abound and Flint (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 per acre; for powdery mildew the rate is 3.2 to 4.8 oz per acre and for downy mildew the rate is 4.0 to 6.4 oz per acre. 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 50% WG

Flint 50% WG is in the same general class of chemistry as Abound and Sovran. It is registered for control of black rot, powdery mildew and downy mildew. Phomopsis cane and leaf spot is not listed on the Flint label. The Flint label provides different use rates for control of different diseases. For powdery mildew the rate is 1.5 to 2.0 oz per acre; for black rot the rate is 2.0 oz per acre and for downy mildew the rate is 4.0 oz per acre. 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.

RESISTANCE MANAGEMENT FOR STROBILURIN FUNGICIDES

Do not apply more than 3 sequential sprays of Abound, Sovran or Flint before alternating with a fungicide that has a different mode of action. For wine and table grapes, do not make more than 4 applications of a strobilurin fungicide per acre per year. For all other types of grapes, do not make more than 3 applications of a strobilurin fungicide per acre per year. Always read the label.

EUTYPA DIEBACK

Benlate is registered for use as a paint or spray to cover pruning wounds during the dormant season to protect them from infection by Eutypa. It is used at the rate of 3.2 oz/gal. The label states "Paint or spray on immediately after pruning, before rain, dew and spores come in contact with fresh wood."

DOWNY AND POWDERY MILDEWS - Post-Harvest Control

Fungicide applications for the control of downy mildew and powdery mildew are often stopped shortly before harvest. In some years these diseases may cause defoliation well before the onset of cool weather in the fall. Post harvest early defoliation predisposes the vines to winter injury and reduces fruit set in the following season. Thus, it is important to maintain at least some protection against foliar infections by these fungi. Post harvest rates for fungicides should be the same as preharvest rates. For SI fungicides check the label for season limits on quantity of product.

OSU Extension Facts are also available on the World Wide Web at: <http://agweb.okstate.edu/pearl/>

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