Almond Year-Round IPM Program
ANNUAL CHECKLIST *(reviewed 8/17)*

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 at the bottom of this page 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 covers the major pests of almond in California. Details on carrying out each practice, example monitoring forms, and information on additional pests can be found in the Pest Management Guidelines. Track your progress through the year with this annual checklist form. Color photo identification pages and examples of monitoring forms can be found online at: http://ipm.ucanr.edu/FORMS/.

✓ Done	Dormancy to delayed-dormancy Mitigate pesticide effects on air and water quality.
	Count mummy nuts in orchard. • If more than two nuts per tree remain, knock off and destroy mummy nuts by the initiation of bloom to reduce navel orangeworm and brown rot
	Manage orchard floor vegetation: • After harvest, assess weeds present and identify those that were not controlled by a fall preemergence herbicide application. • Keep records. In January, consider applying postemergence herbicides in tree row strips alone or in combination with preemergence herbicides.
	Take spur samples for scale and mite eggs mid-November to mid-January. • Record results. • Manage if needed according to the Pest Management Guidelines.
	Examine trees for peach twig borer hibernacula in the crotches of one-year-old wood. • Consult the Pest Management Guidelines to determine if treatments should be made during dormancy, bloom (*Bacillus thuringiensis* only), or in May.
	In orchards with varieties that retain leaves, monitor rust for possible spring fungicide application and take a first-year twig sample (green shoots) to monitor for scab infections. • If scab infections are high, consider dormant or delayed-dormant treatments.
	Other pests you may see: • Armillaria root rot (oak root fungus): mushrooms emerge during wet periods. • Pocket gophers (mound-building activity).

✓ Done	Bloom to postbloom Mitigate pesticide effects on air and water quality.

	Manage navel orangeworm:
	• Ensure that mummies on the ground are destroyed before navel orangeworm emergence.
	• Put out pheromone traps, egg traps, or both:
	  ○ Central and southern San Joaquin Valley by February 15 (pheromone) or March 15 (egg).
	  ○ Northern San Joaquin and Sacramento valleys no later than the first week of March (pheromone) or March 15 (egg).

	Monitor peach twig borer: • Put up pheromone traps by March 15 and check according to the Pest Management Guidelines.

✓ Done	**Bloom to postbloom** **Mitigate pesticide effects on air and water quality.**
	• Record results.
	When rainy conditions promote disease, time pesticide applications according to the Pest Management Guidelines for: • Anthracnose • Leaf blight • Bacterial spot • Rust (if overwintered lesions on retained leaves) • Brown rot blossom blight • Scab • Green fruit rot (jacket rot) • Shot hole
	Monitor for shot hole fruiting structures in leaf lesions as long as weather is wet. Apply fungicides if needed according to the Pest Management Guidelines.
	Monitor San Jose scale: • Put up pheromone traps by March 1 and check according to the Pest Management Guidelines. • Record results.
	Start to monitor for spider mites when mites are first seen in the lower center tree canopy. • Manage if needed according to the Pest Management Guidelines.
	Monitor for vertebrates and manage as necessary. • Gophers • Ground squirrels • Voles
	Other pests you may see: Insects: Diseases: • Brown mite • Armillaria root rot (oak root fungus) • European red mite • Bacterial canker • Forest tent caterpillar • Phytophthora root and crown rot • Fruittree leafroller (possible nut drop) • Wood-decay fungi (fruiting bodies) • Leaffooted plant bug (possible nut drop) • Obliquebanded leafroller
	Manage orchard floor vegetation: • Mow ground cover before bloom for frost protection and to remove competing bloom.

✓ Done	**Fruit development** (late April to start of shaking) **Mitigate pesticide effects on air and water quality.**
	Monitor shoot strikes for peach twig borer and Oriental fruit moth; examine strikes to properly identify species. • Manage if needed according to the Pest Management Guidelines.
	Monitor San Jose scale: • Pheromone traps are useful for detecting male scales and parasites.
	Monitor navel orangeworm egg, and pheromone, traps: • Keep records. • Manage if needed according to the Pest Management Guidelines.
	Monitor ant mounds (once during April or May) • Keep records. • Manage if needed according to the Pest Management Guidelines.
	Monitor spider mites weekly: • Keep records.

✔ Done	**Fruit development** (late April to start of shaking) **Mitigate pesticide effects on air and water quality.**
	• Manage if needed according to the Pest Management Guidelines.
	Take leaf samples in April or July to make sure that nitrogen levels do not favor hull rot.
	Monitor for and manage if needed according to the Pest Management Guidelines: • Alternaria leaf spot • Bacterial spot • Hull rot caused by *Monilinia* or *Rhizopus* spp. • Rust • Scab • Shot hole
	Assess weeds in late spring: • Identify uncontrolled weeds to plan future management strategies. • Keep records of monitoring. • Continue to maintain ground cover to facilitate cultural practices and pest management.
	Other pests you may see: Insects: • Brown mite • European red mite • Leaffooted bugs • Obliquebanded leafroller • Peach silver mite • Peachtree borer • Stink bugs • Tenlined June beetle (where soils are very sandy) Diseases: • Almond leaf scorch • Armillaria root rot (dying trees) • Band canker (2nd to 6th leaf trees) • Ceratocystis canker • Silver leaf • Wood-decay fungi (fruiting bodies) • Noninfectious bud failure
	Identify beginning of hullsplit; regulate irrigation during hullsplit to manage hull rot.

✔ Done	**Harvest**
	Harvest early to avoid third-generation navel orangeworm eggs and to minimize hull rot.
	Assess trunk damage to evaluate shaker or harvest operation for bark injury.
	Pick up nuts promptly to avoid ant damage.
	Take harvest sample to determine pest damage. • Store sample in freezer until nuts are cracked open for observation.

✔ Done	**Postharvest** **Mitigate pesticide effects on air and water quality.**
	Look for nuts or leaves stuck on trees well after harvest, indicating hull rot or San Jose scale.
	Monitor for rust lesions. Manage according to the Pest Management Guidelines.
	After fall rain begins, monitor for shot hole leaf lesions with fruiting structures. • Manage according to the Pest Management Guidelines.
	Survey weeds: • Record results. • If use of preemergence herbicide in rows is planned, time it properly for the weed spectrum.
	Consider planting a cover crop if resident vegetation is sparse and orchard floor cover is desired.

✓ **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 pollinators. For more information see Protecting Natural Enemies and Pollinators at http://ipm.ucanr.edu/mitigation/protect_beneficials.html.
	• Potential for water quality problems using the UC IPM WaterTox database. See http://ipm.ucanr.edu/TOX/simplewatertox.html.
	• Impact on aquatic invertebrates. For more information, see *Pesticide Choice*, UC ANR Publication 8161 (PDF), http://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 (PDF), http://anrcatalog.ucanr.edu/pdf/8012.pdf.
	• Endangered species that may be near your site. Find out using the Department of Pesticide Regulation's PRESCRIBE program. (http://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 http://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 (PDF), http://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 (PDF), http://anrcatalog.ucanr.edu/pdf/8214.pdf. • *Protecting Surface Water from Sediment-Associated Pesticides in Furrow-Irrigated Crops*, UC ANR Publication 8403 (PDF), http://anrcatalog.ucanr.edu/pdf/8403.pdf.
	Consult the Department of Pesticide Regulation Groundwater Protection Program (GWPA) website for pesticide information and mitigation measures. (http://cdpr.ca.gov)

✓ Done	Pesticide application checklist
	Install an irrigation recirculation or storage and reuse system. Redesign inlets into tailwater ditches to reduce erosion. For more information, see these publications: • Reducing Runoff from Irrigated Lands: Tailwater Return Systems, UC ANR Publication 8225 (PDF), http://anrcatalog.ucanr.edu/pdf/8225.pdf. • Reducing Runoff from Irrigated Lands: Storing Runoff from Winter Rains, UC ANR Publication 8211 (PDF), http://anrcatalog.ucanr.edu/pdf/8211.pdf.
	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 (PDF), http://anrcatalog.ucanr.edu/pdf/8212.pdf</print. • *Using the Pressure Chamber for Irrigation Management in Walnut, Almond, and Prune,* UC ANR Publication 8503.
	Consider using cover crops.
	Consider vegetative filter strips or ditches. (For more information, see *Vegetative Filter Strips,* UC ANR Publication 8195 (PDF), http://anrcatalog.ucanr.edu/pdf/8195.pdf.)
	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) emissions by decreasing the amount of pesticide applied, choosing low-emission management methods, and avoiding fumigants and emulsifiable concentrate (EC) formulations.
	Use the Department of Pesticide Regulation calculators to determine VOC emission rates from fumigant and nonfumigant pesticides. (http://cdpr.ca.gov)
	More information about topics mentioned on this checklist is available at the UC IPM website: http://ipm.ucanr.edu/PMG/selectnewpest.almonds.html.
	For more about mitigating the effects of pesticides, see the Mitigation pages: ipm.ucanr.edu/mitigation/.