RUTGERS
New Jersey Agricultural Experiment Station

This is a section from the

2018 Mid-Atlantic Commercial Vegetable Production Recommendations

The manual, which is published annually, is **NOT** for home gardener use.

The **full manual**, containing recommendations specific to New Jersey, can be found on the Rutgers NJAES website in the Publications section:
http://njaes.rutgers.edu/pubs/publication.asp?pid=E001.

The **label** is a legally-binding contract between the user and the manufacturer. The user must follow all rates and restrictions as per label directions. The use of any pesticide inconsistent with the label directions is a violation of Federal law.

Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

F. Commodity Recommendations

Pesticide Use Disclaimer

THE LABEL IS THE LAW
Before using a pesticide, check the label for up to date rates and restrictions.

Labels can be downloaded from: *http://www.cdms.net/*, *http://www.greenbook.net/* or *http://www.agrian.com/labelcenter/results.cfm*

Guide to the Recommended Pesticide Tables in the Following Crop Chapters:

1. Pesticides are listed by **group or code number based on chemical structure and mode of action**, as classified by the Weed Science Society of America (WSSA) for herbicides, the Insecticide Resistance Action Committee (IRAC) for insecticides, and the Fungicide Resistance Action Committee (FRAC) for fungicides.
   If the number is in bold font, the product may have resistance concerns.

2. For **restricted use pesticides**, the restricted active ingredients are labeled with a *****. See the Pesticide Safety chapter for more information.

3. **In addition to the pesticides listed below, other formulations or brands with the same active ingredient(s) may be available. ALWAYS CHECK THE LABEL:**

a) to ensure a pesticide is labeled for the same use,
b) to ensure the pesticide is labeled for the desired crop, and
c) for additional restrictions.

4. All pesticide recommendations are made for spraying a **broadcast area of 1 acre** (43,560 square feet). **Adjust the rate for banded applications** (for more information, see the Pest Management chapter, Calibrating Granular Applicators section).

5. Check the label for the maximum amount of pesticide per application and the maximum number of applications per year.

6. **Bee Toxicity Rating (Bee TR)**: N=nontoxic; L=minimum impact on bees; M=moderately toxic, can be used if dosage, timing and method of application are correct, but should NOT be applied directly to crop if bees are present; H=highly toxic, severe losses expected, -- = data not available.

Tomatoes

Recommended Varieties

	Variety[1]	Type	Season	Culture	Use[2]	Disease Resistance[3]	Plant Habit[4]
Market	Applause	Globe, Red	Early	Field	DM, LW	V,F	D
	Primo Red	Globe, Red	Early	Field	DM, LW, S	V,F,Tomv	D
	Sunshine	Globe, Red	Early	Field	DM, LW, S	V,F,Gls	D
	Sunbrite	Globe, Red	Early	Field, High Tunnel	DM, LW, S	Asc, V,F,Gls	D
	Amelia	Globe, Red	Mid	Field	LW, S	V,F,Tswv	D
	BHN 1009	Globe, Red	Mid	Field	LW, S	V,F	D
	BHN 589	Globe, Red	Mid	Field, High Tunnel	DM, LW	V,F,Tomv	D
	BHN 961	Globe, Red	Mid	Field	DM, LW, S	V,F,Tomv	D
	BHN 964	Globe, Red	Mid	Field	DM, LW, S	V,F,Tomv,Eb	D
	Biltmore	Globe, Red	Mid	Field	DM, LW,	V,F,Asc,Gls	D
	Brandy Boy	Globe, Red	Mid	Field, High Tunnel	DM, LW		I
	Charger	Globe, Red	Mid	Field, High Tunnel	DM, LW, S	V,F,Gls,Asc,Tylc	D
	Crista	Globe, Red	Mid	Field	DM, LW, S	V,F,Tswv	D
	Defiant	Globe, Red	Mid	Field	DM, LW	V,F,Lb	D
	Floralina	Globe, Red	Mid	Field	DM, LW	V,F,Asc,Gls	D
	Florida 47R	Globe, Red	Mid	Field	LW, S	V,F,Asc,Gls	D
	Mountain Glory	Globe, Red	Mid	Field	DM, LW, S	V,F,Gls,Tswv	D
	Mountain Spring	Globe, Red	Mid	Field	DM, LW	V,F	D
	Mt. Merit	Globe, Red	Mid	Field	DM, LW, S	V,F,N,Tswv, Lb,	D
	Red Deuce	Globe, Red	Mid	Field	DM, LW, S	V,F,Tomv,Gls,Asc	D
	Red Defender	Globe, Red	Mid	Field	DM, LW, S	V,F,N,Tswv	D
	Red Mountain	Globe, Red	Mid	Field, High Tunnel	DM, LW, S	V,F,Tswv	D
	Rocky Top	Globe, Red	Mid	Field, High Tunnel	DM, LW, S	V,F,Gls	D
	Scarlet Red	Globe, Red	Mid	Field, High Tunnel	DM, LW, S	V,F	D
	Red Morning	Globe, Red	Mid	Field	DM, LW, S	V,F, Tomv, Tswv	D
	Volante	Globe, Red	Mid	Field	DM. LW, S	V,F,Gls,Asc, Tswv	D
	BHN 871	Globe, Yellow	Mid	Field, High Tunnel	DM, LW	V,F,Tomv	D
	Carolina Gold	Globe, Yellow	Mid	Field	DM, LW	V,F	D
	Lemon Boy	Globe, Yellow	Mid	Field, High Tunnel	DM, LW	V,F,N	I
	BHN 602	Globe, Red	Mid, Late	Field	DM, LW, S	V,F,Tswv	D
	Florida 91	Globe, Red	Mid, Late	Field	DM, LW, S	V,F,Asc,Gls	D
	Mt. Fresh Plus	Globe, Red	Mid, Late	Field	DM, LW, S	V,F,N	D
	Phoenix	Globe, Red	Mid, Late	Field	LW, S	V,F,Asc,Gls	D
	Red Bounty	Globe, Red	Mid, Late	Field, High Tunnel	DM, LW	V,F,N,Gls,Tswv	D

[1]All varieties are hybrids. [2]DM=Direct Market, LW=Local Wholesale, S=Shipping. [3]Resistances or tolerances: Asc=Alternaria stem canker, Eb=Early blight, F=Fusarium wilt, Gls=Gray leaf spot, Lb=Late blight, N=Root-knot nematode, Tomv=Tomato mosaic virus, Tswv=Tomato spotted wilt virus, Tylc=Tomato Yellow Leaf Curl virus, V=Verticillium wilt. [4]D=Determinate, I=Indeterminate.

	Variety	Maturity	Size	Shape	Color	Plant Habit
Heirloom	Mortgage Lifter	Late	Large	Beefsteak	Pink skin, Pink flesh	I
	Hawaiian Pineapple	Late	Large	Beefsteak	Orange bicolor	I
	Prudens Purple	Mid	Large	Globe	Deep pink skin and flesh	I, potato leaf
	Mister Stripy	Late	Large	Round	Bicolor red and yellow	I
	Brandywine Red	Late	Large	Beefsteak	Red skin, red flesh	I, potato leaf
	Box Car Willie	Late	Med-large	Globe	Red skin, red flesh	I
	Eva Purple Ball	Mid	Medium	Round	Deep pink skin and flesh	I
	Arkansas Traveler	Late	Medium	Round	Red skin, red flesh	I
	Costoluto Genovese	Late	Medium	Ribbed flat globe	Red skin and flesh	I
	Snow White	Late	Small	Round cherry	Yellow skin and flesh	I
	Yellow Pear	Late	Small	Small pear	Yellow skin and flesh	I

Recommended Varieties continued on next page

Recommended Varieties - continued

	Variety[1]	Type	Color	Disease Resistance[2]	Plant Habit[3]
Plum, Cluster, Cherry and Grape	Plum Crimson	Plum	Red	V,F	D
	Plum Dandy	Plum	Red	V,F	D
	Plum Regal	Plum	Red	V,F,Lb,Tswv,	D
	Picus	Plum	Red	V,F,Asc,Gls,Tswv	D
	Pony Express	Plum	Red	V,F,N,Tomv,Bs	D
	Mariana	Plum	Red	V,F,N,Asc	D
	Victoria Supreme	Plum	Red	V,F,N,Asc,Gls	D
	Health Kick	Plum	Red	V,F,Asc,Tswv,Bs	D
	Mt. Magic	Small cluster	Red	V,F,Lb	I
	BHN 762	Cherry	Red	V,F	D
	Sun Sugar	Cherry	Orange	F, Tmv	I
	Mountain Bell	Cherry	Red	V,F	I
	Sweet Chelsea	Cherry	Red	V,F,N,Tomv	I
	Sun Gold	Cherry	Orange	F, Tomv	I
	Sweet Treats	Cherry	Pink	F,Tomv,Gls	I
	BHN 785	Grape	Red	F	D
	Mini Charm	Grape	Red	V,F,Tomv	I
	Smarty	Grape	Red	V, F	I
	Jolly Girl	Grape	Red	V, F	D
	Cupid	Grape	Red	F, Asc	I
	Juliet	Large Grape	Red		I

[1]All varieties are hybrids. [2]Resistances or tolerances: Asc=Alternaria stem canker, Bs=Bacterial speck, Eb=Early blight, F=Fusarium wilt, Gls=Gray leaf spot, Lb=Late blight, N=Root-knot nematode, Tmv=Tobacco mosaic virus,.Tomv=Tomato mosaic virus, Tswv=Tomato spotted wilt virus, V=Verticillium wilt. [3]D=Determinate, I=Indeterminate.

	Variety[1]	Season	Disease Resistance[3]
Processing[2]	TSH4	Early	V,F,Bs
	H-3402	Mid	V,F,N,Bs
	H-9704	Mid	V,F,Asc
	H-9997	Early	V,F,N,Asc,Bs

[1]All varieties are hybrids. [2]Most plantings are contracted by processor; consult with processor to determine preferred varieties [3]Disease resistance or tolerance: Asc=Alternaria stem canker, Bs = Bacterial speck, F=Fusarium wilt, N=Root-knot nematode, V=Verticillium wilt.

Recommended Nutrients Based on Soil Tests

In addition to using the table below, check the suggestions on rate, timing, and placement of nutrients in your soil test report and the Soil and Nutrient Management chapter. Your state's soil test report recommendations and/or your farm's nutrient management plan supersede recommendations found below.

Tomatoes[1]		Soil Phosphorus Level				Soil Potassium Level				
		Low	Med	High (Opt)	Very High	Low	Med	High (Opt)	Very High	
	N (lb/A)	P_2O_5 (lb/A)				K_2O (lb/A)				Nutrient Timing and Method
Bare-Ground Fresh Market	80-90	200	150	100	0[2]	300	200	100	0[2]	Total nutrient recommended
	40-45	200	150	100	0[2]	300	200	100	0[2]	Broadcast and disk-in
	40-45	0	0	0	0	0	0	0	0	Sidedress when first fruits are set
Processing Machine Harvest	50-75	200	150	100	0[2]	250	150	100	0[2]	Total nutrient recommended
	25	200	150	100	0[2]	250	150	100	0[2]	Broadcast and disk-in
	25-50	0	0	0	0	0	0	0	0	Sidedress at first cultivation
Polyethelene Mulched Fresh Market	150-210	200	150	100	0[2]	300	200	100	0[2]	Total nutrient recommended
	0	200	150	100	0[2]	150	100	50	0	Broadcast and disk-in
	50-85	0	0	0	0	0	0	0	0	Incorporate into the plant bed before laying polyethylene mulch
	90-125	0	0	0	0	150	100	50	0[2]	Fertigate 0.5 to 2.5 lb/day. See chart and Drip/Trickle Fertilization section

[1]Apply 1-2 lb/A of boron (B) with broadcast fertilizer; see also Table B-7 in the Soil and Nutrient Management chapter.
[2]In VA, crop replacement values of 50 lb/A of P_2O_5 and 50 lb/A of K_2O are recommended on soils testing Very High.

Fertigation Schedule Examples for Fresh Market Tomatoes

This table provides examples of fertigation schedules based on two common scenarios – sandy coastal plain soils and heavier upland soils. Modify according to specific soil tests and base fertility.

Fertigation recommendations for 150 lb N and 150 lb K_2O[1,2] For soils with organic matter content less than 2% or coarse texture and low to medium or deficient K								
			Nitrogen			**Potash**		
Preplant (lb/A)[3]			**50**			**125**		
			N	**N**	**N**	**K_2O**	**K_2O**	**K_2O**
Stage and Description	Weeks	Days	lb/day	lb/week	lb/stage	lb/day	lb/week	lb/stage
1 Early vegetative	1-2	1-14	0.5	3.5	7	0.5	3.5	7
2 Late vegetative	3-4	15-28	0.7	4.9	9.8	0.7	4.9	9.8
3 Early flowering	5-6	29-42	1.0	7	14	1	7	14
4 Flowering and fruiting	7-8	43-56	1.5	10.5	21	1.5	10.5	21
5 Early harvest	9-11	57-77	2.2	15.4	46.2	2.2	15.4	46.2
6 Later harvest[4]	12-14	78-98	2.5	17.5	52.5	2.5	17.5	52.5
Fertigation recommendations for 75 lb N and 75 lb K_20[1,2] For soils with organic matter content greater than 2% or fine texture and high or optimum K								
			Nitrogen			**Potash**		
Preplant (lb/A)[3]			**50**			**50**		
			N	**N**	**N**	**K_2O**	**K_2O**	**K_2O**
Stage and Description	Weeks	Days	lb/day	lb/week	lb/stage	lb/day	lb/week	lb/stage
1 Early vegetative	1-2	1-14	0.25	1.75	3.5	0.25	1.75	3.5
2 Late vegetative	3-4	15-28	0.35	2.45	4.9	0.35	2.45	4.9
3 Early flowering	5-6	29-42	0.5	3.5	7	0.5	3.5	7
4 Flowering and fruiting	7-8	43-56	0.75	5.25	10.5	0.75	5.25	10.5
5 Early harvest	9-11	57-77	1.1	7.7	23.1	1.1	7.7	23.1
6 Later harvest[4]	12-14	78-98	1.25	8.75	26.25	1.25	8.75	26.25

[1]Rates above are based on 7,260 linear bed ft/A (6 ft bed spacing). If beds are closer or wider, fertilizer rates should be adjusted proportionally. Drive rows should not be used in acreage calculations. See Fertigation in C-Irrigation Management for more information.
[2]Base overall application rate on soil test recommendations.
[3]Applied under plastic mulch to effective bed area using modified broadcast method. [4]For extended harvest after 10 weeks continue fertigation at this rate.

Critical Tomato Tissue Test Values for Most Recently Matured Leaves

Timing	**Value**	**N**	**P**	**K**	**Ca**	**Mg**	**S**	**Fe**	**Mn**	**Zn**	**B**	**Cu**	**Mo**
		%	**%**	**%**	**%**	**%**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
Prior to Blossom	**Deficient**	<3.0	0.3	3	1	0.3	0.3	<40	30	25	20	5	0.3
	Adequate range	3	0.3	3	1	0.3	0.3	40	30	25	20	5	0.2
		5	0.6	5	2	0.5	0.8	100	100	40	40	15	0.6
	High	>5.0	0.6	5	2	0.5	0.8	>100	100	40	40	15	0.6
	Toxic (>)	-	-	-	-	-	-	-	-	-	-	-	-
At First Flower	**Deficient**	<2.8	0.2	2.5	1	0.3	0.3	<40	30	25	20	5	0.2
	Adequate range	2.8	0.2	2.5	1	0.3	0.3	40	30	25	20	5	0.2
		4	0.4	4	2	0.5	0.8	100	100	40	40	15	0.6
	High	>4.0	0.4	4	2	0.5	0.8	>100	100	40	40	15	0.2
	Toxic (>)	-	-	-	-	-	-	-	1500	300	250	-	-
At Early Fruit Set	**Deficient**	<2.5	0.2	2.5	1	0.25	0.3	<40	30	20	20	5	0.2
	Adequate range	2.5	0.2	2.5	1	0.25	0.3	40	30	20	20	5	0.2
		4	0.4	4	2	0.5	0.6	100	100	40	40	10	0.6
	High	>4.0	0.4	4	2	0.5	0.6	>100	100	40	40	10	0.6
	Toxic (>)	-	-	-	-	-	-	-	-	-	250	-	-

Plant Petiole Sap Testing

Plant petiole sap and tissue testing are valuable tools to assess crop nutrient status during the growing season, to aid with in-season fertility programs, or to evaluate potential deficiencies or toxicities.

Tomato Developmental Stage	Fresh Petiole Sap Concentration (ppm)	
	NO_3-N	K
First buds	1000-1200	3500-4000
First open flowers	600-800	3500-4000
Fruits 1 inch diameter	400-600	3000-3500
Fruits 2 inch diameter	400-600	3000-3500
First harvest	300-400	2500-3000
Second harvest	200-400	2000-2500

Seed Treatment

Purchase hot water treated seed if possible or request hot water seed treatment. Hot water treatment is administered to eradicate bacterial pathogens. For more information see Disease Control below.

Hardening Transplants

Hardening seedlings before field planting is recommended. However, hardening by exposure to cool temperatures 60-65°F (16-18°C) day and 50-60°F (10-16°C) night for one week or more causes catfacing. Instead, harden plants by withholding N and reducing water; allow plants to wilt slightly between light waterings.

Drip/Trickle Fertilization

The start of any nutrient management program is an accurate soil test from a certified laboratory. Choose a nutrient program that meets your individual production system requirements based on soil and production history.

Before laying plastic mulch, adjust soil pH to 6.5 and apply enough farm-grade fertilizer to supply 50-85 lb/A of N, depending on soil and yield potential. Apply the balance of your needed K_2O that you do not plan to apply via fertigation as a modified broadcast application that treats only the mulched area. Nitrogen fertilizer should be incorporated into the bed or split between incorporated and a surface band bed treatment immediately before laying plastic mulch.

After laying plastic mulch and installing the trickle irrigation system, apply completely soluble fertilizer through the drip system to supply additional N and potash throughout the season. Depending on soil texture and yield potential, N and K fertigation should be increased over the growing season as plants mature. Adjust rates as necessary based on soil and tissue tests (see tables above). For more information, see the Drip Irrigation section in the Irrigation Management chapter.

Fresh Market

Yield and fruit size and quality of fresh market tomatoes are increased by the use of black plastic mulch in combination with trickle irrigation. Form raised, dome-shaped beds to aid in disease control. Lay 4 ft wide black plastic mulch tightly over the beds. For early summer harvest of market tomatoes, start transplanting April 10-20 in southern or normally warmer areas, and May 10-25 in cooler, northern areas.

Ground Culture: Space determinate vined varieties in rows 4-5 ft apart with plants 15-24 inches apart in the row. For indeterminate varieties, space rows 5-6 ft apart with plants 24-36 inches apart in the row.

Stake Culture: Staking tomatoes is a highly specialized production system. Staking improves fruit quality by keeping plants and fruit off the ground and allows for better spray coverage. Staked tomatoes are easier to harvest than non-staked tomatoes. The recommendations below are for the short-stake cultural system using determinate cultivars that grow 3-4 ft tall. Row widths of 5-6 ft with in-row spacings of 18-24 inches between plants are recommended.

Pruning is practiced to establish a desired balance between vine growth and fruit growth. Little to no pruning results in a plant with a heavy load of smaller fruit. Moderate pruning results in fewer fruit that are larger and easier to harvest. Pruning can result in earlier maturity of the crown fruit and improve spray coverage and pest control. The pruning method is variety and fertility dependent. Less vigorous determinate cultivars generally require less pruning. Growers should experiment with several degrees of pruning on a small scale to determine pruning requirements for specific cultivars and cultural practices.

Removing all suckers up to the one immediately below the first flower cluster is adequate for most determinate cultivars. Removing the sucker immediately below the first flower cluster or pruning above the first flower cluster can result in severe leaf curling and stunting of the plant. Prune when the suckers are 2-4 inches long. A 2nd pruning may be required to remove suckers that are too small to be easily removed during the 1st pruning and to remove ground suckers that may develop. Pruning when suckers are too large requires more time and can damage the plants, delay maturity, and increase disease incidence. Do not prune plants when they are wet to avoid spread of bacterial diseases. Pruning should be done before the first stringing because the string can slow down the pruning process.

Staking involves setting up a series of wooden stakes with twine woven around the stakes to train the plants to grow vertically off the ground. Stakes 4-4½-ft long by 1-inch square are driven approximately 12 inches into the soil between the plants.

Vigorous cultivars may require larger and longer stakes. A stake placed between every other plant is adequate to support most determinate varieties. Placing an additional stake at an angle and tied to the end stake of each section or row is needed to strengthen the trellis system. Stakes can be driven by hand with a homemade driving tool or with a commercially available, power-driven stake driving tool. Drive stakes to a consistent depth so that spray booms can be operated in the field without damaging the trellis system. Select "tomato twine" that is resistant to weathering and stretching and that binds well to the wooden stakes. Tomato twine is available in 3-4-lb boxes and approximately 30 lb/A are required. To make tying convenient, use a homemade stringing tool made from a length of metal conduit, PVC pipe, broom handle, or wooden dowel. With conduit or PVC pipe, the string is fed through the pipe. With a broom handle or wooden dowel, two small parallel holes, each approximately ½-1 inch from the end, must be drilled to feed the string through one hole along the length of the tool and through the other hole. The tool serves as an extension of the worker's arm (the length cut to the worker's preference) and helps to keep the string tight.

Stringing consists of tying the twine to an end stake passing the string along one side of the plants, looping the twine around each stake until you reach the end of a row or section (100-ft sections with alleys may be helpful for harvesting). The same process is continued on the other side of the row. The string tension must be tight enough to hold the plants upright but harvest can be difficult and strings can scar fruit if they are too tight.

The first string should be strung 8-10 inches above the ground when plants are 12-15 inches tall and before they fall over. Run the next string 6-8 inches above the preceding string before plants start to fall over. Three to 4 stringings are required for most determinate varieties. Stringing should be done when the foliage is dry to prevent the spread of bacterial diseases.

Processing Tomatoes

Transplanting: Processing tomatoes can be transplanted starting April 15-20 in warmer, southern areas to May 5-10 in PA and normally cooler areas. Successive plantings can be made through early June. Space transplants 9-12 inches apart in single rows 5 ft. apart or to accommodate machine harvesters. Small, determinate varieties may be grown in double rows. Space double rows 12 inches apart and space plants 12-18 inches apart in each of the double rows.

Fruit Ripening: Ethephon is a growth regulator labeled for use on processing tomatoes. Proper application increases earliness and yield and decreases sorting of green fruit in machine-harvested tomatoes. Rate and time of application are critical for successful use, see state fact sheets and check product label for details.

Harvest and Post-Harvest Considerations

Depending on marketing requirement, tomatoes may be harvested at the **mature green stage** (when and after which the fruit cavity is filled by gel), **breaker stage** (just showing pink at the bottom of the fruit), **semi-ripe** (with different amounts of red pigmentation) or **fully ripe**. Fruit are very perishable and subject to surface and internal damage, and must be handled with care. If tomatoes are to be harvested at breaker, partially ripe, or vine-ripe stages, fields should be harvested often and thoroughly to hasten the ripening of later fruits and reduce the range of ripeness. Harvesting every day may be desirable during peak season. Remove all diseased, misshapen, and otherwise cull tomatoes from the vines as soon as they are discovered. Remove discarded tomatoes from the field to avoid the spread and buildup of diseases and insect pests. For standard slicing tomatoes, cherry tomatoes, and plum tomatoes, remove the stem during picking. Cluster tomatoes are harvested with the whole truss attached to fruits.

Tomatoes should be washed sufficiently to remove dust and foreign material, by hand or mechanically by spraying them with chlorinated water as they move over a set of soft brush rolls. The small amount of retained water

may be removed by absorbent rollers alone or in combination with an overhead air-blast drier. The wash water should be several degrees warmer than the pulp temperature of the tomatoes to avoid drawing water and disease organisms into the fruit. The water should be chlorinated at the rate of 125 ppm. The chlorine level and pH (6 to 7) of the wash water should be checked at least hourly during the day with test papers or a meter. Tomatoes are then sized and separated by color and grade and carefully packed into 25 lb boxes.

Size Classification of Tomatoes

Size Designation	Minimum Diameter (inch)	Maximum Diameter (inch)
Extra small	1-28/32	2-4/32
Small	2-4/32	2-9/32
Medium	2-9/32	2-17/32
Large	2-17/32	2-28/32
Extra large	2-28/32	3-15/32

Color Classification of Tomatoes

Tomatoes may be graded into the following color classes (some classes may be combined).

Green	The surface of the tomato is completely green. The shade of green may vary from light to dark. Mature green fruits are typically ripened at the terminal market or by the repacker with ethylene gas.
Breakers	There is a definite break in the color from green to tannish yellow with pink or red skin covering not more than 10% of the surface.
Turning	More than 10% but not more than 30% of the surface, shows a definite change in color from green to tannish yellow, pink, red, or a combination of those colors.
Pink	More than 30% but not more than 60% of the surface shows pinkish red or red color.
Light Red	More than 60% but not more than 90% shows pinkish red or red color.
Red	More than 90 % of the surface shows red color.

Shipping

For long distance shipping, mature green harvest is the common practice. For local wholesale, harvest is usually at the breaker stage. For direct market, harvest is at the ripe stage. Store mature-green tomatoes at 55-70°F (13-21°C); breakers, partially ripe, and ripe fruit at 50°F (10°C) and a relative humidity of 90-95%. Exposing tomatoes to temperatures below 50°F results in loss of color, shelf life, firmness and flavor.

Tomato Disorders

Blossom-End Rot (BER) This physiological disorder is caused by inadequate movement of calcium into the fruit. BER occurs at low soil moisture and is more severe when plants have small, shallow root systems. Plastic mulch can restrict the movement of water to the root zone and increase BER. Hot, windy conditions increase water loss from the plant and increase the incidence of BER.

Be sure soil calcium is sufficient and in balance with other essential plant nutrients. Test the soil and apply lime and fertilizer according to recommendations, then lay plastic mulch when soil moisture is optimal for planting. Apply irrigation to wet the root zone and encourage deep root development.

Blotchy Ripening, Graywall and Internal White Tissue These problems are a complex of physiological disorders and pathological diseases. Blotchy Ripening and graywall often appear on shaded fruit growing in the interior of dense vegetative plants. Yellow-eye, a ring of yellow tissue surrounding the blossom scar, often occurs in fruit with blotchy ripening and internal white tissue.

Blotchy ripening is when areas of the fruit do not ripen or do so after the rest of the fruit is ripe. White or yellow blotches may appear on the surface of the fruit while the internal tissue is still hard. Usually this disorder occurs on the upper portion of the fruit and there is no internal browning of the fruit. This disorder is more often seen during cool, wet and cloudy conditions. It is worsened by too much or too little water. High N and/or low K will cause an increase in the disorder. Older varieties are often more susceptible to this disorder.

Research in California indicates that for proper fruit color development higher K levels than are necessary for yield alone are needed. Soils and plants with high K had lower levels of the disorder. Foliar applications of K were not totally effective in reducing the disorder. Work in Michigan suggests that soils high in organic matter (above 3.5%) helped to reduce the disorder in a tomato crop. In addition, soils with a pH of 6.4 had low incidence of yellow shoulder while tomatoes grown on soils with a pH above 6.7 had a high incidence.

Growers should have K tissue levels of at least 3% before fruit is one inch in diameter. In addition, the ratio of Magnesium (MG) to Calcium (Ca) is important and a ratio of Mg:Ca of 1:4 to 1:6 should be maintained in the crop.

Graywall appears as grayish and sometimes sunken areas on a fruit. Internally the vascular tissue is brown resulting from collapse of the tissue. This can occur on the outer part of the fruit as well as in the center. It is usually more of a problem with cool, short days and often occurs in a late tomato crop. Graywall usually develops in green fruit but can occur as fruit is ripening. Fruit do not ripen properly and will have a blotchy appearance making them unmarketable. Graywall occurs on any part of the fruit. High N may increase the incidence of graywall and adequate K may reduce the problem. The disorder may also be caused by stress on the plants resulting from drought, excessive heat, root problems, severe nutrient deficiencies, etc. and there are varietal differences in susceptibility. This disorder is not clearly understood. Note that internal browning can also be caused by tobacco mosaic virus (TMV).

Internal white tissue is a disorder where the fruit usually show no external symptoms. When a ripe, affected fruit is cut there will be white, hard areas found in the outer tissue and sometimes in the center of the fruit as well. High temperatures during ripening are believed to be the cause of this disorder. Maintaining adequate K in the soil may reduce but not eliminate it. Some varieties are more susceptible to this disorder, especially high colored varieties. This disorder can be severe enough to cause fruit to be unmarketable.

Catfacing Catfacing is where fruit are malformed and scarred, usually at the blossom end. It is caused by exposure of seedlings to 60-65°F (16-18°C) day temperatures and 50-60°F (10-16°C) night temperatures for 1 week, approximately 4 weeks before pollination. The first flower cluster is susceptible to low temperature-induced catfacing when seedlings have 4-5 true leaves. Fruit on later clusters will show catfacing if exposed to low temperatures in the field. Avoid hardening seedlings by exposure to low temperatures. Varieties differ in their susceptibility to the disorder.

Cracking Cracking is due to the rapid uptake of water, resulting in enlargement of cells and separation of the epidermis of the fruit. Water can be taken up through the roots or through the tissue around the stem scar. The type of cracking (concentric, radiating out from the stem, or diagonal or transverse cracks across the fruit) is determined primarily by fruit structure and variety. Different types of cracking may be present in a variety or an individual fruit.

The severity of cracking is determined by water availability, variety and maturity. As the fruit ripens, the bonding between cells progressively weakens, resulting in more severe cracking. High rainfall and irrigation, or frequent low to moderate rainfall, especially following a period of low soil moisture may increase cracking. To minimize cracking, select a crack-resistant variety, maintain a high calcium level in the soil and keep fruit growing at a uniform rate by maintaining uniform soil moisture levels. Maintain good fruit cover by proper fertilization and fungicide applications. Harvest fruit at the earliest stage of maturity that is acceptable by your market.

Russeting Russeting, or weather checking of the surface of the fruit is caused by the presence of water on the fruit surface for extended periods of time when there are frequent light rainfalls, mist, fog, and dew. Wide fluctuations in temperature of exposed fruit also contribute to this disorder. Russeting can cause fruit to be unmarketable. Maintain good fruit cover by proper fertilization and fungicide applications. Use varieties that feature a dense canopy and resistance to foliar diseases.

Sunburn and Sunscald Sunburn and sunscald result from exposure to direct sunlight. Mild sunburn appears as yellowish or yellow-red color of fruit on the side exposed to the sun. Severe symptoms appear as whitish, water-soaked, scalded, or blistered areas. Sunscald is more severe on fruit that developed in shaded conditions but was exposed to direct sunlight after defoliation or harvesting. Under dry conditions, the white areas can become dry and leathery. Secondary infection can produce a dark, dry rot. Under moist conditions, scalded areas can decay from secondary infections. To control sunburn and sunscald, select varieties with good fruit cover, supply sufficient water and nutrients to provide good vegetative growth and manage pests. Train workers to avoid turning vines during harvesting or to reposition vines to shade fruit.

Yellow Shoulders Yellowing may occur on the shoulders of fruit exposed to the sun, especially on varieties that have darker green shoulders when immature (those lacking the uniform ripening gene). The tissue beneath the yellow shoulder is usually corky and may vary from greenish white to pale yellow. Select varieties with the uniform ripening gene and provide good fruit cover as described above.

Weed Control

THE LABEL IS THE LAW - See the Pesticide Use Disclaimer on page F 1.

Recommended Herbicides

1. Identify the weeds in each field and select recommended herbicides. More information is available in the "Herbicide Effectiveness on Common Weeds in Vegetables" Table (E-2) in the Pest Management chapter.

2. Minimize herbicide resistance development. Identify the herbicide site mode of action group and follow recommended good management practices. Include non-chemical weed control whenever possible.

Labeled Applications Sites for Tomato

		Plastic mulch production						Bare-ground production		
		Soil-Applied		Postemergence						
Herbicides	WSSA group number	Under Plastic	Row Middles	Over Plastic	Row Middles	Post-Harvest		Soil-applied	POST	Post-harvest
Sandea	2	YES*	YES		YES			YES*	YES	
Dacthal	3								YES***	
Prowl H2O	3		YES					YES		
Treflan	3		YES					YES**		
Metribuzin	5	YES	YES		YES			YES	YES	
Reflex	14	YES	YES		YES			YES**		
Devrinol	15	YES	YES					YES		
Dual	15	YES	YES					YES		
Select	1			YES						
SelectMax	1			YES						
Poast	1			YES						
Matrix	2		YES		YES				YES	
Gramoxone	22				YES	YES				YES

*Delay transplanting for 7 days after application; not labeled for direct-seeding. **Transplants only.
***Dacthal is labeled for over the top application, but will it will not control emerged weeds.

1. Soil-Applied

Group	Product Name	Product Rate	Active Ingredient (*=Restricted Use)	Active Ingredient Rate	PHI (d)	REI (h)
2	Sandea 75DF	0.5 to 1.0 oz/A	**halosufluron**	0.023 to 0.047 lb/A	30	12

- **Plasticulture**: under plastic application is labeled delay transplanting 7 days after herbicide application. Apply in a band under the plastic, immediately before laying the mulch; use on transplants only (not for seeded tomatoes), avoid herbicide treated soil from moving into the holes during transplanting. Plasticulture: labeled for row middle application with directed/shield application.
- **Bareground**: for transplants only: apply preplant incorporated 7 days before transplanting; use on transplants only (not for seeded tomatoes), avoid herbicide treated soil from moving into the holes during transplanting.
- Bareground: for directed-seeded apply as directed/shielded application to row middles
- Suppresses or controls yellow nutsedge and certain broadleaf weeds. Sandea provides both residual and postemergence control of susceptible weed species. Effective postemergence control requires an adjuvant.
- Sandea is an ALS inhibiting herbicide and resistant weed populations are common in the region. **Do not** use Group 2 herbicides repeatedly in the same field.
- **Do not** apply Sandea to crops treated with a soil applied organophosphate insecticide, or use a foliar applied organophosphate insecticide within 21 days before or 7 days after a Sandea application.
- Maximum number of Sandea applications per year is 2 and **do not** exceed 2 oz/A during the crop season.

3	Dacthal 6F Dacthal W-75	8.0 to 14.0 pt/A 6.0 to 14 lb/A	**DCPA**	6.0 to 10.5 lb/A	--	12

- Labeled for applications over the top of transplants without injury (will not control emerged weeds); transplants should be well-established and growing conditions favorable for good plant growth.
- Label recommends 4 to 6 weeks after transplanting or direct-seeded plants at 4 to 6 inches in height
- Post-transplant applications can only be made with bare-ground production.
- Dacthal will not control emerged weeds; apply to weed-free soils.
- Primarily controls annual grasses and a few broadleaf weeds, including common purslane.
- Results have been most consistent when used in fields with coarse -textured soils low in organic matter, and when the application are followed by rainfall or irrigation.
- Maximum application not addressed on label.

1. Soil-Applied continued on next page

1. Soil-Applied - continued

3	Prowl H2O 3.8CS	1.0 to 3.0 pt/A	**pendimethalin**	0.48 to 1.42 lb/A	70	24
-**Plasticulture**: recommended for row middles only. Labeled for under plastic, but no local data or experience with this application. -**Bareground**: broadcast preplant or preplant incorporated before transplanting; not labeled for direct-seeded crop. -Avoid root contact with Prowl-treated soil when placing transplants into furrow or hole or injury may occur. -Prowl labeled for directed application to transplanted or established direct-seeded peppers; avoid contact with leaves or stems. -Prowl will not control emerged weeds, only provides residual control; row middle applications may be made with Gramoxone using shielded sprayers. Use the lower rate on coarse-textured or sandy soils. Activate with ½ inch of rainfall or sprinkler irrigation within 48 hr of application to control most annual grasses and certain broadleaf weeds. -Maximum Prowl H2O application per season: 3 pt/A.						
3	Treflan 4E	1 to 2 pt/A	**trifluralin**	0.5 to 1.0 lb/A	--	12
-**Plasticulture**: labeled for row middles only. -**Bareground**: broadcast preplant or preplant incorporated before transplanting; not labeled for direct-seeded crop. All applications need to be mechanically incorporating. -Stunting may occur if weather is cool and damp at time of transplanting. Maximum application per season: not specified.						
5	Metribuzin 75DF	0.33 lb/A	**metribuzin**	0.25 lb/A	7	12
-**Plasticulture**: under plastic application is labeled; apply in a band under the plastic, immediately before laying the mulch; use on transplants only (not for seeded tomatoes), roots of the transplants need to be placed below the zone of treated soil. There is no local data and limited experience with this use. Plasticulture: labeled for row middle application with directed/shield application. -**Bareground**: broadcast preplant or preplant incorporated before transplanting; use on transplants only (not for seeded tomatoes), roots of the transplants need to be placed below the zone of treated soil. -Metribuzin primarily controls broadleaf weeds and is weak on grasses; tankmix to improve grass control. -Metribuzin has some postemergence activity. To get consistent control, apply Metribuzin before weeds are 1 inch tall. -Rainfastness is 6 hrs. Maximum for Metribuzin 75DF: 1.33 lb/A per crop season.						
14	Reflex 2SL	16 to 20 fl oz/A NJ 16 to 24 fl oz/A VA	**fomesafen**	0.25 to 0.375 lb/A	70	24
-**Special Local-Needs Label 24(c) has been approved for NJ and VA only until Dec. 31, 2020.** -The use of Reflex 2SL is legal ONLY if a waiver of liability has been completed (see *http://www.farmassist.com/*). -**Only labeled for transplanted tomatoes**; **do not** use on directed seeded crop. Ensure that Reflex treated soil is not moved into the transplant holes. -**Plasticulture**: under plastic application is labeled; apply in a band under the plastic, immediately before laying the mulch; **do not** mechanically incorporate. Crops may be transplanted immediately following application. -Plasticulture: labeled for application over the top of plastic before transplanting only if beds are shaped to allow herbicide to be readily washed off with irrigation or rainfall; and single rainfall or irrigation provides at least 0.5 inches of water before transplanting; and plastic does not have any holes until after Reflex has been washed off. -Plasticulture: labeled row middles application prior to transplanting. -**Bareground**: labeled for pre-transplant applied to soil surface, **do not** mechanically incorporate. Rainfall or irrigation between herbicide application and transplanting will likely reduce the risk of crop injury due to splashing. -Reflex provides both residual and postemergence control of susceptible weed species. Effective postemergence control requires an adjuvant. Varieties may vary in their response to Reflex; treat small acreages first to determine crop tolerance. -Consider rotational crops when applying fomesafen. If crop is replanted **do not** re-apply. Rotational restrictions depend on whether fomesafen was applied bareground, or under or over plastic mulch, see 24(c) label for specifics. -Maximum Reflex application: NJ 20 fl oz/A; VA 24 fl oz/A IN ALTERNATE YEARS.						
15	Devrinol 2-XT	2 to 4 qt/A	**napropamide**	1.0 to 2.0 lb/A	--	24
-**Plasticulture**: under plastic is labeled for seeded or transplanted tomatoes; apply in a band under the plastic, immediately before laying mulch. Use lower rate on coarse textured or sandy soil. Condensation that forms on the underside of the mulch will activate the herbicide. Plasticulture: row middles application is labeled. -**Bareground**: apply as broadcast, preemergence treatment for seeded and transplanted tomatoes. -Annual grasses and certain annual broadleaf weeds will be suppressed or controlled. May reduce stand and yield of fall planted small grain crop. Moldboard plowing will reduce the risk of injury. Maximum Devrinol 2-XT application per season: 4 qt/A.						
15	Dual Magnum 7.62E	1.0 to 2.0 pt/A	**s-metolachlor**	0.95 to 1.9 lb/A	30 to 90	24
-**Plasticulture**: under plastic is labeled transplanted tomatoes; apply in a band under the plastic, immediately before laying mulch. Use lower rate on coarse textured or sandy soil. Condensation that forms on the underside of the mulch will activate the herbicide. Plasticulture: row middles application is labeled. -**Bareground**: apply for preplant incorporated or broadcast, preemergence treatment before transplanting tomatoes. Seeded tomatoes can be treated when at least 4 inches tall at time of application and spray is directed at the soil and minimal amounts of herbicide contact tomato plants. Avoid moving treated soil into transplant holes. -Use lower rates on coarse-textured soils low in organic matter and higher rates on fine-textured soils with greater organic matter. -Application to varieties with unknown tolerance to Dual Magnum may result in crop injury. Transplants weakened by any cause may be injured by Dual Magnum. Plant healthy transplants and avoid planting when wet, cool, or unfavorable growing conditions exist. -Delaying transplanting for 7 days or more can reduce risk of injury. -**DO NOT** apply within 30 days of harvest if 1.33 pt/A or less is used, or within 90 days of harvest if more than 1.33 pt/A is used except in VA, where a 60 day PHI must be observed when 1.67 pt or less Dual Magnum is used per year. -**DO NOT** exceed 2 applications per growing season.						

2. Postemergence

Group	Product Name	Product Rate	Active Ingredient (*=Restricted Use)	Active Ingredient Rate	PHI (d)	REI (h)
1	Select 2EC Select Max 0.97EC	6 to 8 fl oz/A 9 to 16 fl oz/A	**clethodim**	0.07 to 0.12 lb/A	20	24
	Poast 1.5EC	1 to 2.5 pt/A	**sethoxydim**	0.2 to 0.5 lb/A	20	12
-**Select 2EC**: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution). **Select Max**: use nonionic surfactant (NIS) at 0.25% v/v (1 qt/100 gal of spray solution). **Poast**: Apply with COC at 1.0% v/v -**The use of COC may increase the risk of crop injury when hot or humid conditions prevail.** To reduce the risk of crop injury, omit additives or switch to nonionic surfactant when grasses are small and soil moisture is adequate. -Use lower labeled rates for annual grass control and higher labeled rates for perennial grass control. -Safe for broadcast (over the top) applications with both plasticulture and bareground production. -Yellow nutsedge, wild onion, wild garlic, and broadleaf weeds will not be controlled. -Controls many annual and certain perennial grasses, including annual bluegrass, but Select will not consistently control goosegrass. Control may be reduced if grasses are large or under hot or dry weather conditions. -If repeat applications are necessary, allow 14 days between applications. -**Do not** tank-mix with or apply within 2 to 3 days of any other pesticide - unless labeled - as this may increase the risk of crop injury or reduce the control of grasses. Rainfastness is 1 hr. -**Do not** apply more than 8 fl oz of Select 2EC in a single application and **do not** exceed 2 pt/A for the season; **do not** apply more than 16 fl oz of Select Max in a single application and **do not** exceed 4 pt/A for the season. -**Do not** apply more than 1.5 pt/A Poast 1.5EC in single application and **do not** exceed 4.5 pt/A for the season.						
2	Matrix 25DF	1.0 to 2.0 oz/A	**rimsulfuron**	0.0156 to 0.0312 lb/A	45	4
-Apply early postemergence but not before the crop has at least 2 full-sized true leaves (label allows applications as early as cotyledon stage of tomatoes; but no local data is available at that stage). Not recommended for over the top application with plasticulture. -Apply with nonionic surfactant at 0.25% v/v (1.0 qt/100 gal of spray solution); use of an adjuvant may cause temporary chlorosis, but symptoms usually disappear within 5 to 15 days. -Controls many weeds including foxtail species, pigweed species, wild mustard, and wild radish. Suppresses common lambsquarters, common ragweed, jimsonweed, morningglory species, and yellow nutsedge. Optimum performance is obtained when weeds are less than 1 inch in height and are actively growing. Tank mix with metribuzin to improve broadleaf weed control. -Best results occur with 0.5 inches of rainfall or irrigation no sooner than 4 hours but not more than 5 days after application. -Matrix provides both residual and postemergence control of susceptible weed species. -Matrix is an ALS inhibiting herbicide and resistant weed populations are common in the region. **Do not** use Group 2 herbicides repeatedly in the same field. Rainfastness is 4 hrs. Maximum for Matrix: 4 oz/A per year.						
2	Sandea 75DF	0.5 to 1.0 oz/A	**halosulfuron**	0.023 to 0.047 lb/A	30	12
-Apply over the top, post directed, or with crop shields; not recommended for over the top application with plasticulture. -Apply to tomato plants that are established, actively growing and a minimum of 14 days after transplanting or after the 4th leaf stage of seeded tomatoes. Applications during bloom can cause bloom drop under certain environmental conditions. -Apply with nonionic surfactant at 0.25% v/v (1.0 qt/100 gal of spray solution). -Provides control of yellow nutsedge and certain annual broadleaf weeds. Control of weeds taller than 3 inches may not be adequate. -Sandea provides both residual and postemergence control of susceptible weed species. -Sandea is an ALS inhibiting herbicide and resistant weed populations are common in the region. **Do not** use Group 2 herbicides repeatedly in the same field. **DO NOT** apply Sandea to crops treated with a soil-applied organophosphate insecticide, or use a foliar applied organophosphate insecticide within 21 days before or 7 days after a Sandea application. -Rainfastness is 4 hrs. -**Do not** apply more than 2 applications, or more than 2 oz of product, per crop cycle; **do not** exceed 2 oz/A per 12 month period.						
3	Dacthal 6F Dacthal W-75	8.0 to 14.0 pt/A 6.0 to 14 lb/A	**DCPA**	6.0 to 10.5 lb/A	--	12
-Labeled for applications over the top of transplants. -Dacthal will not control emerged weeds; apply to weed-free soils. See comments under soil applied section						
5	Metribuzin 75DF	0.33 lb/A	**metribuzin**	0.25 lb/A	7	12
-Apply over the top, post directed, or with crop shields; not recommended for over the top application with plasticulture. -Apply postemergence to transplants with at least 5 true leaves and have recovered from transplant shock (new growth evident) or at least 2 weeks after transplanting. Transplant with fewer than 5 true leaves are at greater risk of herbicide injury. -**Do not** use hot caps on tomatoes within 7 days before or after application. -**DO NOT** apply within 3 days after periods of cool, wet, or cloudy weather or crop injury will occur. -**DO NOT** apply within 24 hrs of applications of other pesticides. -Allow at least 14 days between applications or severe crop injury may occur. -Metribuzin primarily controls broadleaf weeds and is weak on grasses. -Metribuzin has some postemergence activity. To get consistent control, apply Metribuzin before weeds are 1 inch tall. -Tank mix with appropriate postemergence herbicides if weeds are emerged at time of application. -Maximum for Metribuzin 75DF: 1.33 lb/A per crop season.						

2.Postemergence continued on next page

2. Postemergence - continued

22	Gramoxone 2SL	2.4 pt/A	**paraquat**	0.6 lb/A	30	24

-Gramoxone can be applied before or after transplanting to control emerged broadleaf weeds and grass seedlings.
-Include a nonionic surfactant at 0.25% v/v. **Do not** allow spray to contact crop foliage as injury may result. Use flaps that drag along the edge of plastic mulch and use low spray pressure (maximum of 30 psi) to reduce small droplets that are prone to drift.
-See the label for additional information and warnings.
-Rainfastness is 30 minutes. A maximum of 3 applications per year are allowed.

3. Postharvest

Group	Product Name	Product Rate	Active Ingredient (*=Restricted Use)	Active Ingredient Rate	PHI (d)	REI (h)
22	Gramoxone 2SL	2.25 to 3 pt/A	**paraquat**	0.56 to 0.75 lb/A	--	24

-**A Special Local-Needs 24(c) label has been approved for the use of Gramoxone SL 2.0 for postharvest application to desiccate the crop in DE, NJ and VA.** Apply after the last harvest for bareground or plasticulture. Always include an adjuvant.
-Spray coverage is essential for optimum effectiveness. See the label for additional information and warnings.
-Rainfastness 30 minutes. A maximum of 2 applications for crop dessication are allowed.

4. Other Labeled Herbicides These products are labeled but limited local data is available; and/or are labeled but not recommended in our region due to potential crop injury concerns.

Group	Product Name	Active Ingredient (*=Restricted Use)
2	Envoke	**trifloxysulfuron**
2	League	**imazosulfuron**
9	Roundup (various)	**glyphosate**
14	Aim	**carfentrazone**
14	Spartan	**sulfentrazone**

Insect Control

THE LABEL IS THE LAW - See the Pesticide Use Disclaimer on page F 1.
Recommended Insecticides Field Tomatoes (Fresh Market and Processing Tomatoes)

Aphids - Green Peach (GPA) and Potato

Apply one of the following formulations (thorough spray coverage between leaves is important):

Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Lannate LV	1.5 to 3.0 pt/A	methomyl*	3	48	H
1A	Vydate L	2.0 to 4.0 pt/A	oxamyl*	7	48	H
3A + 4A	Brigadier	5.10 to 9.85 fl oz/A	bifenthrin* + imidacloprid	1	12	H
3A + 4A	Leverage 360	3.8 to 4.1 fl oz/A	imidacloprid + beta-cyfluthrin*	0	12	H
3A + 4A	Swagger	7.6 to 19.7 fl oz/A	bifenthrin* + imidacloprid	1	12	H
3A + 4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	5	24	H
4A	Admire Pro	7.0 to 10.5 fl oz/A	imidacloprid - **soil**	21	12	H
4A	Admire Pro	1.3 to 2.2 fl oz/A	imidacloprid - **foliar**	0	12	H
4A	Assail 30SG	2.0 to 4.0 oz/A	acetamiprid	7	12	M
4A	Platinum 75SG	1.66 to 3.67 oz/A	thiamethoxam - **soil**	30	12	H
4A	Actara 25WDG	2.0 to 3.0 oz/A	thiamethoxam - **foliar**	0	12	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam+chlorantraniliprole - **soil**	30	12	H
4A + 28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam+chlorantraniliprole - **foliar**	1	12	H
4C	Closer SC	1.5 to 2.0 fl oz/A	sulfoxaflor	1	12	H
4D	Sivanto 200SL, Sivanto Prime	21.0 to 28.0 fl oz/A	flupyradifurone - **soil**	45	4	L
4D	Sivanto 200SL	7.0 to 12.0 fl oz/A	flupyradifurone - **foliar**	1	4	L
4D	Sivanto Prime	10.5 to 14.0 fl oz/A	flupyradifurone - **foliar**	1	4	L
9B	Fulfill 50WDG	2.75 oz/A	pymetrozine	0	12	L
9C	Beleaf 50 SG	2.0 to 4.28 oz/A	flonicamid	0	12	L
23	Movento	4.0 to 5.0 fl oz/A	spirotetramat	1	24	L
28 + 6	Minecto Pro (GPA only)	10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H
n/a	Requiem EC	2.0 to 3.0 qt/A	*Chenopodium* extract - **biopesticide**	0	4	L

Armyworms: True Armyworms (TAW), Fall Armyworms (FAW), Yellow-striped Armyworms (YSAW), Beet Armyworms (BAW)

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV	1.5 to 3.0 pt/A	methomyl*	3	48	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin*+chlorantraniliprole -.**foliar**	5	24	H
3A	Bifenture 2EC, Sniper (except BAW)	2.1 to 5.2 fl oz/A	bifenthrin*	7	12	H
3A	Hero EC (except BAW)	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	1	12	H
3A	Mustang Maxx	3.2 to 4.0 fl oz/A	zeta-cypermethrin*	1	12	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole - **soil**	30	12	H
4A + 28	Voliam flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - **foliar**	1	12	H
5	Entrust SC (OMRI)	4.0 to 8.0 fl oz/A	spinosad	1	4	M
5	Radiant SC	5.0 to 10.0 fl oz/A	spinetoram	1	4	H
6	Proclaim 5SG	2.4 to 4.8 oz/A	emamectin benzoate*	7	12	H
15	Rimon 0.83EC	9.0 to 12.0 fl oz/A	novaluron	1	12	L
18	Confirm 2F	6.0 to 8.0 fl oz/A (early season); 8.0 to 16.0 fl oz/A (late season)	tebufenozide	7	4	L
18	Intrepid 2F	4.0 to 8.0 fl oz/A (early season), 8.0 to 16.0 fl oz/A (late season)	methoxyfenozide	1	4	L
28	Coragen 1.67SC	3.5 to 7.5 fl oz/A	chlorantraniliprole - **soil, drip, foliar**	1	4	L
28	Verimark	5.0 to 10.0 fl oz/A	cyantraniliprole - **soil**	1	4	H
28	Exirel	7.0 to 13.5 fl oz/A	cyantraniliprole - **foliar**	1	12	H
28 + 3A	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Caterpillars: Tomato Fruitworms also called Corn Earworms (CEW), Hornworms (HW), European Corn Borers (ECB), Cabbage Loopers (CL)

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV	1.5 to 3.0 pt/A	methomyl*	3	48	H
3A	Danitol 2.4EC (except ECB)	10.67 fl oz/A	fenpropathrin	3	24	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + thiamethoxam	5	24	H
3A	Asana XL (except ECB)	2.9 to 5.8 fl oz/A (HW only); 5.8 to 9.6 fl oz/A (CEW, CL)	esfenvalerate*	1	12	H
3A	Bifenture 2EC, Sniper, Sniper Helios	2.1 to 5.2 fl oz/A	bifenthrin*	7	12	H
3A	Hero EC	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	1	12	H
3A	Lambda-Cy, LambdaT	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	5	24	H
3A	Mustang Maxx	2.24 to 4.0 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Proaxis	1.92 to 3.2 fl oz/A (HW, CL); 2.56 to 3.84 fl oz/A (ECB, CEW)	gamma-cyhalothrin*	5	24	H
3A	Tombstone, Tombstone Helios	1.6 to 2.8 fl oz/A (CEW, HW, ECB); 2.1 to 2.8 fl oz/A (CL)	cyfluthrin*	0	12	H
3A	Warrior II	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	5	24	H
3A + 4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	5	24	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam+chlorantraniliprole - **soil**	30	12	H
4A + 28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam+chlorantraniliprole - **foliar**	1	12	H
5	Entrust SC (OMRI)	3.0 to 6.0 fl oz/A	spinosad	1	4	M
5	Radiant SC	5.0 to 10.0 fl oz/A	spinetoram	1	4	H
6	Proclaim 5SG	2.4 to 4.8 oz/A	emamectin benzoate*	7	12	H
11A	Dipel (OMRI)	1.0 to 2.0 lb/A	*Bacillus thuringiensis kurstaki*	0	4	N

Caterpillars continued on next page

Caterpillars: Tomato Fruitworms also called Corn Earworms (CEW), Hornworms (HW), European Corn Borers (ECB), Cabbage Loopers (CL) - continued

15	Rimon 0.83EC	9.0 to 12.0 fl oz/A	novaluron	1	12	L
18	Confirm 2F	6.0 to 8.0 fl oz/A (early season); 8.0 to 16.0 fl oz/A (late season)	tebufenozide	7	4	L
18	Intrepid 2F	4.0 to 8.0 fl oz/A (early season); 8.0 to 16.0 fl oz/A (late season) (ECB, HW, CL only)	methoxyfenozide	1	4	L
22	Avaunt 30WDG (except ECB)	2.5 to 3.5 oz/A (HW, CL); 3.5 oz/A (CEW)	indoxacarb	3	12	H
28	Coragen 1.67SC	3.5 to 7.5 fl oz/A	chlorantraniliprole - **soil, drip, foliar**	1	4	L
28	Verimark	5.0 to 10.0 fl oz/A (CEW, HW); 6.75 to 10.0 fl oz/A (CL)	cyantraniliprole - **soil**	1	4	H
28	Exirel	7.0 to 13.5 fl oz/A (CEW, HW, ECB); 10.0 to 17.0 fl oz/A (CL)	cyantraniliprole - **foliar**	1	12	H
28 + 6	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Colorado Potato Beetles (CPB)

Rotation to crops other than potato, tomato, and eggplant is extremely important in reducing CPB problems. Also, transplants placed into no-till fields, mulches or other crop residue will reduce or delay potato beetle infestations.

Look for CPB adults shortly after seedling emergence or transplanting. Early season populations tend to be concentrated in areas where tomatoes or potatoes were previously grown. For direct-seeded tomatoes during emergence, treat when CPB adults are reducing plant densities below recommended levels for maximum yields. Thoroughly scout tomato fields and spray only when necessary. Also spot treatment of "hot spots" only is recommended if infestation is localized. For established direct-seeded or transplant tomatoes, begin treatment if the population level exceeds 15 CPB adults per 10 plants throughout the field. If early treatment is not applied, wait for egg hatch and spray when larvae are young and exceed 20 CPB larvae and/or adults per 10 plants. Reassess after each treatment. Avoid the application of late-season sprays to prevent the buildup of insecticide-resistant beetles.

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Vydate L	2.0 to 4.0 pt/A	oxamyl*	7	48	H
3A+4A	Brigadier	3.8 to 9.85 fl oz/A	bifenthrin* + imidacloprid	1	12	H
3A+4A	Leverage 360	3.8 to 4.1 fl oz/A	imidacloprid + beta-cyfluthrin*	0	12	H
3A+4A	Swagger	10.2 to 19.7 fl oz/A	bifenthrin* + imidacloprid	1	12	H
3A+28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	5	24	H
3A+4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	5	24	H
4A	Admire Pro	7.0 to 10.5 fl oz/A	imidacloprid - **soil**	21	12	H
4A	Admire Pro	1.3 to 2.2 fl oz/A	imidacloprid - **foliar**	0	12	H
4A	Assail 30SG	1.5 to 2.5 oz/A	acetamiprid	7	12	M
4A	Platinum 75SG	1.66 to 3.67 oz/A	thiamethoxam - **soil**	30	12	H
4A	Actara 25WDG	2.0 to 3.0 oz/A	thiamethoxam - **foliar**	0	12	H
4A	Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran - **soil**	21	12	H
4A	Scorpion 35SL	2.0 to 7.0 fl oz/A	dinotefuran - **foliar**	1	12	H
4A	Venom 70SG	5.0 to 6.0 oz/A	dinotefuran - **soil**	21	12	H
4A	Venom 70SG	1.0 to 4.0 oz/A	dinotefuran - **foliar**	1	12	H
4A+28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole - **soil**	30	12	H
4A+28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - **foliar**	1	12	H
4D	Sivanto Prime	10.5 to 14.0 fl oz/A	flupyradifurone - **foliar**	1	4	L
5	Entrust SC (OMRI)	3.0 to 6.0 fl oz/A	spinosad	1	4	M
5	Radiant SC	5.0 to 10.0 fl oz/A	spinetoram	1	4	H
6	Agri-Mek 0.7SC	1.75 to 3.5 fl oz/A	abamectin*	7	12	H
11	Trident (small larvae only; OMRI)	3.0 to 6.0 qt/A	*Bacillus thuringiensis tenebrionis*	0	0	L
15	Rimon 0.83EC	9.0 to 12.0 fl oz/A	novaluron	1	12	L
28	Coragen 1.67SC	3.5 to 7.5 fl oz/A	chlorantraniliprole - **soil, drip, foliar**	1	4	L
28	Verimark	5.0 to 10.0 fl oz/A	cyantraniliprole - **soil, drip**	1	12	H
28	Exirel	7.0 to 13.5 fl oz/A	cyantraniliprole - **foliar**	1	12	H
28 + 6	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Cutworms - See also the Pest Management chapter, Insect Management section.

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
Preplanting Field Treatment. Just before seeding or transplanting, broadcast on the soil surface the following:						
1B	Diazinon AG500	2.0 to 4.0 qt/A	diazinon*	n/a	48	H
3A	Capture LFR	3.4 to 6.8 fl oz/A	bifenthrin*	n/a	12	H
Postplanting Treatment. If control is required after seedling emergence or after transplanting, treat soil thoroughly beneath plants with the following:						
3A	Asana XL	5.8 to 9.6 fl oz/A	esfenvalerate*	7	12	H
3A + 28	Voliam Xpress	5.0 to 8.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	5	24	H
3A	Bifenture 2EC, Sniper, Sniper Helios	2.1 to 6.4 fl oz/A	bifenthrin*	7	12	H
3A	Hero EC	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	1	12	H
3A	Lambda-Cy, LambdaT	1.92 to 3.2 fl oz/A	lambda-cyhalothrin*	5	24	H
3A	Mustang Maxx	2.24 to 4.0 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Proaxis	1.92 to 3.2 fl oz/A	gamma-cyhalothrin*	5	24	H
3A	Warrior II	0.96 to 1.6 fl oz/A	lambda-cyhalothrin*	5	24	H

Flea Beetles

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
3A	Asana XL	5.8 to 9.6 fl oz/A	esfenvalerate	7	12	H
3A	Baythroid XL	2.8 fl oz/A	beta-cyfluthrin*	7	12	H
3A + 4A	Brigadier	3.8 to 9.85 fl oz/A	bifenthrin* + imidacloprid	1	12	H
3A + 4A	Leverage 360	4.1 fl oz/A	imidacloprid + beta-cyfluthrin*	0	12	H
3A + 4A	Swagger	7.6 to 19.7 fl oz/A	bifenthrin* + imidacloprid	1	12	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	5	24	H
3A	Bifenture EC, Sniper, Sniper Helios	2.1 to 5.2 fl oz/A	bifenthrin*	7	12	H
3A	Hero EC	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	1	12	H
3A	Lambda-Cy, LambdaT	2.56 to 3.84 fl oz/A	lambda-cyhalothrin*	5	24	H
3A	Mustang Maxx	2.24 to 4.0 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Proaxis	2.56 to 3.84 fl oz/A	gamma-cyhalothrin*	5	24	H
3A	Tombstone, Tombstone Helios	2.8 fl oz/A	cyfluthrin*	0	12	H
3A	Warrior II	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	5	24	H
3A + 4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	5	24	H
4A	Admire Pro	7.0 to 10.5 fl oz/A	imidacloprid - **soil**	21	12	H
4A	Platinum 75SG	1.66 to 3.67 oz/A	thiamethoxam - **soil**	30	12	H
4A	Actara 25WDG	2.0 to 3.0 oz/A	thiamethoxam - **foliar**	0	12	H
4A	Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran - **soil**	21	12	H
4A	Scorpion 35SL	2.0 to 7.0 fl oz/A	dinotefuran - **foliar**	1	12	H
4A	Venom 70SG	5.0 to 6.0 oz/A	dinotefuran - **soil**	21	12	H
4A	Venom 70SG	1.0 to 4.0 oz/A	dinotefuran - **foliar**	1	12	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole - **soil, drip**	30	12	H
4A + 28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - **foliar**	1	12	H
28	Verimark	6.75 to 13.5 fl oz/A	cyantraniliprole - **soil**	1	4	H

Leafminers

Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
Treat with one of the following formulations when first mines appear and repeat every 7 days or as needed.						
1B	Dimethoate 4EC	0.5 to 1.0 pt/A	dimethoate*	7	48	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda*-cyhalothrin + chlorantraniliprole	5	24	H
4A	Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran - **soil**	21	12	H

Leafminers continued on next page

Leafminers - continued

4A	Scorpion 35SL	2.0 to 7.0 fl oz/A	dinotefuran - **foliar**	1	12	H
4A	Venom 70SG	5.0 to 6.0 oz/A	dinotefuran - **soil**	21	12	H
4A	Venom 70SG	1.0 to 4.0 oz/A	dinotefuran - **foliar**	1	12	H
5	Entrust SC (OMRI)	6.0 to 10.0 fl oz/A	spinosad	1	4	M
5	Radiant SC	6.0 to 10.0 fl oz/A	spinetoram	1	4	H
6	Agri-Mek 0.7SC	1.75 to 3.5 fl oz/A	abamectin*	7	12	H
6	Proclaim 5SG	3.2 to 4.8 oz/A	emamectin benzoate*	7	12	H
16B	Rimon 0.83EC	12 fl oz/A	novaluron	1	12	L
17	Trigard 75WSP	2.66 oz/A	cyromaxine	0	12	L
28	Coragen 1.67SC (larvae only)	5.0 to 7.5 fl oz/A	chlorantraniliprole - **soil, drip, foliar**	1	4	L
28	Exirel	13.5 to 20.5 fl oz/A	cyantraniliprole - **foliar**	1	4	H
28	Verimark	6.75 to 10.0 fl oz/A	cyantraniliprole - **drip or injection**	1	4	H
28	Verimark	6.75 to 13.5 fl oz/A	cyantraniliprole - **soil (at-planting)**	1	4	H
28 + 6	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Mites

Mite infestations generally begin around field margins, grassy areas, and windbreaks. **DO NOT** mow or maintain these areas after midsummer since this forces mites into the crop. Localized infestations can be spot treated. The use of dimethoate for aphids and leafminers will reduce spider mite populations.

Apply one of the following formulations:
Note: Thorough spray coverage beneath leaves is important.

Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
6	Agri-Mek 0.7SC	1.75 to 3.5 fl oz/A	abamectin*	7	48	H
21A	Portal / Portal XLO	2.0 pt/A	fenpyroximate	1	12	L
23	Oberon 2S	7.0 to 8.5 fl oz/A	spiromesifen	1	12	M
25	Acramite 50WS	0.75 to 1.0 lb/A	bifenazate	3	12	L
28 + 6	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Pinworms

This pest is introduced on southern transplants. Begin sprays if leaf damage is observed. Late evening sprays may be most effective when moths are active.

Apply one of the following formulations:

Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Lannate LV	1.5 to 3.0 pt/A	methomyl*	3	48	H
3A	Asana XL	5.8 to 9.6 fl oz/A	esfenvalerate*	7	12	H
3A + 4A	Leverage 360	3.8 to 4.1 fl oz/A	imidacloprid + beta-cyfluthrin*	0	12	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	5	24	H
3A	Baythroid XL	2.1 to 2.8 fl oz/A	beta-cyfluthrin*	7	12	H
3A	Hero EC	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	1	12	H
3A	Lambda-Cy, LambdaT	2.56 to 3.84 fl oz/A	lambda-cyhalothrin*	5	24	H
3A	Mustang Maxx	2.24 to 4.0 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Proaxis	2.56 to 3.84 fl oz/A	gamma-cyhalothrin*	5	24	H
3A	Tombstone, Tombstone Helios	2.1 to 2.8 fl oz/A	cyfluthrin*	7	12	H
3A	Warrior II	1.28 to 1.92 fl oz/A	Warrior II	5	24	H
4A	Platinum 75SG	1.66 to 3.67 oz/A	thiamethoxam - **soil**	30	12	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole - **soil**	30	12	H
4A + 28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - **foliar**	1	12	H
5	Entrust SC (OMRI)	4.0 to 8.0 fl oz/A	spinosad	1	4	M
5	Radiant SC	5.0 to 10.0 fl oz/A	spinetoram	1	4	H
6	Agri-Mek 0.7SC	1.75 to 3.5 fl oz/A	abamectin*	7	48	H
6	Proclaim 5SG	2.4 to 4.8 oz/A	emamectin benzoate*	7	12	H
16B	Rimon 0.83EC	9.0 to 12.0 fl oz/A	novaluron	1	12	L
22	Avaunt 30WDG	3.5 oz/A	indoxacarb	3	12	H
28	Coragen 1.67SC (larvae)	3.5 to 7.5 fl oz/A	chlorantraniliprole - **soil/drip/foliar**	1	4	L

Pinworms continued on next page

Pinworms - continued

28	Exirel	7.0 to 13.5 fl oz/A	cyantraniliprole - **foliar**	1	12	H
28	Verimark	5.0 to 10.0 fl oz/A	cyantraniliprole - **soil**	1	4	H
228 + 6	Minecto Pro	10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H
n/a	NoMate TPW[1]	200 to 400 spirals/A	mating disruption hormone	n/a	n/a	n/a

[1]NoMate uses a disruption pheromone for preventing mating of emerging adults from young transplants. The pheromone is applied to a hard plastic matrix formed into a hanging "spiral" for dispersal into the air. Apply at first sign of pinworm larvae in leaves.

Stink Bugs

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV (brown marmorated stink bug only)	3.0 pt/A	methomyl*	3	48	H
3A	Danitol 2.4EC	10.67 fl oz/A	fenpropathrin*	3	24	H
3A + 4A	Brigadier	5.1 to 9.85 fl oz/A	bifenthrin* + imidacloprid	1	12	H
3A + 4A	Leverage 360	4.1 fl oz/A	imidacloprid + beta-cyflutthrin*	0	12	H
3A + 4A	Swagger	7.6 to 19.7 fl oz/A	bifenthrin* + imidacloprid	1	12	H
3A	Baythroid XL	2.8 fl oz/A	beta-cyfluthrin*	7	12	H
3A	Bifenture 2EC, Sniper	5.2 fl oz/A	bifenthrin*	7	12	H
3A	Hero EC	10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	0	12	H
3A	Lambda-Cy, LambdaT	3.84 fl oz/A	lambda-cyhalothrin	5	24	H
3A	Mustang Maxx	4.0 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Proaxis	3.84 fl oz/A	gamma-cyhalothrin*	5	24	H
3A	Tombstone, Tombstone Helios	2.8 fl oz/A	cyfluthrin*	7	12	H
3A	Warrior II	1.92 fl oz/A	lambda-cyhalothrin*	5	24	H
3A + 4A	Endigo ZC	4.5 fl ozA	lambda-cyhlalothrin	5	24	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	5	24	H
4A	Actara 25WDG	5.5 oz /A	thiamethoxam	0	12	H
4A	Scorpion 35SL	10.5 fl oz/A	dinotefuran - **soil**	21	12	H
4A	Scorpion 35SL	7.0 fl oz/A	dinotefuran - **foliar**	1	12	H
4A	Venom 70SG	6.0 oz/A	dinotefuran - **soil**	21	12	H
4A	Venom 70SG	4.0 oz/A	dinotefuran - **foliar**	1	12	H
4A+28	Durivo	10.0 to 13.0 fl oz/A	lambda-cyhalothrin*+chlorantraniliprole -**soil**	30	12	H
4A+28	Voliam Flexi	4.0 to 7.0 oz/A	lambda-cyhalothrin*+chlorantraniliprole -**foliar**	1	12	H

Thrips

Several species of thrips spread Tomato Spotted Wilt Virus. Scout for thrips and begin treatments when observed. Do not produce vegetable transplants with bedding plants in the same greenhouse.

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
3A	**Baythroid XL[1]**	1.6 to 2.8 fl oz/A	beta-cyfluthrin*	7	12	H
3A	**Lambda-cy, LambdaT[1]**	2.56 to 3.84 fl oz/A	lambda-cyhalothrin*	5	24	H
3A	**Proaxis[1]**	2.56 to 3.84 fl oz/A	gamma-cyhalothrin*	5	24	H
3A	**Tombstone, Tombstone Helios[1]**	2.1 to 2.8 fl oz/A	cyfluthrin*	7	12	H
3A	**Warrior II[1]**	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	5	24	H
3A + 4A	Endigo ZC[1]	4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	5	24	H
3A + 4A	Leverage 360 (foliage feeding thrips only)	3.8 to 4.1 fl oz/A	imidacloprid + beta-cyfluthrin*	0	12	H
4A	Admire Pro (foliage feeding thrips only)	7.0 to 10.5 fl oz/A	imidacloprid - **soil**	21	12	H
4A	Assail 30SG	4.0 oz/A	acetamiprid	7	12	M
4A	Platinum 75SG	1.66 to 2.67 oz/A	thiamethoxam	30	12	H
4A	Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran - **soil**	21	12	H
4A	Scorpion 35SL	2.0 to 7.0 fl oz/A	dinotefuran - **foliar**	1	12	H

Thrips continued on next page

Thrips - continued

4A	Venom 70SG	5.0 to 6.0 oz/A	dinotefuran - **soil**	21	12	H
4A	Venom 70SG	1.0 to 4.0 oz/A	dinotefuran - **foliar**	1	12	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole - **soil**	30	12	H
5	Entrust SC (OMRI)	4.0 to 8.0 fl oz/A	spinosad	1	4	M
5	Radiant SC	6.0 to 10.0 fl oz/A	spinetoram	1	4	H

[1]Resistance concerns with Western flower thrips only

Whiteflies

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
4A	Actara 25WDG	3.0 to 5.5 oz/A	thiamethoxam - **foliar**	0	12	H
4A	Admire Pro	7.0 to 10.5 fl oz/A	imidacloprid - **soil**	21	12	H
4A	Assail 30SG	2.5 to 4.0 oz/A	acetamiprid	7	12	H
4A	Platinum 75SG	1.66 to 3.67 oz/A	thiamethoxam - **soil**	30	12	H
4A	Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran - **soil**	21	12	H
4A	Scorpion 35SL	2.0 to 7.0 fl oz A	dinotefuran - **foliar**	1	12	H
4A	Venom 70SG	5.0 to 6.0 oz/A	dinotefuran - **soil**	21	12	H
4A	Venom 70SG	1.0 to 4.0 oz/A	dinotefuran - **foliar**	1	12	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole - **soil**	30	12	H
4A + 28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - **foliar**	1	12	H
4C	Closer SC	4.25 to 4.5 fl oz/A	sulfoxaflor	1	12	H
4D	Sivanto 200SL, Sivanto Prime	21.0 to 28.0 fl oz/A	flupyradifurone - **soil**	45	4	L
4D	Sivanto 200SL, Sivanto Prime	10.5 to 14.0 fl oz/A	flupyradifurone - **foliar**	1	4	L
7C	Knack	8.0 to 10.0 fl oz/A	pyriproxyfen	1	12	L
9B	Fulfill 50WDG	2.75 oz/A	pymetrozine	0	12	L
16	Courier SC	9.0 to 13.6 fl oz/A	buprofezin	1	12	L
21A	Portal, Portal XLO	2.0 pt /A	fenpyroximate	1	12	L
23	Movento	4.0 to 5.0 fl oz/A	spirotetramat	1	24	L
23	Oberon 2SC	7.0 to 8.5 fl oz/A	spiromesifen	1	12	M
28 + 6	Minecto Pro	10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H
n/a	Requiem EC (biopesticide)	2.0 to 3.0 qt/A	*Chenopodium* extract	0	4	L

Disease Control

THE LABEL IS THE LAW - See the Pesticide Use Disclaimer on page F 1.

Recommended Fungicides

Nematodes See the Soil Fumigation and Nematodes sections in the Pest Management chapter

Seed Treatment

Purchase hot water treated seed or request hot water treatment. Heat treatment is a non-chemical alternative to conventional chlorine treatments that only kills pathogens on the surface of the seed coat. Heat treatment has the additional benefit of killing pathogens within the seed coat and is particularly useful for crops that are prone to seed-borne bacterial infections such as tomato and pepper. Seed heat treatment follows a strict time and temperature protocol and is best done with thermostatically controlled water baths. Two baths are required: one for pre-heating, and a second for the effective (pathogen killing) temperature. Seeds stay in the first bath at 100ºF (38ºC) for 10 minutes, and in the second bath at 122°F (50°C) for 25 minutes. Immediately after removal from the second bath, seeds should be thoroughly rinsed with cool water, and dried on a screen or paper.

Alternatively, soak seeds in a mixture of 1 part Alcide (sodium chlorite), 1 part lactic acid, and 18 parts water for 1-2 minutes under constant agitation, and rinse for 5 minutes in cool running water. Do not use pelleted seeds because moisture results in the loss of coating material. (

Only treat seed that will be used during the current production season. Following heat or chlorine treatment, dust dried seed with Captan 50WP or Thiram 480DP at 1 level tsp/lb seed (3.0 oz/100 lb).

Damping-off and Root Rots

Greenhouse: Use seed treatment and plant in a disease-free mix.
Field: At planting apply one of the fungicides via drip or banded spray. Additional field applications may be made as needed, see label for specific instructions.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
4	MetaStar 2E AG	2.0-4.0 pt/A	metalaxyl	AP	48	N
4	Ridomil Gold 4SL[1]	1.0-2.0 pt/A[1]	mefenoxam	AP	48	N
4	Ultra Flourish 2E[1]	2.0-4.0 pt/A[1]	mefenoxam	AP	48	N
33	Aliette 80WDG	2.5 to 5.0 lb/A	Fosetyl-Al	14	12	N

[1]Apply in a 7-inch band at transplanting. Determine the amount of Ridomil Gold or Ultra Flourish per acre using the calibration formula for changing from broadcast to band application (see the section "Calibrating Granular Applicators" in the Pest Management chapter).

Bacterial Diseases:

Bacterial Canker

Use certified transplants. Rotate to allow 3 years between plantings. When producing transplants, use clorox or heat-treated seed and treat used flats with sodium hypochlorite (bleach) (see the section Transplant Growing in the General Production Recommendations chapter). Stakes from bacterial canker infested fields should be power washed, soaked in a 20% (1 part bleach plus 4 parts water) commercial bleach solution for at least 30 minutes, and power wash a second time prior to use. Avoid pruning and stringing when foliage is wet as this will promote the spread of the disease in infested fields. Applications of Actigard 50WG (0.33 oz/A increasing to 0.75 oz/A when plants are full size, see label) PLUS fixed copper (1.5 lb active/A) have been shown to reduce bacterial canker symptoms on fruit.

Bacterial Speck and Bacterial Spot

When producing transplants, use clorox or heat-treated seed as described above under Seed Treatment. Apply streptomycin sprays (Agri-Mycin 17, Agri-Strep, 1.0 lb/100 gal, 1.25 tsp/gal) when the first true leaves appear and continue every 4-5 days until transplanting. Streptomycin cannot be used after transplanting. Limit handling of plants and keep greenhouse moisture levels low.

Rotate to allow 2 - -3 years between plantings. Use only certified transplants. Bacterial speck and/or spot occur more often on southern-produced transplants. Strains of copper resistant bacterial spot are common in some areas of the mid-Atlantic particularly on the Eastern Shore of VA. Use Actigard alone or in conjunction with copper-containing materials. Where disease is present or anticipated, do not work in fields when plant surfaces are wet.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Tank mix the following beginning shortly after transplanting and repeat every 7 days.						
M1	copper (OMRI)	1.0 lb ai/A	copper	0	see label	N
M3	mancozeb 75DF	1.5 lb/A	mancozeb	5	12/24	N
And rotate with or apply the following:						
M1 + M3	ManKocide 61WP	2.5 to 5.0 lb/A	copper hydroxide + mancozeb	5	48	N
The following is a plant defense activator and preventative applications should begin prior to the onset of symptoms.						
P1	Actigard 50WG[1]	0.33 to 0.75 oz/A (see label)	acibenzolar-S-methyl	14	12	N

[1]Use in areas where copper resistance is known. See label for rates and times of use.

Bacterial Wilt

Use certified transplants. Avoid growing tomatoes in fields where bacterial wilt has occurred. Crop rotation to non--host crops is the best measure to reduce levels of bacterial wilt. In particular, avoid planting where tomatoes or peppers were grown in the preceding year. Some resistant cultivars, such as BHN669, are available. Avoid irrigating with pond water when possible, especially for ponds that are adjacent to previously diseased fields as they may be contaminated with the causal agent.

Fungal Diseases:

Botrytis Fruit Rot (Gray Mold)

Gray mold is a problem during the fall in fields with dense foliage and poor drainage. For fall production, select fields with good drainage.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Shortly before harvest or when conditions are wet and cool, rotate the following as long as weather conditions favor disease development:						
M5	chlorothalonil 6F	2.0 to 2.75 pt/A also very good for late blight	chlorothalonil	0	12	N
7	Endura 70WG	9.0 to 12.5 oz/A also very good for early blight	boscalid	0	12	--
9 + 12	Switch 62.5WG	11.0 to 14.0 oz/A	cyprodinil + fludioxonil	0	12	N

Buckeye Rot caused by *Phytophthora parasitica* and Fruit Rot caused by *Pythium* spp.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Apply one of the following as a soil surface application under the vines 48 weeks before harvest. Apply broadcast or banded (adjust amount). Irrigate after application.						
4	Ridomil Gold 4SL	1.0 pt/A	mefenoxam	AP	48	N
4	Ultra Flourish 2E	1.0 qt/A	mefenoxam	AP	48	N
An alternative to soil application of mefenoxam: Apply one of the following as a foliar spray beginning when crown fruit are one-third their final size. repeat every 14 days up to a total of 3 times:						
4 + M1	Ridomil Gold Copper 65WP	2.0 lb/A	mefenoxam + copper	14	48	--
4 + M5	Flouronil 76WP	2.0 lb/A	mefenoxam + chlorothalonil	14	48	--
4 + M5	Ridomil Gold Bravo 76WP	2.0 lb/A	mefenoxam + chlorothalonil	14	48	--
If weather and soil conditions continue to favor disease development apply one of the following between applications of the above listed fungicides:						
11 + 27	Tanos 50WG	8.0 oz/A	famoxadone + cymoxanil	3	12	--
22 + M3	Gavel 75DF	1.5 to 2.0 lb/A	mancozeb + zoxamide	5	48	--

Fusarium Wilt and Verticillium Wilt

Select varieties with resistance to Fusarium and Verticillium wilts. For Fusarium wilt, select cultivars that are resistant to Races 1, 2, and 3 as all are prevalent on in the Mid-Atlantic region. Soil fumigation and proper crop rotation are essential components of a successful management program.

Late Blight

Use disease free transplants. If possible, produce your own transplants since transplants obtained from other regions may increase the risk of a late blight infestation. A strong scouting program, preventative fungicide applications when warranted, and microclimate management to reduce levels of free moisture on foliage are essential to help reduce the potential for disease development. Tomato cultivars with resistance to Late blight are available.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
When plants are 6 inches tall, apply one of the following protectant fungicides and repeat every 7 days.						
M3	mancozeb 75DF	3.0 lb/A	mancozeb	5	12,24	N
M3+22	Gavel 75DF	1.5 to 2.0 lb/A	mancozeb + zoxamide	5	48	--
M5	chlorothalonil 6F	1.0 to 3.0 pt/A	chlorothalonil	0	12	N
M5+22	Zing! 4.9SC	36.0 fl oz/A	chlorothalonil + zoxamide	7	12	N
Protectant fungicides should only be applied preventatively. Monitor the movement of the disease at *http://www.usablight.org/* or via local online Extension resources. Once late blight is detected in your area, TANK MIX one of the following translaminar fungicides which can move into and through leaves WITH A PROTECTANT FUNGICIDE such as chlorothalonil, Gavel, or mancozeb. Products containing mefenoxam should not be used unless your extension professional or the aforementioned website are certain that current strains are sensitive. To achieve the best control rotate between one of the following options:						
3 + 40	Revus Top 4.16SC	5.5 to 7.0 fl oz/A; also offers protection from leaf spots; **not** for use on small fruited varieties.	difenoconazole + mandipropamid	1	12	M
11	Reason 500SC	5.5 to 8.2 fl oz/A	fenamidone	14	12	--
11+27	Tanos 50WG	8.0 oz/A; also offers protection from leaf spots	famoxadone + cymoxanil	3	12	--

Late Blight continued on next page

Late Blight - continued

21	Ranman 400SC	2.10 to 2.75 fl oz/A	cyazofamid	0	12	L
27	Curzate 60DF	3.2 to 5.0 oz/A	cymoxanil	3	12	N
28	Previcur Flex 6F	1.5 pt/A	propamocarb HCL	5	12	N
40	Forum 4.18SC	6.0 fl oz/A	dimethomorph	4	12	N
43	Presidio 4SC	3.0 to 4.0 fl oz/A	fluopicolide	2	12	L
GREENHOUSE USE: Consult fungicide labels to ensure greenhouse applications are permitted. The following materials permit greenhouse applications and can offer suppression. Apply one of the following:						
M5+33	Catamaran 5.3F	5.5 to 7.0 pt/A	chlorothalonil + phosphite	0	12	--
11	Heritage 50WG	1.6 to 2.0 oz/A	azoxystrobin	0	4	N

Leaf Mold

Leaf mold is caused by the fungus *Passalora fulva* (previously called *Fulvia fulva* or *Cladosporium fulvum*). Leaf mold may occur during periods of high moisture particularly within the canopy.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Apply or rotate between the following fungicides as long as conditions are favorable for disease development:						
M5 + 33	Catamaran 5.3F	4.5 to 7.0 pt/A	chlorothalonil + phosphite	4	12	--
3 + 40	Revus Top 4.16SC	5.5 to 7.0 fl oz/A	difenoconazole + mandipropamid	1	12	M

Leaf mold is primarily damaging in greenhouse and high tunnel tomato settings with long periods of high relative humidity. Vent structures regularly to reduce humidity and leaf wetness. See Table E-10 for fungicides labeled for use in greenhouses.

Leaf Spots caused by Early blight and Septoria leaf spot and Fruit Rots caused by Anthracnose and Early blight:

Follow a crop rotation with at least 2 years without tomatoes or potatoes. Use disease-free transplants and disease resistant varieties when possible. In high elevated areas, in fields not rotated away from tomatoes, or in late planted fields begin sprays shortly after transplanting. In all other areas, follow a regular (7-day) spray schedule.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Alternate or tank mix one of the following protectant fungicides:						
M3	mancozeb 75DF	3.0 lb/A (also for gray leaf spot and leaf mold)	mancozeb	5	12/24	N
M3 + 22	Gavel 75DF	1.5 to 2.0 lb/A	mancozeb + zoxamide	5	48	--
M5	chlorothalonil 6F	2.0 to 3.0 pt/A (also for gray leaf spot, black mold and soil rot)	chlorothalonil	0	12	N
M5 + 22	Zing! 4.9SC	36.0 fl oz/A	chlorothalonil + zoxamide	7	12	N
WITH one of the following fungicides (fungicides from different FRAC codes should be rotated to help reduce the chances for fungicide resistance development):						
3 + 7	Aprovia Top 1.62SC	10.5 to 13.5 fl oz/A	difenoconazole + benzovindiflupyr	0	12	N
3 + 9	Inspire Super 2.82SC	16.0 to 20.0 fl oz/A	difenoconazole + cyprodonil	0	12	--
3 + 11	Quadris Top 2.72SC	8.0 fl oz/A	difenoconazole + azoxystrobin	0	12	--
3 + 40	Revus Top 4.16SC	5.5 to 7.0 fl oz/A	difenoconazole + mandipropamid	1	12	M
7	Endura 70W	2.5 to 3.5 oz/A (also for *Botrytis* at 9.0 to 12.5 oz/A)	boscalid	3	12	--
7	Fontelis 1.67SC	16.0 to 24.0 fl oz/A	penthiopyrad	0	12	L
7 + 11	Priaxor 4.17SC	4.0 to 8.0 fl oz/A	fluxapyroxad + pyraclostrobin	7	12	N
11	azoxystrobin 2.08SC	5.0 to 6.2 fl oz/A (also for black mold and buckeye rot. **Do not** apply near apples, see label)	azoxystrobin	0	4	N
11	Cabrio 20EG	8.0 to 12.0 oz/A	pyraclostrobin	0	12	N
11	Flint 50WDG	4.0 oz/A (**Do not** apply near Concord grapes)	trifloxystrobin	3	12	N
11 + 27	Tanos 50W	8.0 oz/A *PLUS* protectant fungicide (also for buckeye rot suppression and gray leaf spot).	famoxadone + cymoxanil	12	3	--

Postharvest Rots

Avoid harvesting when the foliage is wet. To prevent rots in mature green tomatoes, avoid washing freshly harvested fruit in cold water. To prevent movement of bacteria into the stem end of the fruit, do not allow water temperatures in flumes and tanks of more than 10°F above fruit temperature. Use a minimum of 100 ppm free chlorine and keep pH between 6.5-7.0 in the flume. Store at 55°F (13°C) with relative humidity of 80%. For more information on postharvest tomato diseases, see *http://edis.ifas.ufl.edu/HS131*.

Powdery Mildew

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
At first appearance of the disease, rotate between the following fungicides[1]:						
FIELD, repeat every 7 to 14 days:						
3	Rally 40WSP	2.5 to 4.0 oz/A	myclobutanil	0	12	**N**
3 + 7	Aprovia Top 1.62SC	10.5 to 13.5 fl oz/A	difenoconazole + benzovindiflupyr	0	12	**N**
3 + 9	Inspire Super 2.82SC	16.0 to 20.0 fl oz/A	difenoconazole + cyprodonil	0	12	--
3 + 40	Revus Top 4.16SC	5.5 to 7.0 fl oz/A	difenoconazole + mandipropamid	1	12	M
11	Cabrio 20EG	8.0 to 12.0 oz/A	pyraclostrobin	0	12	N
13	Quintec 2.08SC	6.0 fl oz/A	quinoxyfen	3	12	--
GREENHOUSE[2], thoroughly cover upper and lower leaf surfaces and repeat every 7 days:						
--	JMS Stylet Oil	1.0 to 2.0 gal/100 gal				--
9	Scala 5SC	7.0 fl oz/A	pyrimethanil	1	12	--

[1] Fungicides from different FRAC codes should be rotated to help reduce the chances for fungicide resistance development. [2] Powdery mildew can cause serious problems in greenhouse and high tunnel settings. See Table E-14 for additional fungicides labeled for use in greenhouses.

Southern Blight (*Sclerotium rolfsii*)

Southern blight is most commonly seen in the southern part of the Mid-Atlantic region. High soil moisture and temperature favor disease, while long crop rotations with corn and small grains help reduce disease incidence. Weed control is important as *Sclerotium rolfsii* can infect a number of common weeds in the Mid-Atlantic region. Soil fumigation and staking will greatly reduce disease incidence. Applications of Blocker 4F in transplant water or as an in-furrow treatment may suppress the disease.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
1	Blocker 4F	See label	pentachloronitrobenzene (PCNB)	AP	**12**	--

Timber Rot (*Sclerotinia sclerotiorum)*

Tomato timber rot, also known as sclerotinia stem rot, is a fungal disease caused by *Sclerotinia sclerotiorum*. Rotate away from fields where snap or lima beans, peas, peanuts, lettuce, or cucurbits were grown in the past. -- Timber rot occurs during prolonged wet periods and cooler temperatures (<80°F).

Viruses: Tomato Spotted Wilt Virus (TSWV)

TSWV can result in severely stunted plants. The virus is spread by thrips from ornamental flowering plants, field crops, and weeds to tomatoes. TSWV can be particularly devastating in southern and eastern parts of VA. Use resistant varieties when available. Do not grow any ornamental bedding plants in the same greenhouse as tomato transplants. Control weeds in and around greenhouses, high tunnels, or transplant areas. Monitor greenhouses and tomato fields for thrips and begin an insecticide control program once observed. Use of reflective mulch can help repel thrips. If tomato crops are near wheat or barley fields be aware of increased thrips pressure once these crops start to turn brown in the spring.

For Immediate Medical Attention

Call 911

For a Pesticide Exposure Poisoning Emergency Call

For All States

This number will automatically connect you to the poison center nearest you.
Anyone with a poisoning emergency can call the toll-free telephone number for help. Personnel at the Center will give you frst-aid information and direct you to local treatment centers if necessary.

For Pesticide Spills

Small Spills: See the product label for cleanup advice.
Large spills: Call the National Response Center at 1-800-424-8802 or CHEMTREC at 800-424-9300 (24 hours) - Industry assistance with emergency response cleanup procedures for large, dangerous spills.
Be aware of your responsibility to report spills to the proper state agency.