Wine and Raisin Grape Year-Round IPM Program

(Reviewed 7/15)

ANNUAL CHECKLIST

Use these guidelines for a monitoring-based IPM program to effectively manage pests, while reducing the risks of pesticides on the environment and human health.

When a pesticide application is considered, review the Pesticide Application Checklist for information on how to minimize the risks of pesticide use to water and air quality. Water quality can be impaired when pesticides drift into waterways or when they move off-site. Air quality can be impaired when pesticide applications release volatile organic compounds (VOCs) into the atmosphere.

This year-round IPM program has a separate version for the major pests of table grapes production and wine and raisin grapes production in California. Details on carrying out each practice and information on additional pests can be found in the *Pest Management Guidelines*: *Grape*. Color photo identification sheets and examples of monitoring forms can be found at the forms and photo identification pages.

For information about production practices beyond the scope of pest management, refer to the following manuals:

- Organic Winegrowing Manual, UC ANR Publication 3511
- Raisin Production Manual, UC ANR Publication 3393
- Grape Pest Management–Third Edition, UC ANR Publication 3343

This year-round program section covers the major pests of wine and raisin grapes grown in California. For table grapes, see the Table Grape Year-Round Program.

✓ Done	Delayed-Dormancy • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	On a warm day, monitor vines and spurs for: • Mealybugs • Ants associated with mealybugs and European fruit lecanium scale • Orange overwintering spider mites • Cutworm Keep records (example monitoring form is available online). Treat if needed according to the *Pest Management Guidelines*.
	In coastal areas, check orange tortrix pheromone traps that were deployed during the dormant period. Keep records (example monitoring form available online).
	Just before budbreak, deploy omnivorous leafroller pheromone traps. Check traps twice weekly until a biofix date is established; thereafter, check traps weekly. Keep records (example monitoring form available online).
	Monitor for sharpshooters: • Glassy-winged sharpshooter In coastal regions near riparian and landscape areas check traps for: • Blue-green sharpshooter Change traps weekly. Keep records (example monitoring form available online).
	Vineyard floor management before bud break: • Control weeds with mowing, cultivation, or herbicides • Mow tall cover crop
	Other pests or pest damage you may see. • Rodents • Branch and twig borer • Click beetles • Bud beetles • Dead spurs from trunk diseases

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✓ Done	Budbreak • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	On a warm day, monitor vines and spurs for: • *Pseudoccus* and vine mealybugs • Ants associated with mealybugs and European fruit lecanium scale • Orange overwintering spider mites • Cutworm • Thrips Keep records (example monitoring forms available online). Treat if needed according to the *Pest Management Guidelines*.
	Check pheromone traps for: • Omnivorous leafroller • Orange tortrix in coastal areas Keep records (example monitoring forms available online).
	Monitor leaf wetness. Track powdery mildew ascospore release and mildew risk index.Treat if needed according to the *Pest Management Guidelines*.
	Consider treating for phomopsis cane and leaf spot if rain continues after budbreak.
	Remove vines that have spring symptoms of Pierce's disease.
	Monitor for sharpshooters: Check sticky traps for sharpshooters: • Glassy-winged sharpshooter In coastal regions near riparian and landscape areas check traps for: • Blue-green sharpshooter Change traps weekly. Keep records (example monitoring forms available online).

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✓ Done	Rapid Shoot Growth • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	Look for thrips if cold weather persists.
	Look for spider mites and their natural enemies weekly on first-emerging leaves. Map areas of concern for bloom monitoring.
	Monitor leafhoppers weekly starting a month after budbreak or whenever first nymphs appear. Keep records (example monitoring forms available online).
	Continue checking pheromone traps for: • Omnivorous leafroller • Orange tortrix in coastal areas Keep records (example monitoring forms available online).
	In southern San Joaquin Valley, deploy vine mealybug pheromone traps around April 1 and check every two weeks. • If males are caught or honeydew, sooty mold, or ants are found, look for nymph/female infestations on surrounding vines. • Keep records (example monitoring forms available online). • Treat if needed according to the Pest Management Guidelines.
	Monitor for caterpillars if they have been a problem in the past: • Western grapeleaf skeletonizer • Grape leaffolder • Orange tortrix in coastal vineyards • Omnivorous leafroller Map areas of concern for bloom monitoring.
	If European fruit lecanium scale has been a problem in the past, monitor female development on old wood.
	Manage gray and Argentine ants if mealybugs and scale are a problem.
	Monitor for sharpshooters: • Glassy-winged sharpshooter In coastal regions near riparian and landscape areas check traps for: • Blue-green sharpshooter Change traps weekly. Keep records (example monitoring forms available online).
	Monitor for flagging. If you see a flag, distinguish between Botrytis shoot blight and branch and twig borer.
	Monitor leaf wetness. Track powdery mildew ascospore release and mildew risk index. Treat if needed according to the *Pest Management Guidelines*.
	Survey weeds to plan a weed management strategy. • Control weeds that escaped a dormant season treatment, using postemergence herbicides or cultivation. Record which weeds escaped for future herbicide treatment decisions.

✓ Done	Rapid Shoot Growth • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	Other pests or pest damage you may see: • Eutypa dieback • Phomopsis cane and leaf spot

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✓ Done	Bloom to Véraison • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	Monitor leafhopper and spider mites weekly. Keep records (example monitoring forms available online). Treat if needed according to the *Pest Management Guidelines*.
	Monitor for Botrytis and powdery mildew by inspecting leaves and shoots.
	If European fruit lecanium scale has been a problem in the past, monitor for egg hatch to time treatment.
	Check pheromone traps for: • Omnivorous leafroller • Orange tortrix (in coastal areas) Keep records (example monitoring forms available online).
	In areas other than southern San Joaquin Valley, put up vine mealybug pheromone traps. In all areas, check traps every two weeks. • If males are caught or honeydew, sooty mold, or ants are found, look for sessile nymph/female infestations on surrounding vines. • Keep records (example monitoring forms available online). • Treat if needed according to the *Pest Management Guidelines*.
	Monitor *Pseudococcus* mealybugs by looking for honeydew, sooty mold, and ant activity. • Keep records (example monitoring forms available online). • If you see crawlers, treat if needed according to the *Pest Management Guidelines*.
	To reduce possible summer rot, Botrytis, and leafhoppers, remove basal leaves or basal lateral shoots beginning around berry set. • Time leaf pull before first-generation grape leafhoppers become adults. • Treat for Botrytis prior to rain, if leaves are not removed.
	Monitor caterpillars if they have been a problem in the past: • Omnivorous leafroller • Orange tortrix • Grape leaffolder • Western grapeleaf skeletonizer Keep records (example monitoring forms available online).
	Monitor for sharpshooters: • Glassy-winged sharpshooter In coastal regions near riparian and landscape areas check for: • Blue-green sharpshooter Change sticky traps weekly. Keep records (eample monitoring forms available online).
	Extra care must be taken when applying systemic herbicides, such as glyphosate near or after veraison.

✓ Done	Bloom to Véraison • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	Other pests or pest damage you may see: • Grasshopper • Whitefly

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✓ Done	Veraison • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	Monitor leafhoppers and spider mites weekly. Keep records (example monitoring forms available online). Treat if needed according to the *Pest Management Guidelines*.
	Check pheromone traps for: • Omnivorous leafroller • Orange tortrix in coastal areas Keep records (example monitoring forms available online).
	Check vine mealybug pheromone traps. • If males are found, or if honeydew, sooty mold, or ant activity is found, look for sessile nymph/female infestations on surrounding vines. • Educate field crew to flag cluster infestations for treatment. • Treat if needed according to the *Pest Management Guidelines*.
	Monitor grape and obscure mealybugs. Keep records (example monitoring forms available online). If you see crawlers, treat if needed according to the *Pest Management Guidelines*.
	Monitor for glassy-winged sharpshooter. Check traps weekly. Keep records (example monitoring forms available online).
	Look for vine symptoms of Pierce's disease. Or for virus like symptoms of early fall color and/or poor fruit maturity.
	If rain occurs shortly after veraison, monitor for *Botrytis*.
	Monitor caterpillars if they have been a problem in the past: • Omnivorous leafroller • Orange tortrix • Grape leaffolder • Western grapeleaf skeletonizer Keep records (example monitoring forms available online).
	Inspect roots of weakened vines for galls or phylloxera.
	If necessary manage birds with netting or scare devices as fruit ripens.
	Other pests or pest damage you may see. • Whitefly • European fruit lecanium scale • Grasshoppers/katydids • Esca

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✓ Done	Harvest • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	Be aware that high populations of adult leafhoppers may interfere with hand harvesting.
	Monitor for grape, obscure, and vine mealybugs. • Look for cluster infestations and mark on a map. • Educate harvest crew to flag cluster infestations of vine mealybug for treatment. • Treat vine mealybug if needed according to the *Pest Management Guidelines*.
	If you have vine mealybug, steam sanitize equipment before moving to an uninfested area of the vineyard.
	For Pierce's disease, flag vines with symptoms for removal. Also for virus symptoms. Mark vines for spring monitoring/removal depending on incidence.
	If necessary, continue managing birds with netting or scare devices.
	Treat for Botrytis prior to any anticipated rain.
	Sample soil and roots for nematodes; inspect roots for galls and phylloxera.
	Monitor glassy-winged sharpshooter. Check traps weekly and Keep records (example monitoring forms available online).

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✓ Done	Postharvest • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	If necessary, treat for vine mealybug immediately after harvest according to the *Pest Management Guidelines*.
	To reduce risk of transferring vine mealybug, do not place winery pomace in the vineyard; compost pomace or cover piles securely with clear plastic.
	Look for symptoms of Pierce's disease on vines and flag for removal. Also, look for virus-infected vines.
	Look for European fruit lecanium scale on leaves; treat according to the *Pest Management Guidelines*.
	If you desire a cover crop, seed after harvest. Cover should be planted when regular irrigation is used or rain is expected. If early rain is followed by a dry period, germinated seeds may die without further irrigation.
	Record weeds present in the vineyard. Determine if herbicide applications are warranted. Contact herbicides may be more desirable at this time. Extra care must be taken when using systemic herbicides (glyphosate). Drift may result in damage to new foliage developing in spring.
	Carry out sanitation activities and vine surgery for trunk diseases well before the first rain event: • Botryosphaeria dieback • Eutypa dieback • Esca

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✓ Done	Dormancy • Mitigate pesticide effects on air and water quality. **What should you be doing at this time?**
	Carry out preventative practices for trunk diseases: • Use delayed pruning or double pruning in February or later. • Use applications of pruning-wound protectants after pruning and before rain in November through January.
	In coastal areas, set out orange tortrix pheromone traps by December. • Check traps twice weekly until a biofix date is established; thereafter, check traps weekly. • Keep records (example monitoring forms available online).
	If present, treat for Phomopsis cane and leaf spot before rainfall.
	Sample for nematodes in January or February.
	Carry out dormant-season sanitation activities: • Destroy prunings of older infested wood to reduce pest sources. • Remove dried grape clusters on vines and disc weeds and clusters where orange tortrix or omnivorous leafroller is a problem. • 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. • If you have vine mealybug, steam sanitize equipment before moving to an uninfested area of the vineyard.
	Survey weeds to plan a weed management strategy. If herbicides are used: • Use the late-winter survey form to record your observations and make pre- and postemergence herbicide selection decisions. • Remove leaves and debris under the vine before applying herbicides. • Do not make preemergence herbicide applications if heavy rains are expected soon after application. However, applications should be made when a rain event of 0.25-0.50 inches is expected within 2-3 weeks. • If possible, make preemergence herbicide applications after dormant activities, such as pruning, are completed to reduce soil movement.

✓ Done	Pesticide application checklist When planning for possible pesticide applications in an IPM program, consult the *Pest Management Guidelines*, and review and complete this checklist to consider practices that minimize environmental and efficacy problems
	✓ **Choose a pesticide from the Pest Management Guidelines for the target pest, considering:**
	• Impact on natural enemies and honey bees. For more information see Protecting Natural Enemies and Pollinators at ipm.ucanr.edu/mitigation/protect_beneficials.html.
	• Potential for water quality problems using the UC IPM WaterTox database See ipm.ucanr.edu/TOX/simplewatertox.html.
	• Impact on aquatic invertebrates. For more information, see Pesticide Choice, UC ANR Publication 8161, https://anrcatalog.ucanr.edu/pdf/8161.pdf.

	• Chemical mode of action, if pesticide resistance is an issue. For more information, see
	  ◦ *Herbicide Resistance: Definition and Management Strategies*, UC ANR Publication 8012 anrcatalog.ucanr.edu/pdf/8012.pdf.
	  ◦ Fungicide Resistance in Crop Pathogens: How Can It Be Managed?, www.frac.info/docs/default-source/publications/monographs/monograph-1.pdf.

	• Endangered species that may be near your site. Find out using the Department of Pesticide Regulation's PRESCRIBE program, cdpr.ca.gov/docs/endspec/prescint.htm.
	✓ **Before an application**
	• Ensure that spray equipment is properly calibrated to deliver the desired pesticide amount for optimal coverage. See ipm.ucanr.edu/training/incorporating-calibration.html.
	• Use appropriate spray nozzles and pressure to minimize off-site movement of pesticides.

	• Avoid spraying during these conditions to avoid off-site movement of pesticides.
	  ◦ Wind speed under 3 mph or over 10 mph
	  ◦ Temperature inversions
	  ◦ Just prior to rain or irrigation (unless it is an appropriate amount, such as when incorporating a soil-applied pesticide)
	  ◦ At tractor speeds over 2 mph

	• Identify and take special care to protect sensitive areas (for example, waterways or riparian areas) surrounding your application site.
	• Review and follow labeling for pesticide handling, personal protection equipment (PPE) requirements, storage, and disposal guidelines.
	• Check and follow restricted entry intervals (REI) and preharvest intervals (PHI).
	✓ **After an application**
	• Record application date, product used, rate, and location of application.
	• Follow up to confirm that treatment was effective.

✓	**Consider water management practices that reduce pesticide movement off-site.**

	• Consult relevant publications:
	  ○ Reducing Runoff from Irrigated Lands: Orchard Floor Management Practices to Reduce Erosion and Protect Water Quality, UC ANR Publication 8202, anrcatalog.ucanr.edu/pdf/8202.pdf.
	  ○ Reducing Runoff from Irrigated Lands: Causes and Management of Runoff from Surface Irrigation in Orchards, UC ANR Publication 8214, anrcatalog.ucanr.edu/pdf/8214.pdf.
	  ○ Protecting Surface Water from Sediment-Associated Pesticides in Furrow-Irrigated Crops, UC ANR Publication 8403, anrcatalog.ucanr.edu/pdf/8403.pdf.

	• Consult the Department of Pesticide Regulation Groundwater Protection Program (GWPA) website for pesticide information and mitigation measures, cdpr.ca.gov/docs/emon/grndwtr/index.htm.
	• Install an irrigation recirculation or storage and reuse system. Redesign inlets into tailwater ditches to reduce erosion.
	• Use drip rather than sprinkler or flood irrigation.
	• Limit irrigation to amount required using soil moisture monitoring and evapotranspiration (ET). For more information, see *Reducing Runoff from Irrigated Lands: Understanding Your Orchard's Water Requirements*, UC ANR Publication 8212, anrcatalog.ucanr.edu/pdf/8212.pdf
	• Consider using cover crops.
	• Consider vegetative filter strips or ditches.
	• Apply polyacrylamides in furrow and sprinkler irrigation systems to prevent off-site movement of sediments.
✓	**Consider practices that reduce air quality problems.**
	• When possible, reduce volatile organic compound (VOC) emissionsy decreasing the amount of pesticide applied, choosing low-emission management methods, and avoiding fumigants and emulsifiable concentrate (EC) formulations.
	For more about mitigating the effects of pesticides, see the Mitigation page.