Tomato Year-Round IPM Program

ANNUAL CHECKLIST *(Reviewed 12/12)*

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

Water quality becomes impaired when pesticides move off-site and into water. Each time a pesticide application is considered, review the Pesticide Application Checklist at the bottom of this form to learn how to minimize water quality problems.

This program covers the major pests of tomatoes for processing. 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: Tomatoes at http://www.ipm.ucanr.edu/PMG.

✓ Done	Preplanting **Special issues of concern related to water quality:** Fertilizer application, herbicide application, drift, and runoff due to rain or irrigation.
	Consider a cover crop (rather than fallowing or using vegetative filter strips) to: • Minimize rainfall runoff • Improve infiltration • Reduce erosion
	Consider a subsurface drip irrigation system or other modifications of your irrigation system to reduce run off and risk of diseases and weeds. Perform maintenance if a drip irrigation system is already installed.
	Select your field, considering cropping and pest history, and surrounding crops;check previous crop for signs of disease or soil problems that may affect tomatoes.
	If nematode galled roots were found in the previous season, consider resistant varieties, nematicides, or an alternate crop.
	Review records of weed species and numbers in the previous crop. Evaluate fallow or preplant herbicide needs.
	Take a preplant soil sample for nutrient and salinity analysis, and apply preplant fertilizer.
	Check field and surrounding land for vole and gopher activity in late fall or winter.
	Consider crop rotation for reducing pathogen, nematode and weed problems.
	Consider a preplant irrigation in the Southern San Joaquin Valley.
	Select a tomato variety, considering: • Dodder presence in previous crop (especially if previous crop was tomato or other dodder host such as alfalfa) • Prevalent pathogen problems • Nematode problems
	Use healthy, pathogen-free transplants.
	Consider tillage options before planting.
	If weather has been cool and wet and bacterial speck has been common in the field, consider delaying planting.

✓ Done	Planting to prebloom **Special issues of concern related to water quality:** Fertilizer application, herbicide sprays, fungicide application, insecticide application, drift, and runoff due to irrigation or rain.
	With transplants, take caution not to move pests from the greenhouse to the field. Before planting, visually inspect plants for diseases and insects. • Destroy plants with late blight, gray mold, sweetpotato whitefly or pinworm.
	Apply starter fertilizer at planting.
	Consider an irrigation if your location has not had adequate spring rain.
	Look for insects, seedling diseases, and blank spots **Direct-seeded:** from seedling emergence until the 2 to 3 true leaf stage **Transplants:** for several weeks after transplanting • Aphids • Cutworms • Damping-off • Darkling beetles • Flea beetles • Garden symphylans • Wireworms
	Survey and manage weeds: • Cultivate weeds along plant line. • Consider hand weeding. • Consider applying herbicides after planting based on survey information. • Keep records on a weed survey form (PDF).
	In furrow irrigated systems, consider sidedressing the crop with nitrogen at prebloom. Use a pre-sidedress soil nitrate test to help guide fertilizer applications.
	Consider applying bactericides for: • Bacterial speck—if historicallyit has been common in the field or is present now and the weather has been cool and wet, with forecasts for similar conditions. • Bacterial spot—if present and the weather has been mild and wet.
	Look for bacterial canker and manage according to the Tomato Pest Management Guidelines, especially under cool and wet conditions or in sprinkler-irrigated fields.
	Sporadic or minor pests you may see: • Alfalfa mosaic • Curly top • Rodents, including voles • Tomato spotted wilt

✓ Done	Bloom to early fruit set (up to 1-inch-diameter fruit) **Special issues of concern related to water quality:** Fertilizer application fungicide application, drift, runoff due to irrigation.
	Start monitoring for consperse stink bugs by placing stink bug pheromone traps in the field at flowering, especially in fields with a history of damage.
	Take petiole and leaf tissue samples for nutrient analysis and apply nutrients as necessary.
	Irrigate as required for plant growth.

✓ Done	Bloom to early fruit set (up to 1-inch-diameter fruit) **Special issues of concern related to water quality:** Fertilizer application fungicide application, drift, runoff due to irrigation.
	Look for diseases such as: • Corky root • Fusarium crown and root rot • Curly top • Fusarium wilt • Tomato spotted wilt • Verticillium wilt Clean equipment to reduce transfer of diseases to non-infected fields. Keep records for next year's management practices.
	Monitor weekly for signs and symptoms of powdery mildew.
	Sporadic or minor pests you may see: • Aphids (green peach and other early season aphids, potato) • Armyworms • Hornworms • Loopers • Lygus bugs • Thrips • Tomato pinworm • Tomato bug • Tomato fruitworm • Virus symptoms • Whiteflies

✓ Done	Late fruit set (1-inch fruit to first red fruit) **Special issues of concern related to water quality:** Fertilizer application fungicide application, insecticide application, drift, runoff due to irrigation.
	Use irrigation practices that will enhance fruit yield and quality.
	Take leaf samples for: • Tomato fruitworm • Potato aphid Keep records on a monitoring form (PDF).
	Sample for stink bugs by shaking vines. Treatment is not usually required for juice or paste tomatoes, otherwise treat if needed according to the Tomato Pest Management Guidelines.
	When fruit are 1 inch or more in diameter, sample fruit for: • Beet armyworm • Western yellowstriped armyworm Keep records on a monitoring form (PDF) and treat if needed according to the Tomato Pest Management Guidelines.
	Continue monitoring for leaf and stem bronzing due to russet mite.
	Watch for diseases: • Bacterial canker • Late blight • Buckeye rot Treat if needed according to the Tomato Pest Management Guidelines.
	Consider management for blackmold according to the Tomato Pest Management Guidelines.
	Look for signs and symptoms of powdery mildew.
	Sporadic or minor pests you may see: • Aphids (green peach and other early season aphids, potato) • Hornworms • Loopers • Lygus bugs • Thrips • Tomato bug • Tomato pinworm • Virus symptoms • Whiteflies

✓ Done	First red fruit (preharvest) **Special issues of concern related to water quality:** Insecticide application, fungicide application, drift, fertilizer application, runoff due to irrigation.
	Control irrigation to maintain yield and fruit quality.
	If a late harvest is planned, consider management options for: Blackmold • Powdery mildew, unless a few weeks before harvest
	Take leaf samples for: • Tomato fruitworm • Potato aphid Keep records on a monitoring form (PDF).
	Monitor fruit for armyworm damage and distinguish from fruitworm and cutworm damage. Keep records on a monitoring form (PDF) for armyworm.
	Survey for weeds just before harvest for next year's planning. Keep records on a survey form (PDF).
	Sporadic or minor pests you may see: • Cutworms • Leafminers • Tomato psyllid • Flea beetles • Lygus bugs • Whiteflies • Hornworms • Tomato pinworm

✓ Done	Harvest and postharvest
	Harvest promptly to reduce fruit rot problems such as blackmold.
	Identify pest damage in harvested fruit.
	Consider fall soil sampling for nutrients and nematodes.
	For weedy fields, especially those with perennial weeds such as field bindweed and little mallow, apply irrigation followed by contact herbicides according to the Tomato Pest Management Guidelines.
	Plan fallow season, cover crop, or overwintering crop management to reduce runoff and erosion. Deep ripping, if planned, is best done postharvest.
	Plan for next year.

✓ 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://www.ipm.ucanr.edu/mitigation/protect_beneficials.html.
	• Potential for water quality problems using the UC IPM WaterTox database.See www.ipm.ucdavis.edu/TOX/simplewatertox.html.
	• Impact on aquatic invertebrates. For more information, see *Pesticide Choice*, UC ANR Publication 8161 (PDF), http://anrcatalog.ucdavis.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.ucdavis.edu/pdf/8012.pdf.
	• Endangered species that may be near your site. Find out using the Department of Pesticide Regulation's PRESCRIBE program. (http://www.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 www.ipm.ucdavis.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 over 5 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.

✓ Done	Pesticide application checklist
✓	**Consider water management practices that reduce pesticide movement off-site.**
	Consult relevant publications, such as *Protecting Surface Water from Sediment-Associated Pesticides in Furrow-Irrigated Crops*, UC ANR Publication 8403 (PDF), http://anrcatalog.ucdavis.edu/pdf/8403.pdf.
	Consult the Department of Pesticide Regulation Groundwater Protection Program (GWPA) Web site for pesticide information and mitigation measures. (http://www.cdpr.ca.gov)
	Install an irrigation recirculation or storage and reuse system. Redesign inlets into tailwater ditches to reduce erosion. (For more information, see *Reducing Runoff from Irrigated Lands: Tailwater Return Systems*, http://anrcatalog.ucdavis.edu/pdf/8225.pdf.)
	Use drip rather than sprinkler or flood irrigation.
	Limit irrigation to amount required using soil moisture monitoring and evapotranspiration (ET).
	Consider using cover crops.
	Consider vegetative filter strips or ditches. (For more information, see *Vegetative Filter Strips,* UC ANR Publication 8195 (PDF), http://anrcatalog.ucdavis.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://www.cdpr.ca.gov)

More information about topics mentioned on this checklist is available at the UC IPM Web site: http://www.ipm.ucanr.edu/PMG/selectnewpest.tomatoes.html.

For more about mitigating pesticide hazards, see the Mitigation pages: www.ipm.ucanr.edu/mitigation/.