

Chapter 17. Tomato Production

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Botany and Planting

Tomato - *Solanum lycopersicum*, Solanaceae

Table 17.1. Planting information for tomato.

Planting dates	
North Florida	July-Aug ; Feb-Apr
West-central Florida	Aug-Sept; Jan-Feb
South Florida	Aug-Feb
Planting information	
Distance between rows (in.)	48-72
Distance between plants (in.)	18-32
Seed per acre (lb.)	0.5-0.75
Days to maturity	70-90
Plant population per acre	3630-4356

Cultivars

1. LARGE FRUITED AND BEEFSTEAK TYPES

Amelia. Vigorous determinate, main season, jointed hybrid. Fruit are firm and aromatic suitable for green or vine ripe. Good crack resistance. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3), root-knot nematode, gray leaf spot and Tomato spotted wilt.

Bella Rosa. Midseason maturity. Fruit are large to extra-large, deep globed shaped with firm, uniform green fruits well suited for mature green or vine-ripe production. Determinate, medium to tall vine. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), gray leaf spot, and tomato spotted wilt.

BHN 602. Early-midseason maturity. Fruit are globe shape but larger than BHN 640, and green shouldered. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3) and tomato spotted wilt.

BHN 730. Fusarium Crown Rot and Bacterial Speck resistant for mature green production. Smooth fruit and a strong bush that produces well even on poor soils. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1, 2), Fusarium Crown Rot, Bacterial Speck

BHN 975. Midseason maturity. "Hot set" variety. Strong bush with large, smooth fruit. Resistant: Fusarium crown and root rot, Fusarium wilt (races 1 and 2), Verticillium wilt (race 1).

Charger. Vigorous plant with good vine cover. Large, smooth, deep oblate fruit with excellent firmness and color. Resistant: Fusarium wilt (races 1, 2, and 3), tomato yellow leaf curl, Verticillium wilt (race 1) and Alternaria stem canker.

Crista. Midseason maturity. Large, deep globe fruit with tall robust plants. It does best with moderate pruning and high fertility. Good flavor, color and shelf-life. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3), tomato spotted wilt and root-knot nematode.

Fletcher. Midseason maturity. Large, globe to deep oblate fruit with compact plants. Does best with moderate pruning and high fertility. Good flavor, color and shelf-life. For vine ripe use only due to nipple characteristic on green fruit. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), tomato spotted wilt and root-knot nematode.

Florida 47. A late midseason, determinate, jointed hybrid. Uniform green, globe-shaped fruit. Resistant: Fusarium wilt (races 1 and 2), Verticillium wilt (race 1), Alternaria stem canker, and gray leaf spot.

Florida 91. Midseason variety. Uniform green fruit borne on jointed pedicels. Determinate plant. Good fruit setting ability under high temperatures. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), Alternaria stem canker, and gray leaf spot.

HM 1823. Determinant round tomato, early maturing variety with a strong plant and large to extra-large round fruit. Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), Fusarium crown and root rot and gray leaf spot.

HM 8849 CR. Early maturing variety with a strong plant and good leaf cover. Fruit extra-large, smooth and slightly flatten globe. Resistance: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), Fusarium crown and root rot and gray leaf spot.

Phoenix. Early mid-season. Fruit are large to extra-large, high quality, firm, globe-shaped and are uniformly-colored. "Hot-set" variety. Determinate, vigorous vine with good leaf cover for fruit protection. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), Alternaria stem canker and gray leaf spot.

Quincy. Full season. Fruit are large to extra-large, excellent quality, firm, deep oblate shape and uniformly colored. Very strong determinate plant. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), Alternaria stem canker, tomato spotted wilt and gray leaf spot.

Raceway (STM9203). Main season. Mid vigorous with good vine cover, suited for light pruning. Mostly extra-large, smooth, deep oblate fruit with good firmness and color. Mature green and vine ripe. Resistance: Alternaria stem canker, Fusarium crown and root rot, Fusarium wilt (races 1 and 2), Verticillium wilt (race 1) and Intermediate resistance: Gray leaf spot.

Rally. Mid-season. Excellent quality fruit with good flavor and color for the premium markets. Vigorous with good vine cover, suited for light pruning. Large, very smooth, globe shaped fruit with excellent firmness. Resistance: Alternaria stem canker, Fusarium crown and root rot, Fusarium wilt (races 1 and 2), Tomato mosaic, Verticillium wilt (race 1) and Intermediate resistance: Intermediate resistance: Gray leaf spot and Tomato yellow leaf curl.

Red Defender. Medium maturity. Vigorous vine with smooth, large deep red fruit with excellent firmness and shelf life Resistant: to Alternaria stem canker, Fusarium wilt (races 1 and 2), gray leaf spot, tomato spotted wilt and Verticillium wilt (race 1).

Redline. Main season spring variety. Tall determinate with good cover. Good fruit quality for vine ripe or mature green production. Resistance: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3), Tomato spotted wilt and gray leaf spot.

Rocky Top. Mid-season. Mostly extra-large and large firm fruit. Great eating quality and is well adapted for vine ripe production as well as high tunnel production. Resistance: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3), gray leaf spot.

RFT 6153. Main season. Fruit have good eating quality and fancy appearance in a large sturdy shipping tomato and are firm enough for vine-ripe. Large determinate plants. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2) and gray leaf spot.

Ridge Runner. Medium tall, determinate for the mature green market. Mid-early variety for warm conditions. Resistance: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), Fusarium Crown and Root Rot, Tomato Yellow Leaf Curl.

Sanibel. Main season. Large, firm, smooth fruit with light green shoulder and a tight blossom end. Large determinate bush. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), root-knot nematodes, Alternaria stem canker and gray leaf spot.

Sebring. A main season, determinate, jointed hybrid with smooth, deep oblate, firm, thick walled fruit. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3) Fusarium crown rot, gray leaf spot.

Security 28. An early season determinate variety with a medium vine and good leaf cover adapted to different growing conditions. Produces extra-large, round and firm fruit. Resistant: Alternaria stem canker, Fusarium wilt (races 1 and 2), gray leaf spot, tomato yellow leaf curl and Verticillium wilt (race 1).

Seventy III. Vigorous determinate bush with good plant cover. It is a mid-season variety that is best for spring production. It has good gray wall tolerance. Resistance: Verticillium wilt (Race 1), Fusarium wilt (races 1,2, and 3), and tomato yellow leaf curl.

Solar Fire. An early, determinate, jointed hybrid. "Hot set" variety. Fruit are large, flat-round, smooth, firm, light green shoulder and blossom scars are smooth. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3), gray leaf spot.

Soraya. Full season. Fruit are high quality, smooth and tend toward large to extra-large. Continuous set. Strong, large bush. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3), Fusarium crown rot and gray leaf spot.

Talladega. Midseason. Fruit are large to extra-large, globe to deep globe shape. Determinate bush. Has some hot-set ability. Performs well with light to moderate pruning. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), tomato spotted wilt and gray leaf spot.

Tasti-Lee. It was released for the premium tomato market. A mid-season, determinate, jointed hybrid with moderate heat-tolerance. Fruit are uniform green with a high lycopene content and deep red interior color due to the crimson gene. Resistant: Fusarium wilt (races 1, 2, and 3), Verticillium wilt (race 1), and gray leaf spot.

Tribeca. Main season. Vigorous bush with large fruit. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), tomato spotted wilt and stemphiliun.

Tribute. Main season fall variety. Vigorous plant with good cover. Medium large to large, smooth, globed-shaped fruit with excellent firmness and color. Resistance: Alternaria stem canker, Fusarium wilt (races 1 and 2), Verticillium wilt (race 1), gray leaf spot, tomato spotted wilt and tomato yellow leaf curl.

Volante. Mid-season "Hot set" variety with determinate, medium to tall vine. Fruit are extra-large and large, deep globed shaped with very firm, uniform green fruits well suited for mature green or

vine-ripe production. Resistant: Alternaria stem canker, Fusarium wilt (races 1 and 2), Verticillium wilt (race 1) and Intermediate resistance: Gray leaf spot and Tomato spotted wilt.

2. PLUM AND ROMA TYPES

BHN 685. Midseason. Large to extra-large, deep blocky, globe shaped fruit. Determinate, vigorous bush with no pruning recommended. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3) and Tomato spotted wilt.

Marianna. Midseason. Fruit are predominately extra-large and extremely uniform in shape. Fruit wall is thick and external and internal color is very good with excellent firmness and shelf life. Determinate, small to medium sized plant with good fruit set. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), root-knot nematode, Alternaria stem canker and tolerant to gray leaf spot.

Monticello. Uniform fruit size and a unique blocky shape with an improved disease resistance package. Large firm fruit with good interior quality and small blossom end scar. High level of resistance to Fusarium wilt (races 1 and 2), bacterial speck, grey leaf spot, tomatoes spotted wilt virus, verticillium and root knot nematode

Picus. Main season, determinate Roma tomato that is widely adapted. Fruits are large, uniform and blocky, maturing to a deep-red color with great firmness at the red stage. Medium to large, vigorous plant that provides good fruit cover and sets well in hot temperatures. Resistant: Alternaria stem canker, Fusarium wilt (races 1 and 2), tomato spotted wilt, Verticillium wilt (race 1), Alternaria stem canker and Cladosporium leaf mold.

Regidor. Determinate Roma type for open field production. Medium tall plant with short internodes. 6-8 sets with great fruit quality. Resistant: Fusarium wilt (races 1 and 2), Tomato yellow leaf curl and Verticillium wilt (race 1).

Sunoma. Main season. Fruit are medium-large, elongated and cylindrical. Plant maintains fruit size through multiple harvests. Determinate plant with good fruit cover. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), bacterial speck (race 0), root-knot nematodes, tomato mosaic and gray leaf spot.

Supremo. Mid-season variety with early maturity. Determinate mid compact plant. Uniform predominately extra-large fruit. Suited for concentrated harvests for vine ripe and mature green markets. High resistance: Fusarium wilt (races 1, 2 and 3), Bacterial speck, root-knot nematode, Verticillium wilt (race 1), and Intermediate resistance: Tomato spotted wilt.

Tachi. Mid-season variety with classic saladette shape. Determinate mid compact plant. Fruit size predominately extra-large, uniform and very similar to Mariana. Wide adaptability and suited for concentrated harvests for vine ripe and mature green markets. Advantage over Mariana is its resistance to tomato spotted wilt. Resistance: Fusarium wilt (races 1 and 2), Verticillium wilt (race 1), root-knot nematodes and Alternaria stem canker.

3. CHERRY TYPES

BHN 268. Early to mid-season. Tall bush. An extra firm cherry tomato that holds, packs and ships well. Determinate, small to medium bush with high yields. Resistant: Verticillium wilt (race 1), Fusarium wilt (race 1).

Camelia. Midseason. Deep globe, cocktail-cherry size with excellent firmness and long shelf life. Indeterminate bush. Outdoor or greenhouse production. Verticillium wilt (race 1), Fusarium wilt (race 1) and tobacco mosaic.

Shiren. Compact plant with high yield potential and nice cluster. Resistant: Fusarium wilt (races 1 and 2), root-knot nematodes and tomato mosaic.

Sweet Treats. Early main season with wide adaptability. Strong, vigorous, indeterminate plant. Deep pink, firm, globe shaped fruit with outstanding flavor potential. Strong against cracking. High resistance: Fusarium wilt (race 1 and 2), Leaf mold, Tobacco mosaic and Intermediate resistance: Fusarium crown and root rot and gray leaf mold.

4. GRAPE TYPES

Amai. Early main season with smooth uniform fruit, ~1-2gr more than Sweet Hearts. Uniform sizing. Dark red, firm, elongated grape-shaped fruit. High yield potential. High resistance: Fusarium wilt (race 1), Leaf mold, Tobacco mosaic and Intermediate resistance: Root-knot nematode and gray leaf mold.

BHN 785. Midseason determinate grape hybrid with a strong set of very uniform size and shape fruit on a vigorous bush with good cover. Resistant: Fusarium wilt (race 1).

BHN 1022. Determinate “hot set” variety. Resistant: Fusarium wilt (races 1-3), Toamto spotted wilt

Brixmore. Very early. Indeterminate. Very uniform in shape and size, deep glossy red color with very high early and total yield. High brix and excellent firm flavor. Resistant: Verticillium wilt (race 1), root-knot nematodes and Tomato mosaic.

Cupid. Early. Vigorous, indeterminate bush. Oval-shaped fruit have an excellent red color and a sweet flavor. Resistant: Fusarium wilt (races 1 and 2), bacterial speck (intermediate resistance race 0), Alternaria stem canker, and gray leaf spot.

Jolly Girl. Early season. Determinate plant. Extended market life with firm, flavorful grape-shaped fruits. Average 10% brix. Resistant: Verticillium wilt (race 1), Fusarium wilt (race 2) and cracking.

Santa. 75 days. Vigorous indeterminate bush. Firm elongated grape-shaped fruit with outstanding flavor and up to 50 fruits per truss. Resistant: Verticillium wilt (race 1), Fusarium wilt (races 1, 2, and 3), root-knot nematodes and tobacco mosaic.

St. Nick. Mid-early season. Indeterminate bush. Oblong, grape-shaped fruit with brilliant red color and good flavor. Up to 10% brix.

Smarty. 69 days. Vigorous, indeterminate bush with short internodes. Plants are 25% shorter than Santa. Good flavor, sweet and excellent flavor.

Sweethearts. Early to mid-season. Indeterminate bush with intermediate internodes. Brilliant red, firm, elongated grape-shaped fruit. Matures between 70 and 75 days. Good flavor, crack-resistant and high brix. Resistant: Tobacco mosaic virus. Cladosporium leaf mold and Fusarium wilt (race 1).

Tami G. Early season. Indeterminate, medium tall. Small fruits with nice shape.

Table 17.2. Selected herbicides approved for managing weeds in tomato.

Labels change frequently. Be sure to read a current product label before applying any chemical.			
Active ingredient lb. a.i./A	Trade name product/A	MOA code	Weeds controlled / remarks
*** PREPLANT / PREEMERGENCE ***			
Carfentrazone up to 0.031	(Aim) 1.9 EW or (Aim) 2.0 EC up to 2 fl. oz.	14	Apply as a pre-plant burndown for emerged broadleaves up to 4 inches tall or rosettes less than 3 inches across. Good coverage is essential. A nonionic surfactant, methylated seed oil, or crop oil concentrate is recommended. No pre-transplant interval.
EPTC 2.6	(Eptam) 7 E 3 pt.	8	Annual broadleaves, annual grasses and suppression of yellow/purple nutsedge. Labeled for transplanted tomatoes grown on low density mulch. Do not use under high density, VIF, TIF, or metalized mulches. A 24(c) special local needs label in Florida. 14 day pre-transplant interval.
Flumioxazin up to 0.128	(Chateau) 51 WDG up to 4 oz.	14	Annual broadleaves and grasses. Apply to row middles of raised plastic mulched beds that are at least 4 in. higher than the treated row middle and 24 in. bed width. Label is a Third-Party registration (TPR, Inc.). Use without a signed authorization and waiver of liability is a misuse of the product. Tank mix with a burndown herbicide to control emerged weeds. 0 day pre-transplant interval.
Fomesafen 0.25 - 0.38	(Reflex) 2 EC 1.0 - 1.5 pt.	14	Broadleaves and suppression of yellow/purple nutsedge. Suppression of some annual and perennial grasses. Label is a 24(C) local indemnified label and a waiver of liability must be signed for use. Transplanted crop only. May be applied to bareground production or to plastic mulched beds following bed formation but prior to laying plastic. Use shields or hooded sprayers if applying to row middles and prevent contact with the plastic mulch. 7 and 0 day pre-transplant interval on bare ground and plastic mulch, respectively. 70 day PHI.
Glyphosate	(various formulations) consult labels	9	Emerged broadleaves, grasses, and nutsedge. Apply as a preplant burndown. Consult label for individual product directions.
Halosulfuron 0.024 - 0.05	(Sanda, Profine) 75 DF 0.5 - 1.0 oz.	2	Broadleaf weeds and yellow/purple nutsedge. Do not exceed 2 applications of halosulfuron per 12 month period. 7 day pre-transplant interval. 30 day PHI.
Imazosulfuron 0.19-0.3	(League) 4.0-6.4 oz	2	Broadleaves and suppression of yellow/purple nutsedge. Apply pre-transplant just prior to installation of plastic mulch. 1 day pre-transplant interval. 21 day PHI.
Lactofen 0.25 - 0.5	(Cobra) 2 EC 16 - 32 fl. oz.	14	Broadleaves. Label is a Third-Party registration (TPR, Inc.). Use without a signed authorization and waiver of liability is a misuse of the product. Apply to row middles only with shielded or hooded sprayers. Contact with green foliage or fruit may cause excessive injury. Drift of Cobra treated soil particles onto plant can cause contact injury. Limit of 1 PRE and 1 POST application per growing season. 30 day PHI.
S-metolachlor 1.0 - 1.3	(Brawl, Dual Magnum, Medal) 7.62 EC 1.0 - 1.33 pt. if organic matter less than 3%	15	Annual broadleaves and grasses. Suppression of yellow/purple nutsedge. Apply to bed tops pre-transplant just prior to laying the plastic. May also be used in row middles. Research has shown that the 1.33 pt. may be too high in some Florida soils except in row middles. 30 day PHI. 90 day PHI if rate exceeds 1.33 pt./A.

Table 17.2. Selected herbicides approved for managing weeds in tomato. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.			
Active ingredient lb. a.i./A	Trade name product/A	MOA code	Weeds controlled / remarks
Metribuzin 0.25 - 0.5	(Sencor DF, TriCor DF) 75 WDG 0.33 - 0.67 lb. (Sencor 4, Metri) 4 F 0.5 - 1.0 pt.	5	Small emerged weeds less than 1 in. tall. Apply preplant in transplanted tomatoes only. Incorporate to a depth of 2-4 inches. Maximum of 1.0 lb. a.i./A within a season. Avoid application for 3 days following cool, wet, or cloudy weather to reduce possible crop injury. 7 day PHI.
Napropamide 1.0 - 2.0	(Devrinol DF XT) 50 DF 2.0 - 4.0 lb.	15	Annual broadleaves and grasses. For direct-seed or transplanted tomatoes. Apply to well worked soil that is moist enough to permit thorough incorporation to a depth of 2 in. Incorporate same day as applied.
Oxyfluorfen 0.25 - 0.5	(Goal 2 XL) 2 EC 1.0 - 2.0 pt. (GoalTender) 4 E	14	Broadleaves. Apply pre-transplant just prior to installation of plastic mulch. 30 day pre-transplant interval. Mulch may be applied any time during the 30-day interval.
Paraquat 0.5 - 1.0	(Gramoxone) 2 SL 2.0 - 4.0 pt. (Firestorm) 3 SL 1.3 - 2.7 pt.	22	Emerged broadleaves and grasses. Apply as a preplant burndown treatment. Surfactant recommended.
Pelargonic acid	(Scythe) 4.2 EC 3 - 10% v/v		Emerged broadleaves and grasses. Apply as a preplant burndown treatment or post transplant with shielded or hooded sprayers. Product is a contact, nonselective, foliar applied herbicide with no residual control.
Pendimethalin 0.48 - 0.72	(Prowl H ₂ O) 3.8 1.0 - 1.5 pt.	3	May be applied pretransplant to bed tops just prior to laying the plastic mulch or to row middles. Do not exceed 3.0 pt./A per year. 70 day PHI.
Pyraflufen 0.001 - 0.003	(ETX Herbicide) 0.208 EC 0.3 - 1.25 fl. oz.	14	Emerged broadleaves less than 4 in. tall or rosettes less than 3 in. diameter. Apply as a preplant burndown treatment. Nonionic surfactant or crop oil concentrate recommended.
Rimsulfuron 0.03 - 0.06	(Matrix FNV, Matrix SG, Pruvin) 25 WDG 2.0 - 4.0 oz.	2	Annual broadleaves and grasses. Suppression of yellow nutsedge. Requires 0.5-1 in. of rainfall or irrigation within 5 days of application for activation. May be applied as a sequential treatment with a PRE and POST application not exceeding 0.06 lb. a.i./A in a single season. 45 day PHI
Trifluralin 0.5	(Treflan, Trifluralin) 4 EC 1 pt. (Treflan, Trifluralin) 10 G 5 lb.	3	Annual broadleaves and grasses. Do not apply in Dade County. Incorporate 4 in. or less within 8 hr. of application. Results in Florida are erratic on soils with low organic matter and clay contents. Note label precautions against planting noncrop within 5 months. Do not apply after transplanting.
*** POSTTRANSPLANT ***			
Carfentrazone up to 0.031	(Aim) 1.9 EW or (Aim) 2.0 EC up to 2 fl. oz.	14	Emerged broadleaf weeds. Apply as a hooded application to row middles only. Good coverage is essential. May be tank mixed with other herbicides. A nonionic surfactant, methylated seed oil, or crop oil concentrate is recommended. 0 day PHI.
Clethodim 0.09 - 0.25 0.07 - 0.25	(Arrow, Select) 2 EC 6 - 16 fl. oz. (Select Max) 1 EC 9 - 32 fl. oz.	1	Perennial and annual grasses. Use higher rates under heavy grass pressure or larger weeds. Surfactant or crop oil concentrate recommended. Consult label. 20 day PHI.
DCPA 6.0 - 7.5	(Dacthal) W-75 8 - 10 lb. (Dacthal) 6 F 8 - 10 pt.	3	Annual grasses and select broadleaves. Apply to weed-free soil 6-8 wk. after crop is established and growing rapidly or to moist soil in row middles after crop establishment. Note label precautions against replanting non-registered crops within 8 months.
Diquat 0.5	(Reglone Dessiccant) 1 qt.	22	Broadleaves and grasses. Apply to row middles only. Maximum of 2 applications per season. Prevent drift to crop. Nonionic surfactant recommended. 30 day PHI.
Halosulfuron 0.024 - 0.05	(Sanda, Profine) 75 DF 0.5 - 1.0 oz.	2	Broadleaf weeds and yellow/purple nutsedge. Apply 14 days after transplant but before first bloom. Following first bloom apply with shielded or hooded applicator. May be applied to row middles with shielded or hooded sprayer. Do not exceed 2 oz per 12 month period. Surfactant recommended. 30 day PHI.
Imazosulfuron 0.19-0.3	(League) 4.0-6.4 oz	2	Apply post emergence 3 to 5 days after transplant through early bloom. Only apply if no pre-transplant application was made. Surfactant recommended. PHI 21 days.
Lactofen 0.25 - 0.5	(Cobra) 2 EC 16 - 32 fl. oz.	14	Broadleaf weeds. Apply to row middles only with shielded or hooded sprayers. Contact with green foliage or fruit can cause excessive injury. Drift of Cobra treated soil particles onto plants can cause contact injury. Limit of 1 PRE and 1 POST application per growing season. Do not apply within 18 days of transplant. Surfactant recommended. PHI 30 days.
S-metolachlor 1.0 - 1.3	(Brawl, Dual Magnum, Medal) 7.62 EC 1.0 - 1.33 pt.	15	Annual broadleaf, grasses, and yellow/purple nutsedge. Apply to row middles. Label rates are 1.0-1.33 pt./A if organic matter is less than 3%. Use on a trial basis. Surfactant not recommended. 90 day PHI for rates above 1.33 pt./A. 30 day PHI for rates 1.33 pt./acre or less.
Metribuzin 0.25 - 0.5	(Sencor DF, TriCor DF) 75 WDG 0.33 - 0.67 lb. (Sencor 4, Metri) 4 F 0.5 - 1.0 pt.	5	Small emerged weeds. Apply after transplants or seedlings are well established. Apply in single or multiple applications with a minimum of 14 days between treatments. Maximum of 1.0 lb. a.i./A within a season. Avoid application for 3 days following cool, wet, or cloudy weather to reduce possible crop injury. 7 day PHI.

Table 17.2. Selected herbicides approved for managing weeds in tomato. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.

Active ingredient lb. a.i./A	Trade name product/A	MOA code	Weeds controlled / remarks
Paraquat 0.5	(Gramoxone) 2 SL 2 pt. (Firestorm) 3 SL 1.3 pt.	22	Emerged broadleaf and grass weeds. Direct spray over emerged weeds 1-6 in. tall in row middles between mulched beds. Use low pressure and shields to control drift. Do not apply more than 3 times per season. Nonionic surfactant recommended. 30 day PHI.
Pelargonic acid	(Scythe) 4.2 EC 3 - 10% v/v		Emerged broadleaf and grass weeds. Direct spray to row middles. Product is a contact, nonselective, foliar applied herbicide with no residual control. May be tank mixed with several soil residual compounds.
Pendimethalin 0.48 - 0.72	(Prowl H ₂ O) 3.8 1.0 - 1.5 pt.	3	Broadleaf and grass weeds. May be applied post transplant to row middles if previously untreated. Do not exceed 3.0 pt./A per year. 70 day PHI.
Rimsulfuron 0.02 - 0.03	(Matrix FNV, Matrix SG, Pruvion) 25 WDG 1.0 - 2.0 oz.	2	Broadleaves and grasses. May be applied as a sequential treatment with a PRE and POST application not exceeding 0.06 lb. a.i./A in a single season. Requires 0.5-1.0 in. of rainfall or irrigation within 5 days of application for activation. Nonionic surfactant or crop oil concentrate recommended. PHI 45 days.
Sethoxydim 0.19 - 0.28	(Poast) 1.5 EC 1.0 - 1.5 pt.	1	Actively growing grasses. A total of 4.5 pt./A applied in one season. Unsatisfactory results may occur if applied to grasses under stress. Crop oil concentrate recommended. 20 day PHI.
Trifloxysulfuron 0.005 - 0.009	(Envoke) 75 DG 0.1 - 0.2 oz.	2	Broadleaves and yellow/purple nutsedge. Direct spray solution to the base of transplanted tomato plants. Apply at least 14 days after transplanting and before fruit set. 45 day PHI.
*** POSTHARVEST ***			
Diquat 0.5	(Reglone Dessiccant) 2.0 pt.	22	Minimum of 35 gal./A. Thorough coverage is required. Nonionic surfactant recommended.
Paraquat 0.62 - 0.94	(Gramoxone) 2 SL 2.4 - 3.75 pt. (Firestorm) 3 SL 1.6 - 2.5 pt.	22	Broadcast spray over the top of the plants after the last harvest. Thorough coverage is required to ensure maximum herbicide burndown. Do not use treated crop for human or animal consumption. Nonionic surfactant recommended.

Table 17.3. Selected insecticides approved for managing insect pests of tomato.

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Trade Name (Active Ingredient)	Rate (Product/acre)	Rate per season	REI (hours)	Days to Harvest	Insect or mite pest	MOA Code ¹	Notes ²
Acramite-50WS (bifentazate)	0.75-1.0 lb	One application allowed per season.	12	3	twospotted spider mite	un	One application per season. Field grown only. ACRAMITE-50WS is not systemic in action; therefore complete coverage of both upper and lower leaf surfaces and of fruit is necessary for effective control.
Actara (thiamethoxam)	2.0-5.5 oz	Do not exceed a total of 11.0 oz/ Acre per acre per growing season.	12	0	aphids, Colorado potato beetle, flea beetles, leafhoppers, stinkbugs, whitefly	4A	Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators. Minimum interval between applications is 5 days.
Admire Pro (imidacloprid)	7-10.5 fl oz	Maximum allowed on tomato is 10.5 fl. oz/A.	12	21	aphids, Colorado potato beetle, flea beetles, leafhoppers, thrips (foliar feeding thrips only), whitefly	4A	Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators.
Admire Pro (imidacloprid)	0.6 fl oz per 1000 plants		12	0 (soil)	aphids, whitefly	4A	Greenhouse use: 1 application to mature plants, see label for cautions.
Admire Pro (imidacloprid)	0.44 fl oz per 10,000 plants		12	21	aphids, whitefly	4A	Planthouse: 1 application. See label.
Agree WG (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb		4	0	armyworms, hornworms, loopers, tomato fruitworm	11	Apply when larvae are small for best control. Can be used in greenhouse. OMRI-listed.
*Agri-Mek SC (abamectin)	1.75-3.5 fl oz	Do not apply more than 10.25 fl. oz./A in a growing season.	12	7	broad mite, Colorado potato beetle, <i>Liriomyza</i> leafminers, spider mite, <i>Thrips palmi</i> , tomato pinworm, tomato russet mite	6	Do not make more than 2 sequential applications of Agri-Mek SC or any other foliar applied abamectin-containing product in a growing season.

Table 17.3. Selected insecticides approved for managing insect pests of tomato. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Trade Name (Active Ingredient)	Rate (Product/acre)	Rate per season	REI (hours)	Days to Harvest	Insect or mite pest	MOA Code ¹	Notes ²
*Agri-Mek 0.15 EC	8.0-16.0 fl. oz	Do not apply more than 48 fl oz per acre per season.	12	7	broad mite, Colorado potato beetle, <i>Liriomyza</i> leafminers, spider mite, <i>Thrips palmi</i> , tomato pinworm, tomato russet mite		Do not make more than 2 sequential applications per season.
*Ambush 25W (permethrin)	3.2-12.8 oz	Do not apply more than 76.8 oz/A per season.	12	up to day of harvest	beet armyworm, cabbage looper, Colorado potato beetle, granulate cutworm, hornworms, southern armyworm, tomato fruitworm, tomato pinworm	3	Do not use on cherry tomatoes. Not recommended for control of vegetable leafminer in Florida.
*Asana XL (0.66EC) (esfenvalerate)	2.9-9.6 fl oz	Do not apply more than 0.5 lb ai per acre per season, or 10 applications at highest rate.	12	1	beet armyworm (aids in control), cabbage looper, Colorado potato beetle, cutworms, flea beetles, grasshoppers, hornworms, potato aphid, southern armyworm, tomato fruitworm, tomato pinworm, whitefly, yellowstriped armyworm	3	Not recommended for control of vegetable leafminer in Florida.
Assail 70WP (acetamiprid)	0.6-1.7 oz	Do not exceed a total of 6.8 oz. Assail 70 WP per acre per growing season including any pretransplant applications of acetamiprid.	12	7	aphids, Colorado potato beetle, thrips, whitefly	4A	Do not apply to crop that has been already treated with imidacloprid or thiamethoxam at planting. Begin applications for whitefly when first adults are noticed. Do not make more than 4 applications per season. Do not apply more than once every 7 days.
Athena* (abamectin, bifenthrin)	7-17 fl. oz/A	Do not apply more than 33.5 fl. oz./A in a growing season after transplanting.	12	7	tomato pinworm, broad mite, carmine spider mite, tomato russet mite, two spotted spider mite, leafminer spp. (adult), psyllids, thrips (adult), whitefly (adult); aphids, armyworms, cabbageworm, corn earworm, Colorado potato beetle, cucumber beetle (adult), cutworms, tobacco budworm	3 & 6	Do not make applications less than 10 days apart. Do not make more than 2 consecutive applications.
Avaunt (indoxacarb)	2.5-3.5 oz	Do not apply more than 14 ounces of product per acre per crop. Minimum spray interval is 5 days.	12	3	beet armyworm, hornworms, loopers, southern armyworm, tomato fruitworm, tomato pinworm, suppression of leafminers	22	
Aza-Direct (azadirachtin)	1-2 pts, up to 3.5 pts, if needed		4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whitefly	un	Antifeedant, repellent, insect growth regulator. OMRI-listed.
Azatin XL (azadirachtin)	5-21 fl oz		4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, thrips, weevils, whitefly	un	Antifeedant, repellent, insect growth regulator.
*Baythroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	Do not apply more than 16.8 fl oz per acre per season.	12	0	beet armyworm, cabbage looper, Colorado potato beetle, dipterous leafminers, flea beetles, hornworms, potato aphid, southern armyworm, stink bugs, tomato fruitworm, tomato pinworm, variegated cutworm, thrips (except <i>Thrips palmi</i>), whitefly adults	3	
Belay 50 WDG (clothianidin)	1.6-2.1 oz (foliar application)	Do not apply more than 6.4 oz per acre per season.	12	7	aphids, Colorado potato beetle, flea beetles, leafhoppers, leafminers (suppression), Lygus, stink bugs, whiteflies (suppression)	4A	Do not use an adjuvant. Toxic to bees. Do not release irrigation water from the treated area.
Belay 50 WDG (clothianidin)	4.8-6.4 oz (soil application)	Do not apply more than 6.4 oz per acre per season.	12	Apply at planting	aphids, Colorado potato beetle, flea beetles, leafhoppers, leafminers (suppression), Lygus, foliar feeding thrips, whiteflies (suppression)	4A	See label for application instructions. Do not release irrigation water from the treated area.
Beleaf 50 SG (flonicamid)	2.0-2.8 oz	Do not apply more than 8.4 oz per acre per season.	12	0	aphids, plant bugs	9 C	Begin applications before pests reach damaging levels. Do not apply more than 2 applications per season. Allow a minimum of 7 days between applications.
Beleaf 50 SG (flonicamid)	4.2 oz.	Do not apply more than 8.4 oz per acre per season.		0	2 (ee) for suppression of whitefly and thrips	9C	Begin applications before pests reach damaging levels. Do not apply more than 2 applications per season. Allow a minimum of 7 days between applications.
Belt SC (flubendiamide)	1.5 fl oz	Do not apply more than 4.5 oz per acre per crop season.	12	1	Beet armyworm, cabbage looper, cutworm species, fall armyworm, southern armyworm, tomato fruitworm, tomato hornworm, tomato pinworm, yellow striped armyworm	28	Do not apply more than 1.5 oz per acre per 3 day interval.

Table 17.3. Selected insecticides approved for managing insect pests of tomato. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Trade Name (Active Ingredient)	Rate (Product/acre)	Rate per season	REI (hours)	Days to Harvest	Insect or mite pest	MOA Code ¹	Notes ²
Biobit HP (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb		4	0	caterpillars (will not control large armyworms)	11	Treat when larvae are young. Good coverage is essential. Can be used in the greenhouse. OMRI-listed.
*Brigade 2EC (bifenthrin)	2.1-5.2 fl oz	Make no more than 4 applications per season.	12	1	aphids, armyworms, corn earworm, cutworms, flea beetles, grasshoppers, mites, stink bug spp., tarnished plant bug, thrips, whitefly	3	Do not make applications less than 10 days apart.
CheckMate TPW-F (pheromone)	1.2-6.0 fl oz		0	0	tomato pinworm	--	For mating disruption - See label for details.
Closer SC	1.5-4.5 fl. oz/A	Do not apply more than a total of 17 fl. oz./A per year.	12	1	aphids, plant bugs, whitefly, thrips (suppression only)	4C	Do not make applications less than 7 days apart. Do not make more than four applications per crop. Do not make more than 2 consecutive applications per crop.
Confirm 2F (tebufenozide)	6-16 fl oz	Do not apply more than 64 fl. oz./A per season.	4	7	armyworms, black cutworm, hornworms, loopers	18	Product is a slow-acting IGR that will not kill larvae immediately.
Coragen (chlorantraniliprole/ rynaxypyr)	3.5-7.5 fl oz	Do not apply more than 15.4 fl oz per acre per crop.	4	1	beet armyworm, Colorado potato beetle, fall armyworm, hornworms, leafminer larvae, loopers, southern armyworm, tomato fruitworm, tomato pinworm	28	Can be applied by drip chemigation or as a soil application at planting. See label for details.
Courier 40SC (buprofezin)	9.0-13.6 fl oz	Do not apply more than 27.2 fl. oz./A per crop cycle.	12	1	leafhoppers, mealybugs, planthoppers, whitefly nymphs	16	Apply when a threshold is reached of 5 whitefly nymphs per 10 leaflets from the middle of the plant. Product is a slow-acting IGR that will not kill nymphs immediately. No more than 2 applications per season. Allow at least 5 days between applications.
Crymax WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb		4	0	armyworms, loopers, tomato fruitworm, tomato hornworm, tomato pinworm	11	Use high rate for armyworms. Treat when larvae are young.
*Danitol 2.4 EC (fenpropathrin)	7-10.67 fl oz	Do not exceed 42.67 fl. oz. total application /A per season.	24	3	beet armyworm, cabbage looper, fruitworms, potato aphid, silverleaf whitefly, stink bugs, thrips, tobacco hornworm, tomato pinworm, twospotted spider mite, yellowstriped armyworm	3	
Deliver (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.25-1.5 lb		4	0	armyworms, cutworms, loopers, tomato fruitworm, tomato pinworm	11	Use higher rates for armyworms. OMRI-listed.
*Diazinon AG500; *50 W (diazinon)	AG500: 1-4 qt 50W: 2-8 lb	Do not make more than one soil application per year regardless of target pest.	48	preplant	cutworms, mole crickets, wireworms	1B	Incorporate into soil - see label.
Dimethoate 4 EC (dimethoate)	0.5-1.0 pt	Maximum total rate per year is 1 lb ai/A.	48	7	aphids, leafhoppers, leafminers	1B	Minimum 6 day reapplication interval.
DiPel DF (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.25-2.0 lb		4	0	caterpillars	11	Treat when larvae are young. Good coverage is essential. Can be used for organic production.
Durivo (thiamethoxam & chlorantraniliprole)	10-13 fl oz	Do not exceed a total of 13.0 fl. oz./A per growing season.	12	30	aphids, beet armyworm, Colorado potato beetle, fall armyworm, flea beetles, hornworms, leafhoppers, loopers, southern armyworm, thrips, tomato fruitworm, tomato pinworm, whitefly, yellowstriped armyworm	4A, 28	Several methods of soil application – see label.
*Endigo ZC (lambda-cyhalothrin & thiamethoxam)	4.0-4.5 fl oz	Do not exceed a total of 19.0 fl oz per acre per season.	24	5	aphids, blister beetles, cabbage looper, Colorado potato beetle, cucumber beetle adults, cutworms, fall, southern, and yellowstriped armyworm (1 st and 2 nd instars), flea beetles, grasshoppers, hornworms, leafhoppers, plant bugs, stink bugs, tomato fruitworm, vegetable weevil adult	3A, 4A	See label for limits on each active ingredient.
Entrust (spinosad)	0.5-2.5 oz	Do not apply more than 9 oz per acre per crop.	4	1	armyworms, Colorado potato beetle, flower thrips, hornworms, Liriomyza leafminers, loopers, tomato fruitworm, tomato pinworm	5	OMRI-listed ² . For thrips, rotate to other class of effective insecticide after 2 applications of a Group 5 insecticide for at least 2 applications.
Esteem Ant Bait (pyriproxyfen)	1.5-2.0 lb		12	1	red imported fire ant	7C	Apply when ants are actively foraging.

Table 17.3. Selected insecticides approved for managing insect pests of tomato. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
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Trade Name (Active Ingredient)	Rate (Product/acre)	Rate per season	REI (hours)	Days to Harvest	Insect or mite pest	MOA Code ¹	Notes ²
Extinguish ((S)-methoprene)	1.0-1.5 lb		4	0	fire ants	7A	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially.
Exirel (cyantraniliprole)	7-20.5 fl. oz.	Do not apply a total of more than 0.4 lb ai/A per crop.	12	1	Beet armyworm, Colorado potato beetle, European corn borer, fall armyworm, southern armyworm, tomato fruitworm, tomato pinworm, tomato hornworm, loopers, green peach aphid, <i>Liriomyza</i> leafminers, pepper weevil (suppression), potato aphid, foliage feeding thrips (suppression), whitefly.	28	Application restrictions exist for this product because of risk to bees and other pollinators. Follow application restrictions found in the directions for use to protect pollinators. Minimum application interval between treatment is 5 days.
Fulfill (pymetrozine)	2.75 oz	Do not apply more than 5.5 oz/acre per crop.	12	0	green peach aphid, potato aphid, suppression of whitefly	9B	(FL-040006) 24(c) label for growing transplants also (FL-03004).
Gladiator* (avermectin B1 & zeta-cypermethrin)	10-19 fl. oz.	Do not apply more than 57 fl. oz./A per 12 month cropping year.	12	7	Armyworms, corn earworm, cutworms, hornworms, tobacco budworm, tomato fruitworm, tomato pinworm, cucumber beetle, flea beetle, Colorado potato beetle, leafhoppers, aphids, brown stink bug, <i>Liriomyza</i> leafminers, broad mite, spider mites, tomato russet mite, <i>Thrips palmi</i> .	3 & 6	
Grandevo (<i>Chromobacterium subtsugae</i>)	1.0-3.0 lb		4	0	Armyworms, hornworms, loopers, tomato fruitworm, tomato pinworm, variegated cutworm, aphids, mites, thrips, whiteflies	un	Thorough coverage is necessary for effective control.
*Hero (bifenthrin & zeta-cypermethrin)	4.0-10.3 oz	Do not apply more than 43.26 fl. oz./A per season.	12	1	Armyworms, cabbage looper, Colorado potato beetle, cucumber beetle, cutworms, flea beetles, grasshoppers, hornworms, leafhoppers, stink bugs, tobacco budworm, tomato fruitworm, tomato pinworm, vegetable leafminer, thrips, twospotted spider mite, whiteflies	3	Do not make more than 4 applications per season. Do not make applications less than 10 days apart.
Intrepid 2F (methoxyfenozide)	4-16 fl oz	Do not apply more than 64 fl oz per acre per season.	4	1	beet armyworm, cabbage looper, fall armyworm, hornworms, southern armyworm, true armyworm, yellowstriped armyworm, suppression of tomato fruitworm and tomato pinworm	18	Product is a slow-acting IGR that will not kill larvae immediately.
Javelin WG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.12-1.5 lb		4	0	most caterpillars, but not <i>Spodoptera</i> species (armyworms)	11	Treat when larvae are young. Thorough coverage is essential. OMRI-listed ² .
Kanemite 15 SC (acequinocyl)	31 fl oz	Do not apply more than 62 fl. oz/A per season.	12	1	twospotted spider mite	20B	Do not use less than 100 gal per acre. Make no more than 2 applications at least 21 days apart.
Karate with Zeon* (lambdacyhalothrin)	0.96-1.92 fl. oz.	Do not apply more than 23.04 fl. oz. /A per season.	24	5	beet armyworm, fall armyworm, yellow striped armyworm, cabbage looper, cutworms, hornworms, tobacco budworm, tomato fruitworm, tomato pinworm, aphids, Colorado potato beetle, Cucumber beetle, flea beetles, grasshoppers, leafhoppers, leafminers, spider mites, stink bugs, thrips (except western flower thrips), whiteflies.	3	
Knack IGR (pyriproxyfen)	8-10 fl oz	Do not exceed 20 fl. oz./A per season.	12	14	immature whitefly	7C	Apply when a threshold is reached of 5 nymphs per 10 leaflets from the middle of the plant. Product is a slow-acting IGR that will not kill nymphs immediately. Make no more than two applications per season. Treat whole fields.
*Lannate LV (methomyl)	LV: 1.5-3.0 pt	Do not apply more than 21 pt LV/acre/crop (15 for tomatillos) or 7 lb SP /acre/crop (5 lb for tomatillos).	48	1	aphids, armyworm, beet armyworm, fall armyworm, hornworms, loopers, southern armyworm, tomato fruitworm, tomato pinworm, variegated cutworm	1A	
*Lannate SP (methomyl)	SP: 0.5-1.0 lb		48	1			

Table 17.3. Selected insecticides approved for managing insect pests of tomato. (continued)

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Trade Name (Active Ingredient)	Rate (Product/acre)	Rate per season	REI (hours)	Days to Harvest	Insect or mite pest	MOA Code ¹	Notes ²
Leverage* 360 (beta-cyfluthrin & imidacloprid)	3.8-4.1		12	0	Aphids, early instar beet armyworm, southern armyworm, and yellowstriped armyworm, cabbage looper, Colorado potato beetle, leafhoppers, thrips (except Thrips palmi), stink bugs, tarnished plant bug, tomato fruitworm, tomato hornworm, tomato pinworm, variegated cutworm.	3 & 4A	
Malathion 5 (malathion)	1.0-2.5 pt	10 pints	12	1	aphids, <i>Drosophila</i> , spider mites	1B	8F can be used in greenhouse.
Malathion 8 F	1.5 pt						
MBI-203 EP (<i>Chromobacterium subtsugae</i>)	4.0-12.0 quarts		4	0	Loopers, hornworms, tomato fruitworm, variegated cutworm, saltmarsh caterpillar, armyworms, tomato pinworm	unk.	OMRI listed. Can be used in the greenhouse.
MET52 EC (<i>Metarhizium anisopliae</i> strain F52)	drench: 40-80 fl. oz.; foliar: 0.5 pint - 2qt		0	0	Thrips, whiteflies, mites	unk.	
Movento (spirotetramat)	4.0-5.0 fl oz	Maximum of 10 fl oz/acre per season.	24	1	aphids, psyllids, whitefly, broad mites, tomato russet mite. Pests suppressed: leafminers, two spotted spider mite, western flower thrips larvae	23	
M-Pede 49% EC (Soap, insecticidal)	1-2% V/V		12	0	aphids, leafhoppers, mites, plant bugs, thrips, whitefly	--	OMRI-listed
Mycotrol O (<i>Beauveria bassiana</i> strain GHA)	0.5 quart -1 quart/100 gallons		4	0	whitefly, aphids, thrips	unk	OMRI Listed
*Mustang (zeta-cypermethrin)	2.4-4.3 oz	Do not apply more than 25.8 fl. oz./A per season.	12	1	beet armyworm, cabbage looper, Colorado potato beetle, cutworms, fall armyworm, flea beetles, grasshoppers, green and brown stink bugs, hornworms, leafminers, leafhoppers, <i>Lygus</i> bugs, plant bugs, southern armyworm, tobacco budworm, tomato fruitworm, tomato pinworm, true armyworm, yellowstriped armyworm. Aids in control of aphids, thrips and whitefly.	3	Not recommended for vegetable leafminer in Florida. Do not make applications less than 7 days apart.
Neemix 4.5 (azadirachtin)	4.0-16.0 fl oz		12	0	aphids, armyworms, hornworms, psyllids, Colorado potato beetle, cutworms, leafminers, loopers, tomato fruitworm (corn earworm), tomato pinworm, whitefly	un	IGR, feeding repellent. OMRI-listed.
Oberon 25C (spiromesifen)	7.0-8.5 fl oz	Maximum amount per crop: 25.5 fl oz/A.	12	1	broad mite, twospotted spider mite, whiteflies (eggs and nymphs)	23	No more than 3 applications.
PFR-97 (<i>Isaria fumosorosea</i> Apopka strain 97)	1.0-2.0 lbs		4	0	Aphids, broad mites, rust mites, spider mites, leafminers, thrips, whiteflies	un	Repeat applications at 3-10 days are needed to maintain control. Can be used in greenhouse for food crop transplants raised to be planted into the field. OMRI listed.
Platinum	5-11 fl oz	Do not exceed a total of 11 fl. oz. Platinum/A per growing season.	12	30	aphids, Colorado potato beetles, flea beetles, leafhoppers (suppression), thrips, tomato pinworm, whitefly	4A	Soil application. Not for use in nurseries, plant propagation houses, greenhouses, or on plants grown for use as transplants. See label for rotational restrictions. Do not use with other neonicotinoid insecticides
Platinum 75 SG (thiamethoxam)	1.66-3.67 oz	Do not exceed a total of 3.67 Platinum 75 SG/A per growing season.					
Portal (fenpyroximate)	2.0 pt	Do not apply more than 4.0 pints/A per crop cycle.	12	1	mites, including broad mites; whitefly (supplemental label)	21A	Do not make more than two applications per growing season. Allow 14 days between applications.
*Pounce 25 WP (permethrin)	3.2-12.8 oz		12	0	beet armyworm, cabbage looper, Colorado potato beetle, dipterous leafminers, granulate cutworm, hornworms, southern armyworm, tomato fruitworm, tomato pinworm	3	Do not apply to cherry or grape tomatoes (fruit less than 1 inch in diameter). Do not apply more than 0.6 lb ai per acre per season.

Table 17.3. Selected insecticides approved for managing insect pests of tomato. (continued)

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Trade Name (Active Ingredient)	Rate (Product/acre)	Rate per season	REI (hours)	Days to Harvest	Insect or mite pest	MOA Code ¹	Notes ²
*Proaxis Insecticide (gamma-cyhalothrin)	1.92-3.84 fl oz	Do not apply more than 2.88 pints per acre per season.	24	5	blister beetles, cabbage looper, Colorado potato beetle, cucumber beetles (adults), cutworms, hornworms, flea beetles, grasshoppers, leafhoppers, plant bugs, stink bugs, tobacco budworm, tomato fruitworm, tomato pinworm, vegetable weevil (adult); first and second instar only of the following Lepidoptera: beet armyworm, fall armyworm, southern armyworm, yellowstriped armyworm; suppression of: aphids, spider mites, thrips, whitefly	3	
*Proclaim (emamectin benzoate)	2.4-4.8 oz	No more than 28.8 oz/A per season.	12	7	beet armyworm, cabbage looper, fall armyworm, hornworms, southern armyworm, tobacco budworm, tomato fruitworm, tomato pinworm, yellowstriped armyworm	6	Do not use in greenhouses, nurseries, plant propagation houses, or on any plants grown for use as transplants.
Provado 1.6F (imidacloprid)	3.8-6.2 fl oz	Maximum per crop per season 19.2 fl oz/A.	12	0	aphids, Colorado potato beetle, leafhoppers, whitefly	4A	Do not apply to crop that has been already treated with imidacloprid or thiamethoxam at planting.
Pyganic Crop Protection EC 5.0 II (pyrethrins)	4.5-18.0 fl oz	11.25 pints.	12	0	aphids, beetles, caterpillars, grasshoppers, leafhoppers, leafminers, mites, plant bugs, thrips, whiteflies	3	Pyrethrins degrade rapidly in sunlight. Thorough coverage is important. OMRI-listed. Do not apply more than 10 times per season.
Radiant SC (spinetoram)	5-10 fl oz.	Do not apply more than 34 fl. oz./A per calendar year.	4	1	armyworms (except yellowstriped), Colorado potato beetle, flower thrips, hornworms, <i>Liriomyza</i> leafminers, loopers, <i>Thrips palmi</i> , tomato fruitworm, tomato pinworm	5	For thrips, if additional treatment is needed after two applications, switch to an alternate mode of action (not group 5) for at least two applications.
Requiem 25EC (extract of <i>Chenopodium ambrosioides</i>)	2-4 qt	Limited to 10 applications per crop cycle.	4	0	chilli thrips, eastern flower thrips, Florida flower thrips, green peach aphid, <i>Liriomyza</i> leafminers, melon thrips, potato aphid, western flower thrips, silverleaf whitefly	un	Begin applications before pests reach damaging levels.
Rimon 0.83EC (novaluron)	9.0-12.0 fl oz	Do not apply more than 36 fl oz per acre per season.	12	1	armyworms, Colorado potato beetle, foliage feeding caterpillars, loopers, tomato fruitworm, tomato hornworm, tomato pinworm. Suppression of immature plant bugs, stink bugs, thrips, whiteflies.	15	Minimum of 7 days between applications.
Safari 20 SG (dinotefuran)	7.0-14.0 oz		12	1	Aphids, leafminers, whiteflies	4A	For transplant production only. Can be applied as foliar spray or soil drench.
Scorpion (dinotefuran)	Soil: 9-10.5 fl. oz.; foliar: 2-7 fl. oz.	Do not apply more than 21 fl. oz/A per season as a soil application. Do not apply more than 10.5 fl. oz/A per season foliarly.	12	1	Stink bugs, cucumber beetle, flea beetle, leafhoppers, leafminers, aphids, thrips, whiteflies	4A	Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in the directions for use to protect pollinators. Do not combine soil and foliar applications. Use one method or the other.
Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63-2.5 XLR; 4F: 0.5-2.0 A	Do not apply a total of more than 10 lb or 8 qt per acre per crop.	12	3	Colorado potato beetle, cutworms, fall armyworm, flea beetles, lace bugs, leafhoppers, plant bugs, tomato fruitworm, tomato hornworm, tomato pinworm. Suppression of thrips and stinkbugs.	1A	Do not apply more than seven times.
10% Sevin Granules (carbaryl)	20 lb		12	3	ants, centipedes, crickets, cutworms, earwigs, grasshoppers, millipedes, sowbugs, springtails	1A	Maximum of 4 applications, not more often than once every 7 days.
Sivanto 200 SL (flupyradifurone)	7.0-14.0 fl. oz.	Do not apply more than 28.0 fl. oz./A per year.	4	1	leafhoppers, aphids, Colorado potato beetle, psyllids, whiteflies. Suppression of <i>Scirtothrips dorsalis</i> .	4D	Minimum interval between applications: 7 days.
SuffOil-X (unsulfonated residue of petroleum oil)	1-2 gallons per 100 gallons of water.		4		Aphids, beetle larvae, leafhoppers, leafminers, mites, thrips, whiteflies	un	OMRI listed.
Sulfur (many brands)			24		tomato russet mite, twospotted spider mite	--	May burn fruit and foliage when temperature is high. Do not apply within 2 weeks of an oil spray or EC formulation.
Surround WP (kaolin)	12.5-50 lbs		4	0	cucumber beetles, flea beetles, grasshoppers, leafhoppers, thrips	un	OMRI listed.

Table 17.3. Selected insecticides approved for managing insect pests of tomato. (continued)

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Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Trade Name (Active Ingredient)	Rate (Product/acre)	Rate per season	REI (hours)	Days to Harvest	Insect or mite pest	MOA Code ¹	Notes ²
Trigard (cyromazine)	2.66 oz	Do not apply more than 15.96 oz./A per season.	12	0	Colorado potato beetle (suppression of), leafminers	17	No more than 6 applications per crop. Does not control CPB adults. Most effective against 1 st & 2 nd instar larvae.
Ultra Fine Oil, Saf-T-Side, others	1.0-2.0 gal/100 gal		4	0	aphids, beetle larvae, leafhoppers, leafminers, mites, thrips, whitefly, aphid-transmitted viruses (JMS)	--	Do not exceed four applications per season.
JMS Stylet-Oil (oil, insecticidal)	3.0-6.0 qt/100 gal water (JMS)						Organic Stylet-Oil and Saf-T-Side are OMRI-listed.
Venom 20 SG (dinotefuran)	foliar:0.44-0.895 lb	Do not apply more than 1.34 lb./A per season.	12	1	Colorado potato beetle, flea beetle, green peach aphid, leafhopper, leafminer, potato aphid, thrips, whiteflies	4A	Use only one application method (soil or foliar). Limited to three applications per season. Toxic to honeybees.
Venom 20 SG (dinotefuran)	soil: 1.13-1.34 lb	Do not apply more than 2.68 lb/A per season.	12	21	Colorado potato beetle, flea beetle, green peach aphid, leafhopper, leafminer, potato aphid, thrips, whiteflies		Use only one application method (soil or foliar). Must have supplemental label for rates over 6.0 oz/acre.
Verimark (cyantraniliprole)	5-13.5 fl. oz.	Do not apply more than 0.4 lb ai/A per crop.	4	1	armyworms, loopers, tomato fruitworm, tomato pinworm, flea beetles, green peach aphid, potato aphid (suppression), <i>Liriomyza</i> leafminers, thrips (foliage feeding only), whitefly	28	
Vetica (flubendiamide & buprofezin)	12.0-17.0 fl oz	Do not apply more than 38 fl oz/A per season.	12	1	armyworms, cabbage looper, cutworms, garden webworm, saltmarsh caterpillar, tobacco budworm, tomato hornworm, tomato fruitworm, tomato pinworm, suppression of leafhoppers, mealybugs, and whiteflies	28, 16	Do not apply more than 3 times per season or apply more than 38 fl oz per acre per season. Same classes of active ingredients as Belt, Synapse, Coragen (all group 28), and Courier (group 16).
Voliam Flexi (thiamethoxam & chlorantraniliprole)	4.0-7.0 oz	Do not exceed 14 oz/A per season.	12	1	aphids, beet armyworm, Colorado potato beetle, fall armyworm, flea beetles, hornworms, leafhoppers, loopers, southern armyworm, stink bugs, tobacco budworm, tomato fruitworm, tomato pinworm, whitefly, yellowstriped armyworm, suppression of leafminer	4A, 28	Do not use in greenhouses or on transplants. Do not use if seed has been treated with thiamethoxam or if other Group 4A insecticides will be used. Highly toxic to bees.
*Voliam Xpress (lambda-cyhalothrin & chlorantraniliprole)	5.0-9.0 fl oz	Do not apply more than 31.0 fl oz /A per season.	24	5	Aphids, armyworms, Colorado potato beetle, cucumber beetle adults, flea beetles, leafhoppers, leafminers, stink bugs, thrips (suppression - does not include Western flower thrips), tobacco budworm, tomato fruitworm, tomato pinworm, whiteflies (suppression)	3, 28	
*Vydate L (oxamyl)	foliar: 2.0-4.0 pt	Do not apply more than 32 pts/A per season.	48	3	aphids, Colorado potato beetle, <i>Liriomyza</i> leafminers (suppression), whiteflies (suppression)	1A	
*Warrior II (lambda-cyhalothrin)	0.96-1.92 fl oz	Do not apply more than 23.04 fl. oz/A per season.	24	5	beet armyworm, cabbage looper, Colorado potato beetle, cutworms, fall armyworm, flea beetles, grasshoppers, hornworms, leafhoppers, plant bugs, southern armyworm, stink bugs, thrips, tomato fruitworm, tomato pinworm, vegetable weevil adults, yellowstriped armyworm; Suppression of aphids, leafminers, whitefly	3	
Xentari DF (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb		4	0	caterpillars	11	Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production. OMRI-listed.

¹ Mode of Action (MOA) codes for plant pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v. 7.2 April 2012. Number codes (1 through 28) are used to distinguish the main insecticide mode of action groups, with additional letters for certain sub-groups within each main group. All insecticides within the same group (with same number) indicate same active ingredient or similar mode of action. This information must be considered for the insecticide resistance management decisions. un = unknown, or a mode of action that has not been classified yet.

² Information provided in this table applies only to Florida. Be sure to read a current product label before applying any product. The use of brand names and any mention or listing of commercial products or services in the publication does not imply endorsement by the University of Florida Cooperative Extension Service nor discrimination against similar products or services not mentioned. OMRI listed: Listed by the Organic Materials Review Institute for use in organic production.

*** Restricted use insecticide.**

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action.

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
Anthracnose	M1	(copper compounds) Many brands available: Badge SC, Badge X2, Basic Copper 50W HB, Basic Copper 53, C-O-C-S WDG, Champ DP, Champ F2 FL, Champ WG, Champion WP, C-O-C DF, C-O-C WP, Copper Count N, Cuprofix Ultra 40D, Cueva, Kentan DF, Kocide 3000, Kocide 2000, Kocide DF, Nordox, Nordox 75WG, Nu Cop 50WP, Nu Cop 3L, Nu Cop 50DF, Nu Cop HB	SEE INDIVIDUAL LABELS		1	Varies from 4 hr to 2 days.	Mancozeb enhances bactericidal effect of fix copper compounds.
	M3	(mancozeb) Many brands available: Dithane DF, Dithane F45, Dithane M45, Koverall, Manzate FL, Manzate Pro-Stik, Penncozeb 4FL, Penncozeb 75DF, Penncozeb 80WP	SEE INDIVIDUAL LABELS		5	1	
	M3	Ziram 76DF (ziram)	4 lb	23.7 lb	7	2	Do not use on cherry tomatoes.
	M3 & M1	ManKocide (mancozeb + copper hydroxide)	5 lb	112 lb	5	2	
	M5	(chlorothalonil) Many brands available: Bravo Ultrex, Bravo Weather Stik, Bravo Zn, Chloronil 720, Echo 720, Echo 90 DF, Echo Zn, Equus 500 Zn, Equus 720 SST, Equus DF, Initiate 720	SEE INDIVIDUAL LABELS		0	0.5	Use higher rates at fruit set and lower rates before fruit set.
(suppression)	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	0	0.5	For Disease suppression only. No more than 2 sequential applications before rotating with another effective fungicide from a different FRAC group. See label for additional instructions pertaining to greenhouse useage.
	9 & 3	Inspire Super (cyprodinil + difenoconazole)	20 fl oz	47 fl oz	0	0.5	Limit is 5 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 8 month plant back restriction with off label crops.
	11	Equation	6.2 fl oz	37 fl oz	0	4 hr	Must alternate or tank mix with a fungicide from a different FRAC group; use of an adjuvant or tank mixing with EC products may cause phytotoxicity.
		Heritage	3.2 oz	1.6 lb	0	4 hr	
		Quadris FL	6.2 fl oz	37 fl oz	0	4 hr	
		Satori (azoxystrobin)	6.2 fl oz	37 fl oz	0	4 hr	
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	1.6 pt	8 pt	0	0.5	Must alternate with a non-FRAC code 11 fungicide; use of an adjuvant may cause phytotoxicity.
	11 & 3	Quadris Top (azoxystrobin + difenoconazole)	8 fl oz	47 fl oz	0	0.5	Limit is 4 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group.
	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	0	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	11 & 27	Tanos (famoxadone + cymoxanil)	8 oz	72 oz	3	0.5	Do not alternate or tank mix with other FRAC group 11 fungicides.
	27 & M5	Ariston (cymoxanil + chlorothalonil)	1.9 pt	30.2 pt	3	0.5	Check copper manufacturer's label for specific precautions and limitations for mixing with this product.
(suppression)	19	Ph-D WDG	6.2 oz	31.0 oz	0	4 hr	Alternate with a non-FRAC code 19 fungicide.
		Oso 5% SC (polyoxin D zinc salt)	13 fl oz	78 fl oz	0	4 hr	

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	40 & 3	Revus Top (mandipropamid + difenoconazole)	7 fl oz	28 fl oz	1	0.5	Limit is 4 apps per season; no more than 2 sequential apps. Not labeled for transplants.
Bacterial canker	M1	(copper compounds) Many brands available: Badge SC, Badge X2, Basic Copper 50W HB, Basic Copper 53, C-O-C-S WDG, Champ DP, Champ F2 FL, Champ WG, Champion WP, C-O-C DF, C-O-C WP, Copper Count N, Cuprofix Ultra 40D, Cueva, Kentan DF, Kocide 3000, Kocide 2000, Kocide DF, Nordox, Nordox 75WG, Nu Cop 50WP, Nu Cop 3L, Nu Cop 50DF, Nu Cop HB	SEE INDIVIDUAL LABELS		1	Varies by product from 4 hr to 2 days.	Mancozeb enhances the bactericidal effect of fix copper compounds.
(suppression)	11 & 27	Tanos (famoxadone + cymoxanil)	8 oz	72 oz	3	0.5	Do not alternate or tank mix with other FRAC group 11 fungicides.
Bacterial spot and Bacterial speck	M1	(copper compounds) Many brands available: Badge SC, Badge X2, Basic Copper 50W HB, Basic Copper 53, C-O-C-S WDG, Champ DP, Champ F2 FL, Champ WG, Champion WP, C-O-C DF, C-O-C WP, Copper Count N, Cuprofix Ultra 40D, Cueva, Kentan DF, Kocide 3000, Kocide 2000, Kocide DF, Nordox, Nordox 75WG, Nu Cop 50WP, Nu Cop 3L, Nu Cop 50DF, Nu Cop HB	SEE INDIVIDUAL LABELS		1	Varies by product from 4 hr to 2 days.	Mancozeb enhances the bactericidal effect of fix copper compounds.
	M3	(mancozeb) Many brands available: Dithane DF, Dithane F45, Dithane M45, Koverall, Manzate FL, Manzate Pro-Stik, Penncozeb 4FL, Penncozeb 75DF, Penncozeb 80WP	SEE INDIVIDUAL LABELS		5	1	Bacterial spot control only when tank mixed with a copper fungicide.
	M3 & M1	ManKocide (mancozeb + copper hydroxide)	5 lb	112 lb	5	2	
(suppression)	11 & 27	Tanos (famoxadone + cymoxanil)	8 oz	72 oz	3	0.5	Do not alternate or tank mix with other FRAC group 11 fungicides.
	25	Agri-mycin 17 Ag Streptomycin Bac-Master (streptomycin sulfate)	200 ppm	-	-	0.5	See label for details. For transplant production only. Many isolates are resistant to streptomycin.
	P	Actigard (acibenzolar-S-methyl)	0.75 oz	4.75 oz	14	0.5	Begin applications within one week of transplanting or emergence. Make up to 8 weekly, sequential applications.
Black mold (<i>Alternaria</i> spp.)	3	Mentor (propiconazole)	8 oz /100 gal or /50,000 lb of fruit	-	-	-	Apply as a post-harvest dip, drench, or high-volume spray for the post-harvest control of certain rots. See label for details.
	7	Endura (boscalid)	12.5 oz	25 oz	0	0.5	Alternate with non-FRAC code 7 fungicides, see label
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	0	0.5	No more than 2 sequential applications before rotating with another effective fungicide from a different FRAC group. See label for additional instructions pertaining to greenhouse useage.
	9 & 3	Inspire Super (cyprodinil + difenoconazole)	20 fl oz	47 fl oz	0	0.5	Limit is 5 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 8 month plant back restriction with off label crops.
	11	Heritage Quadris FL Equation Satori (azoxystrobin)	3.2 oz 6.2 fl oz 6.2 fl oz 6.2 fl oz	1.6 lb 37 fl oz 37 fl oz 37 fl oz	0 0 0 0	4 hr 4 hr 4 hr 4 hr	Must alternate or tank mix with a fungicide from a different FRAC group; use of an adjuvant or tank mixing with EC products may cause phytotoxicity.

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	1.6 pt	8 pt	0	0.5	Must alternate with a non-FRAC code 11 fungicide; use of an adjuvant may cause phytotoxicity.
	11 & 3	Quadris Top (azoxystrobin + difenoconazole)	8 fl oz	47 fl oz	0	0.5	Limit is 4 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 1 year plant back restriction for certain off label crops.
	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	0	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	27 & M5	Ariston (cymoxanil + chlorothalonil)	1.9 pt	30.2 pt	3	0.5	Check copper manufacturer's label for specific precautions and limitations for mixing with this product.
	40 & 3	Revus Top (mandipropamid + difenoconazole)	7 fl oz	28 fl oz	1	0.5	4 apps per season; no more than 2 sequential apps. Not labeled for transplants.
Botrytis, Gray Mold	M5	(chlorothalonil) Many brands available: Bravo Ultrex, Bravo Weather Stik, Bravo Zn, Chloronil 720, Echo 720, Echo 90 DF, Echo Zn, Equus 500 Zn, Equus 720 SST, Equus DF, Initiate 720	SEE INDIVIDUAL LABELS		0	0.5	Use higher rates at fruit set and lower rates before fruit set.
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	0	0.5	No more than 2 sequential applications before switching to another effective fungicide with a different mode of action. See label for additional instructions pertaining to greenhouse useage.
(suppression)	7	Endura (boscalid)	12.5 oz	25 oz	0	0.5	Alternate with non-FRAC code 7 fungicides.
	9	Scala SC (pyrimethanil)	7 fl oz	35 fl oz	1	0.5	Use only in a tank mix with another effective non-FRAC code 9 fungicide; Has a 30 day plant back with off label crops.
	9 & 12	Switch 62.5WG (cyprodinil + fludioxonil)	14 oz	56 oz per year	0	0.5	After 2 appl. Alternate with non-FRAC code 9 or 12 fungicides for next 2 applications. Has a 30 day plant back with off label crops.
(suppression)	11	Cabrio 2.09 F (pyraclostrobin)	16 fl oz	96 fl oz	0	0.5	Only 2 sequential appl. Allowed. Limit is 6 appl/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
(suppression)	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	0	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	14	Botran 75 W (dichloran)	1 lbs per 100 gal.	5.33 lb	10	0.5	<u>Greenhouse use only.</u> Limit is 4 applications. Seedlings or newly set transplants may be injured.
	19	Ph-D WDG Oso 5% SC (polyoxin D zinc salt)	6.2 oz 13 fl oz	31.0 oz 78 fl oz	0 0	4 hr 4 hr	Alternate with a non-FRAC code 19 fungicide.
	27 & M5	Ariston (cymoxanil + chlorothalonil)	1.9 pt	30.2 pt	3	0.5	Check copper manufacturer's label for specific precautions and limitations for mixing with this product.
Buckeye rot	M1 + 4	Ridomil Gold Copper (copper hydroxide + mefenoxam)	2 lb	6 lb	14	2	Limited to 3 apps per season. Tankmix with mancozeb.
	11	Heritage Quadris FL Equation Satori (azoxystrobin)	3.2 oz 6.2 fl oz 6.2 fl oz 6.2 fl oz	1.6 lb 37 fl oz 37 fl oz 37 fl oz	0 0 0 0	4 hr 4 hr 4 hr 4 hr	Must alternate or tank mix with a fungicide from a different FRAC group; use of an adjuvant or tank mixing with EC products may cause phytotoxicity.
	11	Cabrio 2.09 F (pyraclostrobin)	16 fl oz	96 fl oz	0	0.5	Only 2 sequential appl. Allowed. Limit is 6 appl/crop. Must alternate or tank mix with a fungicide from a different FRAC group, see label.

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	1.6 pt	8 pt	0	0.5	Must alternate with a non-FRAC code 11 fungicide; use of an adjuvant may cause phytotoxicity.
(suppression)	11 & 27	Tanos (famoxadone + cymoxanil)	8 oz	72 oz	3	0.5	Do not alternate or tank mix with other FRAC group 11 fungicides.
	22 & M3	Gavel 75DF (zoaximide + mancozeb)	2.0 lb	16 lb	5	2	See label
Early blight	M1	(copper compounds) Many brands available: Badge SC, Badge X2, Basic Copper 50W HB, Basic Copper 53, C-O-C-S WDG, Champ DP, Champ F2 FL, Champ WG, Champion WP, C-O-C DF, C-O-C WP, Copper Count N, Cuprofix Ultra 40D, Cueva, Kentan DF, Kocide 3000, Kocide 2000, Kocide DF, Nordox, Nordox 75WG, Nu Cop 50WP, Nu Cop 3L, Nu Cop 50DF, Nu Cop HB	SEE INDIVIDUAL LABELS		1	Varies by product from 4 hr to 2 days.	Mancozeb or maneb enhances bactericidal effect of fix copper compounds. See label for details.
	M3	(mancozeb) Many brands available: Dithane DF, Dithane F45, Dithane M45, Koverall, Manzate FL, Manzate Pro-Stik, Penncozeb 4FL, Penncozeb 75DF, Penncozeb 80WP	SEE INDIVIDUAL LABELS		5	1	
	M3	Ziram 76DF (ziram)	4 lbs	23.7 lb	7	2	Do not use on cherry tomatoes.
	M3 & M1	ManKocide (mancozeb + copper hydroxide)	5 lb	112 lb	5	2	
	M5	(chlorothalonil) Many brands available: Bravo Ultrex, Bravo Weather Stik, Bravo Zn, Chloronil 720, Echo 720, Echo 90 DF, Echo Zn, Equus 500 Zn, Equus 720 SST, Equus DF, Initiate 720	SEE INDIVIDUAL LABELS		0	0.5	Use higher rates at fruit set and lower rates before fruit set.
	4 & M5	Ridomil Gold Bravo 76.4 W (chlorothalonil + mefenoxam)	3 lb	12 lb	14	2	Limit is 4 appl./crop.
	7	Endura (boscalid)	12.5 oz	25 oz	0	0.5	Alternate with non-FRAC code 7 fungicides.
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	0	0.5	No more than 2 sequential applications before switching to another effective fungicide with a different mode of action. See label for additional instructions pertaining to greenhouse useage.
	9	Scala SC (pyrimethanil)	7 fl oz	35 fl oz	1	0.5	Use only in a tank mix with another effective non-FRAC code 9 fungicide ; Has a 30 day plant back with off label crops.
	9 & 3	Inspire Super (cyprodinil + difenoconazole)	20 fl oz	47 fl oz	0	0.5	Limit is 5 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 8 month plant back restriction with off label crops.
	9 & 12	Switch 62.5WG (cyprodinil + fludioxonil)	14 oz	56 oz per year	0	0.5	After 2 apps. alternate with non-FRAC code 9 or 12 fungicides for next 2 applications. Has a 30 day plant back with off label crops.
	11	Heritage Quadris FL Equation Satori (azoxystrobin)	3.2 oz 6.2 fl oz 6.2 fl oz 6.2 fl oz	1.6 lb 37 fl oz 37 fl oz 37 fl oz	0 0 0 0	4 hr 4 hr 4 hr 4 hr	Must alternate or tank mix with a fungicide from a different FRAC group; use of an adjuvant or tank mixing with EC products may cause phytotoxicity.
	11	Cabrio 2.09 F (pyraclostrobin)	16 fl oz	96 fl oz	0	0.5	Only 2 sequential apps. allowed. Limit is 6 apps/crop. Must alternate or tank mix with a fungicide from a different FRAC group.

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	11	Flint (trifloxystrobin)	4 oz	16 oz	3	0.5	Limit is 5 apps/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11	Evito Aftershock (fluoxastrobin)	5.7 fl oz	22.8 fl oz	3	0.5	Limit is 4 apps/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11	Reason 500 SC (fenamidone)	8.2 oz	24.6 lb	14	0.5	Must alternate with a fungicide from a different FRAC group. See supplemental label for restrictions and details.
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	1.6 pt	8 pt	0	0.5	Must alternate with a non-FRAC code 11 fungicide; use of an adjuvant may cause phytotoxicity.
	11 & 3	Quadris Top (azoxystrobin + difenoconazole)	8 fl oz	47 fl oz	0	0.5	Limit is 4 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 1 year plant back restriction for certain off label crops.
	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	0	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	11 & 27	Tanos (famoxadone + cymoxanil)	8 oz	72 oz	3	0.5	Do not alternate or tank mix with other FRAC group 11 fungicides.
	19	Ph-D WDG Oso 5% SC (polyoxin D zinc salt)	6.2 oz 13 fl oz	31.0 oz 78 fl oz	0 0	4 hr 4 hr	Alternate with a non-FRAC code 19 fungicide.
	22 & M3	Gavel 75DF Zing! (zoaximide + mancozeb)	2.0 lb 34 fl oz	16 lb 272 fl oz	5	2	
	27 & M5	Ariston (cymoxanil + chlorothalonil)	3.0 pt	30.2 pt	3	0.5	Check copper manufacturer's label for specific precautions and limitations for mixing with this product.
	28	Previcur Flex (propamocarb hydrochloride)	1.5 pt	7.5 pt	5	0.5	Must tank mix with chlorothalonil or mancozeb.
	28	Promess (propamocarb hydrochloride)	1.5 pt	7.5 pt	5	0.5	Must tank mix with chlorothalonil or mancozeb.
	40 & 3	Revus Top (mandipropamid + difenoconazole)	7 fl oz	28 fl oz	1	0.5	Limit is 4 apps per season; no more than 2 sequential apps. Not labeled for transplants.
Late blight	M1	(copper compounds) Many brands available: Badge SC, Badge X2, Basic Copper 50W HB, Basic Copper 53, C-O-C-S WDG, Champ DP, Champ F2 FL, Champ WG, Champion WP, C-O-C DF, C-O-C WP, Copper Count N, Cuprofix Ultra 40D, Cueva, Kentan DF, Kocide 3000, Kocide 2000, Kocide DF, Nordox, Nordox 75WG, Nu Cop 50WP, Nu Cop 3L, Nu Cop 50DF, Nu Cop HB	SEE INDIVIDUAL LABELS		1		Varies by product from 4 hr to 2 days.
	M3	(mancozeb) Many brands available: Dithane DF, Dithane F45, Dithane M45, Koverall, Manzate, Manzate Pro-Stik, Penncozeb 4FL, Penncozeb 75DF, Penncozeb 80WP	SEE INDIVIDUAL LABELS		5	1	
	M3 & M1	ManKocide (mancozeb + copper hydroxide)	5 lb	112 lb	5	2	
	M5	(chlorothalonil) Many brands available: Bravo Ultrex, Bravo Weather Stik, Bravo Zn, Chloronil 720, Echo 720, Echo 90 DF, Echo Zn, Equus 500 Zn, Equus 720 SST, Equus DF, Initiate 720	SEE INDIVIDUAL LABELS		0	0.5	Use higher rates at fruit set and lower rates before fruit set.

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	4 & M3	Ridomil MZ 68 WP (mefenoxam + mancozeb)	2.5 lb	7.5 lb	5	2	Limit is 3 apps./crop.
	4 & M1	Ridomil Gold Copper 64.8 W (mefenoxam + copper hydroxide)	2 lb	6 lb	14	2	Limit is 3 apps./crop. Tank mix with mancozeb fungicide.
	4 & M5	Ridomil Gold Bravo 76.4 W (chlorothalonil + mefenoxam)	3 lb	12 lb	14	2	Limit is 4 apps./crop.
	11	Heritage	3.2 oz	1.6 lb	0	4 hr	Must alternate or tank mix with a fungicide from a different FRAC group; use of an adjuvant or tank mixing with EC products may cause phytotoxicity.
		Quadris FL	6.2 fl oz	37 fl oz	0	4 hr	
		Equation	6.2 fl oz	37 fl oz	0	4 hr	
		Satori (azoxystrobin)	6.2 fl oz	37 fl oz	0	4 hr	
	11	Cabrio 2.09 F (pyraclostrobin)	16 fl oz	96 fl oz	0	0.5	Only 2 sequential appl. Allowed. Limit is 6 appl/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11	Flint (trifloxystrobin)	4 oz	16 oz	3	0.5	Limit is 5 appl/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11	Evito Aftershock (fluoxastrobin)	5.7 fl oz	22.8 fl oz	3	0.5	Limit is 4 appl/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11	Reason 500 SC (fenamidone)	8.2 oz	24.6 lb	14	0.5	Must alternate with a fungicide from a different FRAC group.
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	1.6 pt	8 pt	0	0.5	Must alternate with a non-FRAC code 11 fungicide; use of an adjuvant may cause phytotoxicity.
(suppression)	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	7	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	11 & 27	Tanos (famoxadone + cymoxanil)	8 oz	72 oz	3	0.5	Do not alternate or tank mix with other FRAC group 11 fungicides.
	19	Oso 5% SC (polyoxin D zinc salt)	13 fl oz	78 fl oz	0	4 hr	Alternate with a non-FRAC code 19 fungicide.
	21	Ranman (cyazofamid)	2.75 oz	16oz	0	0.5	Limit is 6 apps./crop.
	22 & M3	Gavel 75DF Zing! (zoaximide + mancozeb)	2.0 lb 34 fl oz	16 lb 272 fl oz	5	2	
	27	Curzate 60DF (cymoxanil)	5 oz	30 oz per year	3	0.5	Must tank mix with another effective product.
	27 & M5	Ariston (cymoxanil + chlorothalonil)	3.0 pt	30.2 pt	3	0.5	Check copper manufacturer's label for specific precautions and limitations for mixing with this product.
	28	Previcur Flex (propamocarb hydrochloride)	1.5 pt	7.5 pt	5	0.5	Must tank mix with Chlorothalonil or mancozeb.
	28	Promess (propamocarb hydrochloride)	1.5 pt	7.5 pt	5	0.5	Must tank mix with Chlorothalonil or mancozeb.
	33	Aliette 80 WDG (fosetyl-al)	5 lb	20lb	14	0.5	See label for warnings concerning the use of copper compounds.
	33	Alude (mono- and di-potassium salts of phosphorous acid)	1.5 qt/ acre/ 25 gal	-	-	4 hr	For transplants only.
	40	Forum (dimethomorph)	6 oz	30 oz	4	0.5	Only 2 sequential appl. See label for details
	40	Revus (mandipropamid)	8 fl oz	32 fl oz	1	4 hr	Supplemental label; No more than 2 sequential appl.; See label.
		Micora (mandipropamid)	8 fl oz/ 5,000 sq ft	16 fl oz/ 5,000 sq ft	n.a.	4 hr	Micora is only labeled for transplant and retail sale to consumers.

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	40 & 3	Revus Top (mandipropamid + difenoconazole)	7 fl oz	28 fl oz	1	0.5	4 apps per season; no more than 2 sequential apps. Not labeled for transplants. See label
	43	Presidio (Fluopicolide)	4 fl oz	12 fl oz/ per season	2	0.5	4 apps per season; no more than 2 sequential apps. 10 day spray interval; Tank mix with another labeled non-FRAC code 43 fungicide; 18 month rotation with off label crops; see label.
	45 & 40	Zampro (ametoctradin + dimethomorph)	14 fl oz	42 fl oz	4	0.5	Addition of a spreading or penetrating adjuvant is recommended to improve performance. Limit of 3 applications per season.
Leaf mold	M3	(mancozeb) Many brands available: Dithane DF, Dithane F45, Dithane M45, Koverall, Manzate, Manzate Pro-Stik, Penncozeb 4FL, Penncozeb 75DF, Penncozeb 80WP	SEE INDIVIDUAL LABELS		5		
	M5	(chlorothalonil) Many brands available: Bravo Ultrex, Bravo Weather Stik, Bravo Zn, Chloronil 720, Echo 720, Echo 90 DF, Echo Zn, Equus 500 Zn, Equus 720 SST, Equus DF, Initiate 720	SEE INDIVIDUAL LABELS		0	0.5	Use higher rates at fruit set and lower rates before fruit set.
	9 & 3	Inspire Super (cyprodinil + difenoconazole)	20 fl oz	47 fl oz	0	0.5	Limit is 5 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 8 month plant back restriction with off label crops.
	11 & 3	Quadris Top (azoxystrobin + difenoconazole)	8 fl oz	47 fl oz	0	0.5	Limit is 4 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group.
	11 & 27	Tanos (famoxadone + cymoxanil)	8 oz	72 oz	3	0.5	Do not alternate or tank mix with other FRAC group 11 fungicides.
	19	Oso 5% SC (polyoxin D zinc salt)	13 fl oz	78 fl oz	0	4 hr	Alternate with a non-FRAC code 19 fungicide.
	22 & M3	Gavel 75DF (zoaximide + mancozeb)	2.0 lb	16 lb	5	2	
	40 & 3	Revus Top (mandipropamid + difenoconazole)	7 fl oz	28 fl oz	1	0.5	4 apps per season; no more than 2 sequential apps. Not labeled for transplants.
Grey leaf spot	M1	(copper compounds) Many brands available: Badge SC, Badge X2, Basic Copper 50W HB, Basic Copper 53, C-O-C-S WDG, Champ DP, Champ F2 FL, Champ WG, Champion WP, C-O-C DF, C-O-C WP, Copper Count N, Cuprofix Ultra 40D, Cueva, Kentan DF, Kocide 3000, Kocide 2000, Kocide DF, Nordox, Nordox 75WG, Nu Cop 50WP, Nu Cop 3L, Nu Cop 50DF, Nu Cop HB	SEE INDIVIDUAL LABELS		1	Varies by product from 4 hr to 2 days.	Mancozeb or maneb enhances bactericidal effect of fix copper compounds.
	M3	(mancozeb) Many brands available: Dithane DF, Dithane F45, Dithane M45, Koverall, Manzate, Manzate Pro-Stik, Penncozeb 4FL, Penncozeb 75DF, Penncozeb 80WP	SEE INDIVIDUAL LABELS		5	1	
	M3 & M1	ManKocide (mancozeb + copper hydroxide)	5 lb	112 lb	5	2	

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
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Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	M5	(chlorothalonil) Many brands available: Bravo Ultrex, Bravo Weather Stik, Bravo Zn, Chloronil 720, Echo 720, Echo 90 DF, Echo Zn, Equus 500 Zn, Equus 720 SST, Equus DF, Initiate 720	SEE INDIVIDUAL LABELS		0	0.5	Use higher rates at fruit set and lower rates before fruit set.
	4 & M5	Ridomil Gold Bravo 76.4 W (chlorothalonil + mefenoxam)	3 lb	12 lb	14	2	Limit is 4 apps./crop.
	9 & 3	Inspire Super (cyprodinil + difenoconazole)	20 fl oz	47 fl oz	0	0.5	Limit is 5 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 8 month plant back restriction with off label crops.
	11	Flint (trifloxystrobin)	4 oz	16 oz	3	0.5	Limit is 5 apps/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11 & 3	Quadris Top (azoxystrobin + difenoconazole)	8 fl oz	47 fl oz	0	0.5	Limit is 4 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 1 year plant back restriction for certain off label crops.
	22 & M3	Gavel 75DF (zoaximide + mancozeb)	2.0 lb	16 lb	5	2	
	27 & M5	Ariston (cymoxanil + chlorothalonil)	3.0 pt	30.2 pt	3	0.5	Check copper manufacturer's label for specific precautions and limitations for mixing with this product.
	40 & 3	Revus Top (mandipropamid + difenoconazole)	7 fl oz	28 fl oz	1	0.5	4 apps per season; no more than 2 sequential apps. Not labeled for transplants.
Phytophthora crown rot, Phytophthora root rot (<i>Phytophthora</i> spp.)	4	Ridomil Gold SL	1 pt	3 pt	28	2*	Do not apply more than 6 lb mefenoxam/A per crop to the soil. *There is a reentry interval exemption if material is soil-injected or soil-incorporated.
		Ultra Flourish	2 pt	6 pt	7	2*	
		(mefenoxam)					
	4	Metastar 2E (metalaxyl)	2 qt	6 qt	2	28	Soil applied by drip injection.
	11	Reason 500 SC (fenamidone)	8.2 oz	24.6 lb	14	0.5	Must alternate with a fungicide from a different FRAC group. (<i>Phytophthora capsici</i> -suppression only)
	14	Terramaster 4EC (etr Diazole)	7 fl oz	27.4 fl oz	3	0.5	Greenhouse use only.
	21	Ranman (cyazofamid)	2.75 fl oz	16.5 fl oz	0		Apply to the base of plant at the time of transplanting. Make additional applications on a 7 to 10 day schedule if conditions are favorable for disease.
	28	Previcur Flex (propamocarb hydrochloride)	SEE LABEL		5	0.5	GREENHOUSE APPLICATION: 6 apps/ crop cycle. Do not mix with other products. Can cause phytotoxicity if applied in intense sunlight.
	33	Aliette 80 WDG Linebacker WDG (fosetyl-aluminum)	5 lb	2 lb	14	0.5	See label for warnings concerning the use of copper compounds.
	33	Alude (mono- and di-potassium salts of phosphorous acid)	1.5 qt/ acre/ 25 gal	-	-	4 hr	For transplants only.
	43	Presidio (fluopicolide)	4 fl oz	12 fl oz	2	0.5	4 apps per season; no more than 2 sequential apps. 10 day spray interval; Tank mix with another labeled non-FRAC code 43 fungicide; 18 month rotation with off label crops.
	45 & 40	Zampro (ametoctradin + dimethomorph)	14 fl oz	42 fl oz	4	0.5	Addition of a spreading or penetrating adjuvant is recommended to improve performance. Limit of 3 applications per season.

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
Powdery mildew	M2	(sulfur) Many brands available: Cosavet DF, Kumulus DF, Micro Sulf, Microfine Sulfur, Microthiol Disperss, Sulfur 6L, Sulfur 90W, Super Six, That Flowable Sulfur, Tiolux Jet, Thiosperse 80%, Wettable Sulfur, Wettable Sulfur 92, Yellow Jacket Dusting Sulfur, Yellow Jacket Wettable Sulfur	SEE INDIVIDUAL LABELS		1	1	Follow label closely, may cause leaf burn if applied during high temperatures.
	3	Rally 40WSP Nova 40 W Sonoma 40WSP (myclobutanil)	4 oz	1.25 lb	0	1	Note that a 30 day plant back restriction exists.
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	0	0.5	No more than 2 sequential applications before switching to another effective fungicide with a different mode of action. See label for additional instructions pertaining to greenhouse useage.
	9 & 3	Inspire Super (cyprodinil + difenoconazole)	20 fl oz	47 fl oz	0	0.5	Limit is 5 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 8 month plant back restriction with off label crops.
	9 & 12	Switch 62.5WG (cyprodinil + fludioxonil)	14 oz	56 oz per year	0	0.5	After 2 apps alternate with non-FRAC code 9 or 12 fungicides for next 2 applications. Has a 30 day plant back with off label crops.
	11	Heritage Quadris FL Equation Satori (azoxystrobin)	3.2 oz 6.2 fl oz 6.2 fl oz 6.2 fl oz	1.6 lb 37 fl oz 37 fl oz 37 fl oz	0 0 0 0	4 hr 4 hr 4 hr 4 hr	Must alternate or tank mix with a fungicide from a different FRAC group; use of an adjuvant or tank mixing with EC products may cause phytotoxicity.
	11	Cabrio 2.09 F (pyraclostrobin)	16 fl oz	96 fl oz	0	0.5	Only 2 sequential apps. allowed. Limit is 6 appl/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11	Flint (trifloxystrobin)	4 oz	16 oz	3	0.5	Limit is 5 apps/crop; must alternate or tank mix with a fungicide from a different FRAC group.
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	1.6 pt	8 pt	0	0.5	Must alternate with a non-FRAC code 11 fungicide; use of an adjuvant may cause phytotoxicity.
	11 & 3	Quadris Top (azoxystrobin + difenoconazole)	8 fl oz	47 fl oz	0	0.5	Limit is 4 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 1 year plant back restriction for certain off label crops.
	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	0	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	19	Ph-D WDG Oso 5% SC (polyoxin D zinc salt)	6.2 oz 13 fl oz	31.0 oz 78 fl oz	0 0	4 hr 4 hr	Alternate with a non-FRAC code 19 fungicide.
	40 & 3	Revus Top (mandipropamid + difenoconazole)	7 fl oz	28 fl oz	1	0.5	4 apps per season; no more than 2 sequential apps. Not labeled for transplants.
	U8	Vivando (metrafenone)	15.4 fl oz	46.2 fl oz	0	0.5	3 apps per season; no more than 2 sequential apps. Do not mix with horticultural oils.
Pythium diseases (<i>Pythium spp.</i>)	4	Ridomil Gold GR	20 lb	40 lb	28	2*	*There is a reentry interval exemption if material is soil-injected or soil- incorporated.
		Ridomil Gold SL	2 pt	3 pt	7	2*	
		Ultra Flourish	2 pt	6 pt	7	2	
		(mefenoxam)					

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
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Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	4	Metastar 2E (metalaxyl)	2 qt	6 qt	28	2	Soil applied by drip injection.
	14	Terramaster 4EC (etridiazole)	7 fl oz	27.4 fl oz	3	0.5	Greenhouse use only.
	21	Ranman (cyazofamid)	3 fl oz/ 100 gal	-	0	-	For greenhouse transplant production; make a single application to the seedling tray 1 week prior up to the time of transplanting. Do not use any surfactant.
	28	Previcur Flex (propamocarb hydrochloride)	SEE INDIVIDUAL LABELS		5	0.5	GREENHOUSE APPLICATION: 6 apps/ crop cycle. Do not mix with other products. Can cause phytotoxicity if applied in intense sunlight.
	28	Previcur Flex (propamocarb hydrochloride)	1.5 pts/ treated acre	7.5 pt/ treated acre	5	0.5	(Root rots and seedling diseases) Applied to lower portion of plant and soil, or as a soil drench or drip irrigation.
	28	Promess (propamocarb hydrochloride)	1.5 pt	7.5 pt	5	0.5	Must tank mix with chlorothalonil or mancozeb.
	33	Alude (mono- and di-potassium salts of phosphorous acid)	1.5 qt/ acre/ 25 gal	-	-	4 hr	For transplants only.
Rhizoctonia root rot, Rhizoctonia fruit rot (<i>Rhizoctonia solani</i>)	M5	(chlorothalonil) Many brands available: Bravo Ultrex, Bravo Weather Stik, Bravo Zn, Chloronil 720, Echo 720, Echo 90 DF, Echo Zn, Equus 500 Zn, Equus 720 SST, Equus DF, Initiate 720	SEE INDIVIDUAL LABELS		0	0.5	Use higher rates at fruit set and lower rates before fruit set.
	7	Fontelis (penthiopyrad)	1.0 - 1.6 fl oz/ 1000 row-ft	24 fl oz	0	0.5	Apply at-plant, pre-plant incorporated, in-furrow, as a transplant drench, or by drip irrigation.
(suppression)	11	Cabrio (pyraclostrobin)	16 oz	96 oz	0	0.5	Limit is 2 sequential applications before alternating to another effective fungicide from a different FRAC group.
(suppression)	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	7	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	14	Blocker 4F Terraclor 75 WP (PCNB)	SEE INDIVIDUAL LABELS		Soil treat- ment at planting	0.5	See label for application type and restrictions
	14	Par-Flo 4F (PCNB)	12 fl oz per 100 gal.	2 app.	Soil drench	0.5	Limited to only container-grown plants in nurseries or greenhouse.
	27 & M5	Ariston (cymoxanil + chlorothalonil)	1.9 pt	30.2 pt	3	0.5	Check copper manufacturer's label for specific precautions and limitations for mixing with this product.
Septoria leaf spot	M1	(copper compounds) Many brands available: Badge SC, Badge X2, Basic Copper 50W HB, Basic Copper 53, C-O-C-S WDG, Champ DP, Champ F2 FL, Champ WG, Champion WP, C-O-C DF, C-O-C WP, Copper Count N, Cuprofix Ultra 40D, Cueva, Kentan DF, Kocide 3000, Kocide 2000, Kocide DF, Nordox, Nordox 75WG, Nu Cop 50WP, Nu Cop 3L, Nu Cop 50DF, Nu Cop HB	SEE INDIVIDUAL LABELS		1	Varies by product from 4 hr to 2 days.	
	M3	(mancozeb) Many brands available: Dithane DF, Dithane F45, Dithane M45, Koverall, Manzate, Manzate Pro-Stik, Penncozeb 4FL, Penncozeb 75DF, Penncozeb 80WP	SEE INDIVIDUAL LABELS		5		

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
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Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	M3	Ziram 76DF (ziram)	4 lbs	23.7 lb	7	2	Do not use on cherry tomatoes.
	M3 & M1	ManKocide (mancozeb + copper hydroxide)	5 lbs	112 lb	5	2	
	M5	(chlorothalonil) Many brands available: Bravo Ultrex, Bravo Weather Stik, Bravo Zn, Chloronil 720, Echo 720, Echo 90 DF, Echo Zn, Equus 500 Zn, Equus 720 SST, Equus DF, Initiate 720	SEE INDIVIDUAL LABELS		0	0.5	Use higher rates at fruit set and lower rates before fruit set.
	4 & M5	Ridomil Gold Bravo 76.4 W (chlorothalonil + mefenoxam)	3 lb	12 lb	14	2	Limit is 4 apps./crop.
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	0	0.5	No more than 2 sequential apps. before switching to another effective fungicide with a different mode of action. See label for additional instructions pertaining to greenhouse useage.
	9 & 3	Inspire Super (cyprodinil + difenoconazole)	20 fl oz	47 fl oz	0	0.5	Limit is 5 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 8 month plant back restriction with off label crops.
	11	Heritage Quadris FL Equation Satori (azoxystrobin)	3.2 oz 6.2 fl oz 6.2 fl oz 6.2 fl oz	1.6 lb 37 fl oz 37 fl oz 37 fl oz	0 0 0 0	4 hr 4 hr 4 hr 4 hr	Must alternate or tank mix with a fungicide from a different FRAC group; use of an adjuvant or tank mixing with EC products may cause phytotoxicity.
	11	Cabrio 2.09 F (pyraclostrobin)	16 fl oz	96 fl oz	0	0.5	Only 2 sequential appl. Allowed. Limit is 6 apps/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11	Flint (trifloxystrobin)	4 oz	16 oz	3	0.5	Limit is 5 apps/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11	Reason 500 SC (fenamidone)	8.2 oz	24.6 lb	14	0.5	Must alternate with a fungicide from a different FRAC group.
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	1.6 pt	8 pt	0	0.5	Must alternate with a non-FRAC code 11 fungicide; use of an adjuvant may cause phytotoxicity.
	11 & 3	Quadris Top (azoxystrobin + difenoconazole)	8 fl oz	47 fl oz	0	0.5	Limit is 4 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Up to a 1 year plant back restriction for certain off label crops.
	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	0	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	11 & 27	Tanos (famoxadone + cymoxanil)	8 oz	72 oz	3	0.5	Do not alternate or tank mix with other FRAC group 11 fungicides.
	22 & M3	Gavel 75DF Zing! (zoaximide + mancozeb)	2.0 lb 34 fl oz	16 lb 272 fl oz	5	2	
	27 & M5	Ariston (cymoxanil + chlorothalonil)	3.0 pt	30.2 pt	3	0.5	Check copper manufacturer's label for specific precautions and limitations for mixing with this product.
	40 & 3	Revus Top (mandipropamid + difenoconazole)	7 fl oz	28 fl oz	1	0.5	4 apps per season; no more than 2 sequential apps. Not labeled for transplants.
Sour Rot (<i>Geotrichum candidum</i>)	3	Mentor (propiconazole)	8 oz /100 gal or /50,000 lb of fruit	-	-	-	Apply as a post-harvest dip, drench, or high-volume spray for the post-harvest control of certain rots. See label for details.

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
Southern blight	7	Fontelis (penthiopyrad)	1.0 - 1.6 fl oz/ 1000 row-ft	24 fl oz	0	0.5	Apply at-plant, pre-plant incorporated, in-furrow, as a transplant drench, or by drip irrigation.
	11	Evito Aftershock (fluoxastrobin)	5.7 fl oz	22.8 fl oz	3	0.5	Limit is 4 appl./crop. Must alternate or tank mix with a fungicide from a different FRAC group.
(suppression)	11	Cabrio (pyraclostrobin)	16 oz	96 oz	0	0.5	Limit is 2 sequential applications before alternating to another effective fungicide from a different FRAC group.
(suppression)	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	0	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	14	Blocker 4F Terraclor 75 WP (PCNB)	SEE INDIVIDUAL LABELS		Soil treatment at planting	0.5	See label for application type and restrictions.
(suppression)	19	Oso 5% SC (polyoxin D zinc salt)	13 fl oz	78 fl oz	0	4 hr	Alternate with a non-FRAC code 19 fungicide.
Target spot	M5	(chlorothalonil) Many brands available: Bravo Ultrex, Bravo Weather Stik, Bravo Zn, Chloronil 720, Echo 720, Echo 90 DF, Echo Zn, Equus 500 Zn, Equus 720 SST, Equus DF, Initiate 720	SEE INDIVIDUAL LABELS		0	0.5	Use higher rates at fruit set and lower rates before fruit set.
	4 & M5	Ridomil Gold Bravo 76.4 W (chlorothalonil + mefenoxam)	3 lb	12 lb	14	2	Limit is 4 appl./crop.
	7	Endura (boscalid)	12.5 oz	25 oz	0	0.5	Alternate with non-FRAC code 7 fungicides.
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	0	0.5	No more than 2 sequential apps. before switching to another effective fungicide with a different mode of action. See label for additional instructions pertaining to greenhouse usage.
	9	Scala SC (pyrimethanil)	7 fl oz	35 fl oz	1	0.5	Use only in a tank mix with another effective non-FRAC code 9 fungicide; has a 30 day plant back with off label crops.
	9 & 3	Inspire Super (cyprodinil + difenoconazole)	20 fl oz	47 fl oz	0	0.5	Limit is 5 apps./season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 8 month plant back restriction with off label crops.
	11	Heritage Quadris FL Equation Satori (azoxystrobin)	3.2 oz 6.2 fl oz 6.2 fl oz 6.2 fl oz	1.6 lb 37 fl oz 37 fl oz 37 fl oz	0 0 0 0	4 hr 4 hr 4 hr 4 hr	Must alternate or tank mix with a fungicide from a different FRAC group; use of an adjuvant or tank mixing with EC products may cause phytotoxicity.
	11	Cabrio 2.09 F (pyraclostrobin)	16 fl oz	96 fl oz	0	0.5	Only 2 sequential appl. Allowed. Limit is 6 appl./crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11	Evito Aftershock (fluoxastrobin)	5.7 fl oz	22.8 fl oz	3	0.5	Limit is 4 appl./crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	1.6 pt	8 pt	0	0.5	Must alternate with a non-FRAC code 11 fungicide; use of an adjuvant may cause phytotoxicity.
	11 & 3	Quadris Top (azoxystrobin + difenoconazole)	8 fl oz	47 fl oz	0	0.5	Limit is 4 apps per season with no more than 2 sequential apps. Must tank mix or alternate with another effective fungicide from another FRAC group. Has up to a 1 year plant back restriction for certain off label crops.

Table 17.4. Tomato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Refer to Table 18.1 for biopesticide and other alternative products labeled for disease management.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	0	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.
	11 & 27	Tanos (famoxadone + cymoxanil)	8 oz	72 oz	3	0.5	Do not alternate or tank mix with other FRAC group 11 fungicides.
	27 & M5	Ariston (cymoxanil + chlorothalonil)	3.0 pt	30.2 pt	3	0.5	Check copper manufacturer's label for specific precautions and limitations for mixing with this product.
	40 & 3	Revus Top (mandipropamid + difenoconazole)	7 fl oz	28 fl oz	1	0.5	4 apps per season; no more than 2 sequential apps. Not labeled for transplants.
Timber Rot, Sclerotinia stem rot, or White mold (<i>Sclerotinia sclerotiorum</i>) (suppression)	11	Heritage Quadris FL (azoxystrobin)	3.2 oz 6.2 fl oz	1.6 lb 37 fl oz	0	4 hr	Must alternate or tank mix with a fungicide from a different FRAC group; use of an adjuvant or tank mixing with EC products may cause phytotoxicity.
	11	Cabrio 2.09 F (pyraclostrobin)	16 fl oz	96 fl oz	0	0.5	Only 2 sequential apps. allowed. Limit is 6 apps/crop. Must alternate or tank mix with a fungicide from a different FRAC group.
	11 & 7	Priaxor (pyraclostrobin + fluxapyroxad)	8 fl oz	24 fl oz	0	0.5	Limit is 3 apps per season; no more than 2 sequential apps. See label about compatibility with other formulated products and adjuvants.

¹ FRAC code (fungicide group): Number (1 through 46) and letters (U and P) are used to distinguish the fungicide mode of action groups. All fungicides within the same group (with same number or letter) indicate same active ingredient or similar mode of action. This information must be considered for the fungicide resistance management decisions. U = unknown, or a mode of action that has not been classified yet and is typically associated with another number; P = host plant defense inducers. Source: FRAC Code List 2013; <http://www.frac.info/> (FRAC = Fungicide Resistance Action Committee).

² Information provided in this table applies only to Florida. Be sure to read a current product label before applying any chemical. The use of brand names and any mention or listing of commercial products or services in the publication does not imply endorsement by the University of Florida Cooperative Extension Service nor discrimination against similar products or services not mentioned.