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## Table Grape Year-Round IPM Program Annual Checklist

### *Supplement to UC IPM Pest Management Guidelines: Grape*

These practices are recommended for a monitoring-based IPM program that reduces environmental quality problems related to pesticide use. Track your progress through the year using this form.

Each time a pesticide application is considered, review the Pesticide Application Checklist at the bottom of this form for information on how to minimize environmental quality problems. This program covers the major pests of table grape. Details on carrying out each practice, information on additional pests, and additional copies of this form are available from the UC IPM Pest Management Guidelines: Grape at <http://www.ipm.ucdavis.edu/PMG>.

This year-round program applies only to table grapes. For **wine and raisin grapes**, see the Wine and Raisin Grape Year-Round Program.

✓ Done	<b>Delayed-dormant period activities</b> (San Joaquin Valley, February; Coachella Valley, December to January) What should you be doing at this time?		
	<p>On a warm day (above 65° F), monitor trunks, cordons, and spurs for:</p> <ul style="list-style-type: none"> <li>• Mealybugs</li> <li>• Ants associated with mealybugs and European fruit lecanium scale</li> <li>• Overwintering spider mites (orange)</li> <li>• Cutworms</li> </ul> <p>Keep records (example form available online). Manage** if needed according to the PMG.</p>		
	<p>Just before budbreak, in the San Joaquin Valley, place omnivorous leafroller pheromone traps in the vineyard.</p> <ul style="list-style-type: none"> <li>• Check traps twice weekly until a biofix date is established; thereafter, check traps weekly.</li> <li>• Record biofix for the first moth.</li> <li>• Keep records (example form available online).</li> </ul>		
	<p>Just before budbreak, place sticky traps in and around the vineyard for glassy-winged sharpshooter.</p> <ul style="list-style-type: none"> <li>• Change traps weekly.</li> </ul> <p>Keep records (example form available online).</p>		
	<p>Other pests or pest damage you may see.</p> <table style="width: 100%; border: none;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Rodents</li> <li>• Branch and twig borer</li> <li>• Click beetles</li> </ul> </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Bud beetles</li> <li>• Eutypa dieback</li> <li>• Bot canker</li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li>• Rodents</li> <li>• Branch and twig borer</li> <li>• Click beetles</li> </ul>	<ul style="list-style-type: none"> <li>• Bud beetles</li> <li>• Eutypa dieback</li> <li>• Bot canker</li> </ul>
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✓ Done	<b>Budbreak period activities</b> <b>(San Joaquin Valley, March; Coachella Valley, January to February)</b> What should you be doing at this time?
	On a warm day (above 65° F), monitor trunks, cordons, and spurs for: <ul style="list-style-type: none"> <li>• Mealybugs</li> <li>• Ants associated with mealybugs and European fruit lecanium scale</li> <li>• Overwintering spider mites (orange)</li> <li>• Cutworms</li> </ul> Keep records (example form available online). Manage** if needed according to the PMG.
	In San Joaquin Valley continue to check pheromone traps twice weekly for omnivorous leafroller, if biofix has not been reached. <ul style="list-style-type: none"> <li>• Record biofix for the first moth (example monitoring form).</li> <li>• Check traps weekly after biofix date is established.</li> </ul>
	Monitor for powdery mildew using the risk assessment index followed by visual inspections. <ul style="list-style-type: none"> <li>• Treat** if needed according to PMG.</li> </ul>
	If rainfall is predicted after budbreak, consider treating** for phomopsis cane and leaf spot in sensitive varieties (Thompson seedless, redglobe).
	Note locations of vines showing poor budbreak for future assessment of abiotic disorders or diseases.
	Check sticky traps for glassy-winged sharpshooters. <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> </ul>
	Survey weeds to plan a weed management strategy if not completed earlier in the season. If herbicides** are to be used: <ul style="list-style-type: none"> <li>• Record observations (example form available online).</li> <li>• Make your selection based on weed survey observations.</li> </ul>
	Other pests you may see: <ul style="list-style-type: none"> <li>• Grape bud beetle</li> <li>• Red-headed and green sharpshooter</li> </ul>



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✓ Done	<b>Rapid shoot growth period activities</b> (San Joaquin Valley, March to May; Coachella Valley, February to May) What should you be doing at this time?
	Look for spider mites and their natural enemies on emerging leaves weekly. <ul style="list-style-type: none"> <li>• Map areas of concern for bloom monitoring.</li> </ul>
	Monitor leafhoppers weekly, starting a month after budbreak or when first nymphs appear. When samples reach 10 leafhoppers per leaf: <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> <li>• Treat** if needed according to PMG.</li> </ul>
	Manage mealybugs ( <i>Pseudococcus</i> , vine): <ul style="list-style-type: none"> <li>• Place vine mealybug pheromone traps in the vineyard:               <ul style="list-style-type: none"> <li>○ Southern San Joaquin Valley, April 1</li> <li>○ Coachella Valley, March 1</li> </ul> </li> <li>• Check traps every 2 weeks.</li> <li>• Sanitize equipment before moving to uninfested areas in the vineyard.</li> </ul> If grape or vine mealybug females are found on the vine, treat** according to PMGs.
	Monitor caterpillars if they have been a problem in the past: <ul style="list-style-type: none"> <li>• Western grapeleaf skeletonizer</li> <li>• Grape leafroller</li> <li>• Omnivorous leafroller</li> </ul> Map areas of concern for bloom monitoring.
	Continue checking pheromone traps for omnivorous leafrollers.
	If European fruit lecanium scale has been a problem in the past, monitor female development on old wood.
	Manage ants if mealybugs and scale are a problem.
	Check sticky traps for glassy-winged sharpshooters. <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> </ul>
	Watch for shoot flagging (wilting) to determine if caused by: <ul style="list-style-type: none"> <li>• Powdery mildew</li> <li>• Botrytis shoot blight</li> <li>• Branch and twig borer</li> </ul>
	Monitor visually for powdery mildew spores and by using mildew risk index. <ul style="list-style-type: none"> <li>• Treat** if needed according to PMG.</li> </ul>
	Survey weeds to plan a weed management strategy. If herbicides** are to be used: <ul style="list-style-type: none"> <li>• Make your selection based on weed survey observations.</li> <li>• Record your observations (example form available online).</li> </ul>
	Look for these disease symptoms: <ul style="list-style-type: none"> <li>• Bot canker</li> <li>• Eutypa dieback</li> <li>• Measles</li> <li>• Pierce's disease</li> <li>• Phomopsis cane and leafspot</li> </ul> If infected plants are found, consult the PMG.
	Other pests you may see: <ul style="list-style-type: none"> <li>• Thrips</li> <li>• Red-headed and green sharpshooters</li> </ul>



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✓ Done	<b>Bloom to veraison period activities</b> (San Joaquin Valley, early May to July; Coachella Valley, April) What should you be doing at this time?
	Monitor for western flower thrips, particularly in vineyards near drying grains. <ul style="list-style-type: none"> <li>• Manage according to PMG.</li> </ul>
	Monitor leafhopper, spider mites, and mealybugs weekly. <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> <li>• Manage if needed according to PMGs.</li> </ul>
	Examine leaves and shoots for Botrytis bunch rot and powdery mildew. <ul style="list-style-type: none"> <li>• Manage if needed according to PMG.</li> </ul>
	If European fruit lecanium scale has been a problem in the past, monitor for egg hatch to time treatment**.
	Continue to check omnivorous leafroller pheromone traps weekly. <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> </ul>
	Continue monitoring pheromone traps for vine mealybug. <ul style="list-style-type: none"> <li>• If males are caught or honeydew, sooty mold, or ants are found, look for females on surrounding vines.</li> <li>• Keep records (example form available online).</li> </ul> If grape or vine mealybug females are found on the vine, manage according to PMG.
	Remove basal leaves and lateral shoots in the fruit zone beginning around berry set to minimize summer rot, Botrytis bunch rot, and leafhopper populations, and to maximize application** coverage. <ul style="list-style-type: none"> <li>• Time leaf pull before first-generation grape leafhoppers become adults.</li> <li>• Remove only the leaves on the shaded side of the canopy on non-divided trellis systems to prevent heat damage and sunburn of sensitive varieties (Thompson seedless, redglobe).</li> </ul> Treat** for Botrytis before rain according to PMG.
	Monitor caterpillars if they have been a problem in the past: <ul style="list-style-type: none"> <li>• Omnivorous leafroller</li> <li>• Grape leafroller</li> <li>• Western grapeleaf skeletonizer</li> </ul> Keep records (example form available online).
	Monitor sticky traps for glassy-winged sharpshooters: <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> </ul>
	Other pests or pest damage you may see: <ul style="list-style-type: none"> <li>• Grasshopper</li> <li>• Whitefly</li> <li>• Grape thrips</li> <li>• Black widow spiders</li> <li>• Red-headed and green sharpshooters</li> <li>• False chinch bug</li> </ul>



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✓ Done	<b>Veraison period activities</b> <b>(San Joaquin Valley, June to July; Coachella Valley, May)</b> What should you be doing at this time?
	Monitor leafhoppers, spider mites, and mealybugs weekly. <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> </ul> Manage if needed according to PMGs.
	Continue checking pheromone traps weekly for omnivorous leafroller. <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> </ul>
	Inspect vines for grape mealybug and vine mealybug. <ul style="list-style-type: none"> <li>• Educate field crew to identify and mark vine infestations for treatment**.</li> <li>• Manage if needed according to PMG.</li> </ul>
	Monitor sticky traps for glassy-winged sharpshooter. <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> </ul>
	Mark locations of vines with poor growth for future confirmation and management of abiotic disorders or pests: <ul style="list-style-type: none"> <li>• Bot canker</li> <li>• Eutypa dieback</li> <li>• Measles</li> <li>• Pierce's disease</li> <li>• Phylloxera</li> <li>• Nematodes</li> </ul>
	Monitor for Botrytis bunch rot, powdery mildew, and summer bunch rot. <ul style="list-style-type: none"> <li>• Hedge canopy to increase air movement and reduce humidity in the fruit zone.</li> <li>• Manage if needed according to PMG.</li> </ul>
	Monitor caterpillars if they have been a problem in the past: <ul style="list-style-type: none"> <li>• Omnivorous leafroller</li> <li>• Grape leafroller</li> <li>• Western grapeleaf skeletonizer</li> </ul> Keep records (example form available online).
	If necessary manage birds with netting or scare devices as fruit ripens.
	Remove weeds that have escaped treatment before they set seed.
	Consider the use of plastic vine covers for late harvest varieties, which are susceptible to Botrytis bunch rot after heavy rain.
	Other pests or pest damage you may see: <ul style="list-style-type: none"> <li>• Whitefly</li> <li>• European fruit lecanium</li> <li>• Grasshoppers</li> <li>• Red-headed and green sharpshooters</li> <li>• Vinegar flies</li> </ul>



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<b>✓ Done</b>	<b>Harvest period activities</b> (San Joaquin Valley, late June to early November; Coachella Valley, mid-May to early July) What should you be doing at this time?
	Check fruit at harvest to assess the effectiveness of the current year's IPM program and to determine the needs of next year's program. <ul style="list-style-type: none"> <li>• Note blocks in the vineyard that had problems.</li> </ul>
	Check sticky traps for glassy-winged sharpshooter. <ul style="list-style-type: none"> <li>• Keep records (example form available online).</li> </ul>
	If necessary, continue managing birds with netting or scare devices.

<b>✓ Done</b>	<b>Postharvest period activities</b> What should you be doing at this time?
	Continue monitoring for vine mealybug on fruit and foliage. <ul style="list-style-type: none"> <li>• Treat** if needed according to PMG.</li> </ul> If vine mealybug is present, steam-sanitize equipment before moving to uninfested areas.
	In the San Joaquin Valley look for European fruit lecanium scales on leaves. <ul style="list-style-type: none"> <li>• Treat** if needed just before leaf drop, according to PMG.</li> </ul>
	Continue to mark and remove vines or cordons infested with diseases such as: <ul style="list-style-type: none"> <li>• Eutypa dieback</li> <li>• Pierce's disease</li> <li>• Bot canker</li> </ul>
	Continue to monitor for western grapeleaf skeletonizer on early harvested varieties.
	In the Coachella Valley, sample for nematodes in October if not already done in spring.
	Check sticky traps for glassy-winged sharpshooters.
	Other pests you may see: <ul style="list-style-type: none"> <li>• Grape thrips</li> <li>• Red-headed and green sharpshooters</li> </ul>

<b>✓ Done</b>	<b>Dormant period activities</b> What should you be doing at this time?
	In the San Joaquin Valley, sample for nematodes from November to February.
	Carry out dormant-season sanitation activities: <ul style="list-style-type: none"> <li>• Prune late in dormancy after rains to reduce wound infections.</li> <li>• Destroy prunings of older infested wood to reduce pest sources.</li> <li>• Remove dried grape clusters on vines and disc weeds and clusters where orange tortrix or omnivorous leafroller is a problem.</li> <li>• In vineyards with a history of branch and twig borers, examine old pruning scars and dead parts of vines for brown frass and wood dust.</li> <li>• If you have vine mealybug, steam sanitize equipment before moving to uninfested area of the vineyard.</li> </ul>
	Survey weeds to plan a weed management strategy. <ul style="list-style-type: none"> <li>• Record your observations (example form available online).</li> <li>• Use records to make herbicide selections in vineyards where sprays** are planned.</li> </ul>

✓ Done	<b>**Pesticide application checklist</b>
	<p>When planning for possible pesticide applications in an IPM program, review and complete this checklist to consider practices that minimize environmental and efficacy problems.</p> <ul style="list-style-type: none"> <li>✓ Choose a pesticide from the UC IPM Pest Management Guidelines for the target pest considering:               <ul style="list-style-type: none"> <li>▪ Impact on natural enemies.</li> <li>▪ Potential for water quality problems using the UC IPM WaterTox database. (For more information, see <a href="http://www.ipm.ucdavis.edu/TOX/simplewatertox.html">http://www.ipm.ucdavis.edu/TOX/simplewatertox.html</a>.)</li> <li>▪ Impact on aquatic invertebrates. (For more information, see <i>Pesticide Choice</i>, UC ANR Publication 8161, <a href="http://anrcatalog.ucdavis.edu/pdf/8161.pdf">http://anrcatalog.ucdavis.edu/pdf/8161.pdf</a>.)</li> <li>▪ Chemical mode of action if pesticide resistance is an issue.</li> </ul> </li> <li>✓ Select an alternative chemical or nonchemical treatment when risk is high.               <ul style="list-style-type: none"> <li>▪ Choose sprayers and application procedures that keep pesticides on target.</li> <li>▪ Identify and take special care to protect sensitive areas (for example, waterways or riparian areas) surrounding your application site.</li> <li>▪ Review and follow label for pesticide handling, storage, and disposal guidelines.</li> <li>▪ Check and follow restricted entry intervals (REI) and preharvest intervals (PHI).</li> <li>▪ After an application is made, record application date, product used, rate, and location of application. Follow up to confirm that treatment was effective.</li> </ul> </li> <li>✓ Consider water management practices that reduce pesticide movement off-site. (For more information, see UC ANR Publication 8214, <i>Reducing Runoff from Irrigated Lands: Causes and Management of Runoff from Surface Irrigation in Orchards</i>, <a href="http://anrcatalog.ucdavis.edu/pdf/8214.pdf">http://anrcatalog.ucdavis.edu/pdf/8214.pdf</a>.)               <ul style="list-style-type: none"> <li>▪ Install an irrigation recirculation or storage and reuse system.</li> <li>▪ Use drip rather than sprinkler or flood irrigation.</li> <li>▪ Limit irrigation to amount required using soil moisture monitoring and evapotranspiration (ET).</li> <li>▪ Consider vegetative filter strips or ditches. (For more information, see <i>Vegetative Filter Strips</i>, UC ANR Publication 8195, <a href="http://anrcatalog.ucdavis.edu/pdf/8195.pdf">http://anrcatalog.ucdavis.edu/pdf/8195.pdf</a>.)</li> <li>▪ Redesign inlets into tailwater ditches to reduce erosion.</li> </ul> </li> <li>✓ Consider management practices that reduce air quality problems.               <ul style="list-style-type: none"> <li>▪ When possible, choose pesticides that are not in emulsifiable concentrate (EC) form which release volatile organic compounds (VOCs). VOCs react with sunlight to form ozone, a major air pollutant.</li> </ul> </li> </ul>

