

# Tomato Disease & Insect Control Manual With Variety Selection

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Suggested spray schedule, irrigation schedule and weed control guide attached at end.

## Acknowledgements

Special thanks goes to the following people and sources of information for making this manual and short course possible.

- UT Extension 2014 Commercial Vegetable Disease Control Guide
- Southeastern U.S. 2014 Vegetable Crop Handbook
- North Carolina Agricultural Chemical Manual 2014
- Dr. Allen Straw, Virginia Tech Vegetable Specialist
- Cornell University Department of Plant Pathology Website, T. A. Zitter for pictures
- Diane Brickey – Editing

## Disease Identification

Pictures taken from Cornell University, Rutgers University, A.F. Sherf, R. Providenti, and Grainger County Producers



Calcium Deficiency or Blossom-End Rot use Calcium Nitrate the 4<sup>th</sup>, 6<sup>th</sup> and 9<sup>th</sup> week of crop at 50 lbs/acre in drip irrigation.



Magnesium Deficiency  
use Epson Salt at 20 lb/A  
or 4 lb/greenhouse



Phytophthora Blight



Septoria Leaf Spot



The photographic work of Kent Loeffler is gratefully acknowledged.

## Botrytis Gray Mold



Leaf Mold



Bacterial Pith Necrosis



Bacterial Canker



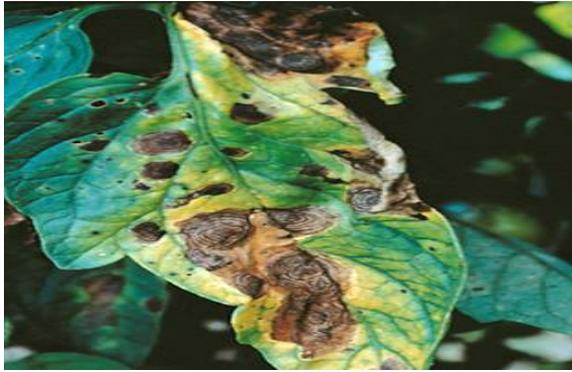
Bacterial Speck



Bacterial Spot



Southern Bacterial Wilt



Early Blight



Tomato Spotted Wilt Virus caused by Thripes



Fusarium Wilt



Verticillium Wilt



Late Blight

## Virus Diseases and Disorders of Tomato



Tomato Mosaic



Tobacco Mosaic Virus



Cucumber Mosaic



Tomato Big-Bud Phytoplasma

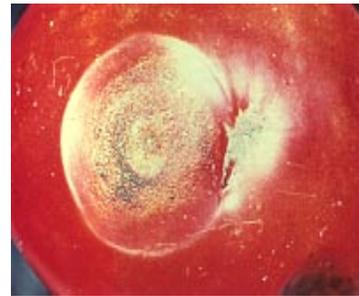
## Common Tomato Fruit Disorders



Blotchy Ripening



Bacterial Soft Rot



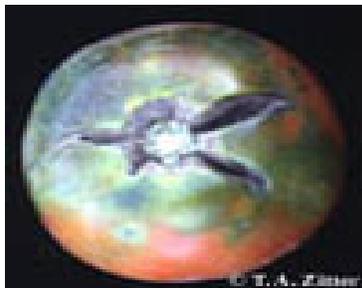
Anthracnose



Graywall



Zippering



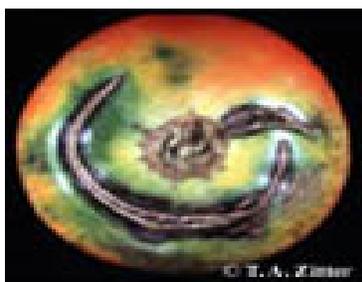
Radial Cracking



Catface



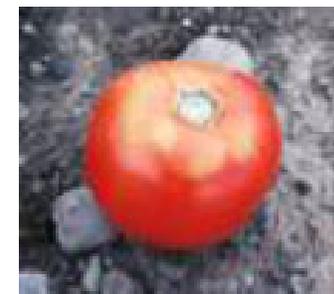
Bird's Eye Spot



Concentric Crack



Sunscald



Yellow Shoulders

## Tomato Disease Control

All tables taken from UT Extension 2014 Commercial Vegetable Disease Guide

Pest	Fungicide	Suggested rate/acre	Remarks & Precautions
<b>TOMATO, PLANT BED, OUTDOOR</b>			
<b>Damping Off</b> Lower stem shrivels and seedling collapses.	Terraclor 75WP	4-8 oz/100 gal water	Soil drench applied to 400-800 sq. ft of containers or beds. Can be repeated once 4-6 weeks later. Use fungicide treated seed when possible.  Minimum of 50 gal water per 1000 sq ft
	Previcur Flex	32 fl oz/1000 sq ft at seeding 16 fl oz after emergence	
<b>Botrytis (Gray Mold)</b> Gray, fuzzy growth. & <b>Early Blight</b> Brown spots on leaves or stem.	chlorothalonil 6L	1.38 - 2 pt/43560 sq ft	Spray, first true leaves, repeat at weekly interval. Outdoor beds only.
<b>Bacterial Canker, Spot, Speck</b> Tiny, dark brown to black spots on leaves.	streptomycin sulfate	1 lb/100 gal	When symptoms appear and 4-5 days intervals until transplant
	sodium hypochlorite (Clorox)	1 qt in 4 qt water	Wash seed for 40 min in solution with continuous agitation; air dry promptly. Use 1 gal solution per 1 lb seed

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Pest	Fungicide	Suggested Rate/Acre	PHI days	Maximum Use/Acre/Season	Remarks & Precautions
<b>TOMATO, GREENHOUSE</b> After Transplant					
<b>Early &amp; Late Blight,</b>  <b>Gray Leaf Spot,</b> <b>Leaf Mold</b>	mancozeb 80WP	1.5 - 2 lb/100 gal	5	22.4 lb	<b>Potential for phytotoxicity(injury) exists for Catamaran. Do not apply as a mixture with any other product.</b> Tanos must be tank mixed with mancozeb.
	Catamaran	4.5 pt/43,560 sq ft	0	50 pt	
	Tanos 50WG	6-8 oz/43,560 sqft	3	72 oz	
<b>Botrytis Stem Canker</b>	Botran 75WP	1 lb/100 gal	10	4 app	Botran is sprayed to stem of plant from ground level up to 18- 24 in
<b>Bacterial Speck &amp; Spot</b> <b>Early &amp; Late Blight,</b> <b>Septoria Leaf Spot</b>	Fixed copper				Foliar sprays
	Kocide DF	2 - 4 Tbsp/1000 sq ft			
	Kocide 2000	1.5 - 2.25 Tbsp/1000 sq ft			
<b>Gray Mold (Botrytis)</b>	Fontelis	1 – 1.5 TBSP/gal/1360 sq ft	0	2.2 fl oz/1360 sq ft	Foliar sprays. Do not make more than 2 consecutive applications of Degree before rotating. Scala must be tank mixed with another effective fungicide. Ventilate for at least 2 hours after application to avoid plant damage from vapor.
	Scala 5SC	7 fl oz/100 gal	1	35 fl oz	
	Catamaran	4.5 pt/43,560 sq ft	0	50 pt	
	Degree 50WDG	1.5 lb/43,560 sq ft	0	6 lb	
	Serenade	2–6 qt/43,560 sqft	0		
	Veranda	6.2 oz/acre	0	5 app	
<b>Sclerotinia Stem Rot (Timber Rot)</b>	Contans WG	.75 – 1.5 oz/1000 sq ft			Apply to soil 3 months prior to planting. Till 2-8 in depth. Botran should give some control, also.
<b>Powdery Mildew</b>	Fontelis	1 – 1.5 TBSP/gal/1360 sq ft	0	2.2 oz	Spray at 1st sign of mildew and repeat at 5- to 14-day intervals. Due to sulfur’s high effectiveness extended spray intervals may be possible. Re-apply only if mildew resumes activity. Do not apply if temps will exceed 90F within 3 days after spraying.
	Veranda	6.2 oz/ acre	0	5 app	
	Rally 40WP	2.5-4 oz/43,560 sq ft	0		
	Sulfur 90WP	5 lb/43,560 sq ft	0		
<b>Pythium Root Rot</b>	Previcur Flex	12.8 fl oz/100 gal	5	4 app	Applied with drip system.
	Terramaster4EC	6.5 fl oz/500 gal	3	4 app	See label directions

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<b>TOMATO, FIELD</b>					
<b>Bacterial Spot and Speck</b> Small, dark spots on foliage and fruit.	Actigard 50WG	0.33 - 0.75 oz	14	8 app	Actigard is a plant resistance activator. Under certain conditions, this product may lead to reductions in yield. Refer to label for disclaimer. Begin applications within 1 week of transplanting. Make up to 8 applications, at weekly intervals. After the eighth application, switch to copper sprays if bacterial diseases are present. Begin Actigard applications at 0.33 oz/A, increasing to 0.75 oz/A as plants grow.
<b>Bacterial Spot, Speck, and Canker</b> Small, dark spots on foliage and fruit.	fixed copper + mancozeb 80WP	See label  1.5 lb	5	22.4 lb	Ridomil/ Copper can be used, but see label for limitations on use of Ridomil. Adding Tanos to copper and mancozeb may slightly enhance efficacy.
	<hr/> AgriPhage	<hr/> 1 pt			<hr/> May be useful where copper-resistant bacterial strains are present. Cannot be tank-mixed with copper. Use as part of cooperative program with Omni-Lytics, (866-285-2644), who formulates the bacteriophage to match your bacterial strains. Re-sample frequently, to accommodate strain shifts.
<b>Blossom End Rot</b> Firm, sunken area on blossom end of fruit.	calcium chloride	4 lb/100 gal	0	4 app	Apply as soon as problem is detected or earlier. Maintain adequate calcium level in soil and uniform soil moisture. Avoid excessive irrigation when plants are small.

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Pest	Fungicide	Suggested Rate/Acre	PHI day	Maximum Use/Acre/Season	Remarks & Precautions
<b>TOMATO, FIELD</b>					
<b>Early Blight</b> Brown target spots followed by blighting of foliage.	Fontelis	10-24 oz	0	72 oz	Start spraying soon after plants are set and repeat at 7- to 10-day intervals. Note: Quadris, Cabrio and tanos are showing little effect on Early blight. Fontelis and Inspire Super are show good results for early blight.
	Priaxor	4-8 fl oz	0	3 app	
	Inspire Super	16-20 fl oz	0	47 fl oz	
	Cabrio 20EG	8 - 16 oz	0	96 oz	
	chlorothalonil	1.38 - 2 pt	0	20 pt	
<b>Late Blight</b> (also see late blight, below) Dark, irregular spots, often worse on younger leaves. Favored by mild, wet weather.	mancozeb	1.5 - 3 lb	5	22.4 lb	
	Quadris 2.08F	5 - 6.2 fl oz	0	37 fl oz	
	Quadris Opti	1.6 pt	0	5 app	
<b>Anthracnose</b> Circular, sunken spots on ripe fruit.	Tanos 50WG	6 - 8 oz	3	72 oz	
<b>Septoria Leaf Spot</b> Small, gray circular leaf spots with dark borders.					
<b>Fusarium Wilt</b> Yellowing and wilting of foliage. Brown discoloration inside of stem.					Crop rotation, fumigation and resistant varieties are treatments. Maintain pH between 6.5 and 7.0.

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Pest	Fungicide	Suggested Rate/Acre	PHI days	Maximum Use/Acre/Season	Remarks & Precautions	
<b>TOMATO, FIELD</b>						
<b>Buckeye Fruit Rot</b> Circular, zonate bands within large spot on fruit, worse on lower clusters.	Ridomil Gold	2.5 pt	14	3 app	All are foliarly applied. Certain mefenoxam and metalaxyl products can be applied in drip irrigation, but have 28 day PHIs..	
	Bravo					
	Ridomil Gold	2 lb	14	3 app		
	Copper					
	Quadris 2.08F	5 - 6.2 fl oz	0	37 fl oz		
	Quadris Opti	1.6 pt	0	5 app		
	Gavel 75DF	1.5 - 2 lb	5	8 app		
	Presidio 4SC	3-4 fl oz	2	12 fl oz		
	<b>Gray Mold (Botrytis)</b> Gray, fuzzy mold on blighted foliage and fruits.	chlorothalonil 6L	2.75 pt	0	20 pt	Endura may only be applied 2 times per season when applied at the gray mold rate. It is labeled for early blight control at 2.5 - 3.5 oz/A. Scala must be tank mixed with another one of these. Switch or Fontelis use only 2 times in a roll.
		Endura 70WG	9 - 12.5 oz	0	25 oz	
Scala 5SC		7 fl oz	1	35 oz		
Switch		11-14 oz	0	56 oz		
<b>Early Blight</b> (See above)	Fontelis	10-24 fl oz	0	72 fl oz		
<b>Leaf Mold</b> Yellow spots on upper surface of leaf, olive to gray mold on underside.	chlorothalonil 6L	2.75 pt	0	20 pt	Tanos must be tank mixed with and alternated with a non-strobilurin fungicide such as chlorothalonil or mancozeb. .	
	mancozeb 80WP	1.5 - 3 lb	5	22.4 lb		
	Tanos 50WG	8 oz	3	72 oz		
	Quadris Top					
		8 fl oz	0	47 fl oz		
<b>Pythium Root and Stem Rot</b> Dark, watery rot of lower stem of young plants.	MetaStar 2E	2-4 qt	28	6 qt	Apply MetaStar, Ridomil or Ultra Flourish preplant incorporated or see label for other methods. Aliette/Linebacker are foliar sprays. Apply Previcur via transplant water, drip, sprinkler, or direct nozzle to lower portion of plant and soil.	
	AG					
	Ridomil Gold 4SL	1 - 2 pt/treated acre	28	3 pt		
	Ultra Flourish	2 - 4 pt/treated acre	28	6 pt		
	Aliette 80WDG					
	Previcur Flex 6F	2.5 - 5 lb	14	20 lb		
		1.5 pt	5	7.5 pt		

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Pest	Fungicide	Suggested Rate/Acre	PHI (days)	Maximum Use/Acre/Season	Remarks & Precautions
<b>TOMATO, FIELD</b>					
<b>Late Blight</b> Large, irregular spots on leaves; firm rot of fruit.	Cabrio	8-16 fl oz	0	96 oz	Begin applications before onset of disease and repeat on a 5- to 10-day schedule. Use 5-7 day intervals during mild, wet weather or if late blight is present. Most of these products require alternation with late blight fungicides with a different mode of action. Tank mix with a protectant fungicide such as chlorothalonil or mancozeb. Most Late Blight is resistant to Ridomil. Do not use Revus Top on small-fruit varieties (mature fruit less than 2 in.)
	Quadris	6.2 fl oz	0	37 fl oz	
	Reason 4.13F	5.5-8.2 fl oz	14	24.6 oz	
	Tanos	6-8 oz	3	72 oz	
	Ranman	2.1-2.75 fl oz	0	6 app	
	Gavel 75DF	1.5-2 lb	5	8 app	
	Curzate 60DF	3.2 - 5 oz	3	30 oz	
	Previcur Flex	.7-1.5 pt	5	7.5 pt	
	Forum	6 fl oz	4	5 app	
	Revus	5.5-8 fl oz	1	32 fl oz	
	Revus Top	5.5-7 fl oz	1	28 fl oz	
	Presidio 4 SC	3-4 fl oz	2	12 fl oz	
	Zampro	14 fl oz	4	42 fl oz	
chlorothalonil	2-2.75 pt	0	20 pt		
<b>Sclerotinia Stem Rot (Timber Rot)</b> Dry, brown rot on stem. Hard, black pea-like structures form inside stem.	Cabrio	12-16 oz	0	96 oz	The Endura and Fontelis tomato label does not include this disease; however, applied as for early blight control, should provide suppression of Sclerotinia.
<b>Southern Blight</b> Plants wilt and die. White mold can often be seen on base of stem.	Terraclor 75WP (soil treatment)	3 lb/ 100 gal water			Turn soil deep to bury plant debris which might harbor disease organisms. Use Terraclor in setting water ½ pt per plant. Rotate with sod crops.
	At Planting				
	Blocker	5-7.5 pt/100 gal			
	Fontelis	1-1.6 fl oz/1000row ft			
	After Planting				
	Cabrio	12-16 oz			
	Fontelis	16-24 fl oz			
<b>Verticillium Wilt</b> Yellowing of leaves; main stem has tan discoloration.					Crop rotation, fumigation, and resistant varieties are treatments.

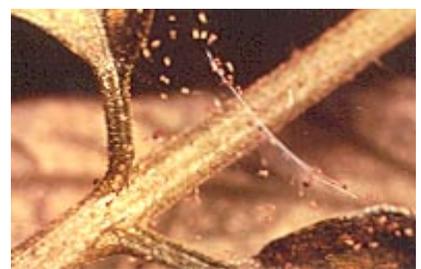
Pest	Fungicide	Suggested Rate/Acre	PHI (days)	Maximum Use/Acre/Season	Remarks & Precautions
<b>TOMATO, FIELD</b>					
<b>Phytophthora Blight</b> ( <i>P. capsici</i> ) Rot of roots and crown.	MetaStar 2E	2 -4 qt	28	6 qt	Plant on raised beds, improve field drainage, and do not plant wet areas. MetaStar, Ridomil or Ultra Flourish: Apply preplant incorporated or see label for other methods. Fosphite: Apply at 2 - 4 week intervals (see label). Presidio: apply as a soil sprau or drip irrigation. Must be mixed with fungicide with a different mode of action. Ranman: Apply in transplant water or to the base of the plant at transplanting. Can also be applied to the foliage, but must involve in a resistance management program(see label) Zampro: aply at planting as a spray directed to plant base and root zone or in drip irrigation.
	Ridomil Gold	1 – 2 pt	28	3 pt	
	Ultra Flourish	2 - 4 pt	28	6 pt	
	phosphorous acid: Fosphite	Pre-plant root dip: 2 qt/100 gal Drip irrig.: 2 - 3 qt in at least 100 gal	0		
	Presidio	3-4 fl oz	2	12 fl oz	
	Ranman	2.75 fl oz	0	6 app	
	Zampro	14 fl oz	4	42 fl oz	

## Insect Identification

Pictures taken from Cornell University, Rutgers University, A.F. Sherf, R. Providenti, and Grainger County Producers



Aphids



Spider Mites



White Flies

Cabbage Looper



Tomato Hornworm



Tarnish Plant Bug Injury



Stink Bug



Leaffooted Bug



Tobacco Hornworm



Tomato Fruitworm



Spotted Cucumber Beetle



Striped Cucumber Beetle



Colorado Potato Beetle



Blister Beetle

# Greenhouse Tomato Insect Control

All tables taken from 2014 NC Agricultural Chemical Manual

CROP Insect	Insecticide and Formulation	Amount of Formulation	Re Entry Interval	Pre Harvest Interval (PHI) (Days)	Precautions and Remarks
<b>TOMATO, PEPPER</b>					
Aphid	imidacloprid, MOA 4A (Admire Pro) 4.6 F	0.6 fl oz/1,000 plants	12 hrs	0	Apply in a minimum of 21 gal water using soil drenches, micro-irrigation, or drip irrigation. Do not apply to immature plants as phytotoxicity may occur. Make only one application per crop per season. Also controls whiteflies.
	malathion, MOA 1B (various) 10 A 57 EC 25 WP	1 lb/50,000 cu ft 1 qt/100 gal water 4 lb/100 gal water	12 hrs	15 hr 1 1	
	insecticidal soap (M-Pede) 49 EC	2 tbsp/gal water	12 hrs	0	May be used alone or in combination. Acts as an exciter.
	<i>Beauveria bassiana</i> (Mycotrol WP)	0.25 lb/20 gal water		0	Apply when whiteflies are observed. Repeat in 4-to 5-day intervals.
Armyworm, Fruitworm, Cabbage looper, Cutworm, Pinworm	malathion, MOA 1B (various) 10 A 57 EC 25 WP	1 lb/50,000 cu ft 1 qt/100 gal water 4 qt/100 gal water	12 hrs	15 hr 1 1	See instructions for Aphids (above). Hazardous to honey bees.
	<i>Bacillus thuringiensis</i> , MOA 11 (Javelin) WG (Agree) WP (Dipel) DF Xentari DF	0.5 lb to 1.25 lb/100 gal water 1 to 2 lb 0.5 to 1.25 0.5 to 1.5	4 hrs	0	
	Chlorfenapyr MOA 13 (Pylon) 2SC,	6.5 to 13 fl oz/100 gal water or per acrea area		0	For use on tomatoes more than 1 inch in diameter at maturity. Do not make more than two applications at 5 to 10 day intervals before rotating to an insecticide with a different mode of action.
	spinosad, MOA 5 Entrust SC	3 fl oz/100 gal	4 hrs	1	Do not make more than two consecutive applications. Do not apply to seedling tomatoes or peppers grown for transplants.
Leafminer	malathion, MOA 1B (various) 10 A	1 lb/50,000 cu ft	12 hrs	15 hr	See TOMATO—Aphid
	diazinon, MOA 1B (Diazinon, Spectracide) (AG 500) 50 WP	4 to 8 oz/100 gal water	48 hrs	3	Keep ventilators closed for 2 hr or overnight. Plant injury may result if labeling directions are not followed. For use by members of N.C. Greenhouse Vegetable Growers Association only.
	spinosad, MOA 5 (Entrust) SC	10 fl oz/100 gal	4 hrs	1	Do not apply to seedlings grown for transplants.
Millipede, Cricket	malathion, MOA 1B (various) 5 D	Follow label directions	12 hrs		Apply to soil at base of plants. Do not contaminate fruit.
Slug	metaldehyde (various) bait	Follow label directions			Apply to soil surface around plants. Do not contaminate fruit.
Spider mite, broad mite	Bifenazate (Floramite) SC	4 to 8 fl oz/100 gal water (1/4 to 1/2 tsp/gal)		3	For use on tomatoes >1" in diameter at maturity. Not registered on pepper.
	mineral oil (TriTek)	1 to 2 gal/100 gal		0	Begin applications when mite populations are low, and repeat at weekly intervals.
	Chlorfenapyr, MOA 13 (Pylon) 2SC	9.8 to 13 fl oz/100 gal water or per acrea area		0	For use on tomatoes more than 1 inch in diameter at maturity. Do not make more than two applications at 5 to 10 day intervals before rotating to an insecticide with a different mode of action.
	insecticidal soap (M-Pede) 49 EC	2 tbsp/gal water	12 hrs	0	
Thrips, including wester flower	<i>Beauveria bassiana</i> (Mycotrol WP)	0.25 lb/20 gal water		0	Use screens on intake vents. Apply when whiteflies observed. Repeat in 4- to 5-day intervals.
	Chlorfenapyr, MOA 13 (Pylon) 2SC	9.8 to 13 fl oz/100 gal water or per acrea area		0	For use on tomatoes more than 1 inch in diameter at maturity. Do not make more than two applications at 5 to 10 day intervals before rotating to an insecticide with a different mode of action.
	spinosad, MOA 5 (Entrust) SC	5.5 fl oz/100 gal	4 hrs	1	Do not make more than two consecutive applications, and do not apply more than 8 times in a 12 month period against thrips. Do not apply to seedlings grown for transplants.
Whitefly	imidacloprid, MOA 4A (Admire Pro) 4.6 F	0.6 fl oz/1,000 plants	12 hrs	0	Apply in a minimum of 21 gal water using soil drenches, micro-irrigation, or drip irrigation. Do not apply to immature plants as phytotoxicity may occur. Make only one application per crop per season. Also controls aphids.
	insecticidal soap (M-Pede) 49 EC	2 tbsp/gal water	12 hrs	0	
	pyrethrins and PBO, MOA 3 (Pyrethone)	12 oz/ 20 gal water		0	May be used alone or tank mixed with a companion insecticide. (See label for details.)
	<i>Beauveria bassiana</i> (Mycotrol WP)	0.25 lb/20 gal water		0	Apply when whiteflies are observed. Repeat in 4- to 5-day intervals.
	buprofezin, MOA 16 (Talus) 40SC	9 to 13.6 oz/100 gal water or per acre area		1	Insect growth regulator that affects immature stages of whiteflies. Will not kill adults. For use on tomatoes only.
	pyriproxyfen, MOA 7C (Distance) 0.86EC	6 fl oz/100 gal water		14	Insect growth regulator that affects immature stages of whiteflies. Will not kill adults.

# Field Insect Control

All tables taken from Southeastern U.S. 2014 Vegetable Crop Handbook

Insect	Insecticide, Mode of Action Code, and Formulation	Amount of Formulation Per Acre	Restricted Entry Interval (REI)	Pre harvest Interval (PHI) (Days)	Precautions and Remarks	
Aphid	dimethoate 400, MOA 1B	1 pt	48 hrs	180	Do not exceed 5 pt per acre per year.	
Aphid, Flea beetle	acetamiprid, MOA 4A (Assail) 30 SG	2 to 4 oz	12 hrs	7	Do not apply more than once every 7 days, and do not exceed 5 applications per season.	
	clothianidin, MOA 4A (Belay) 50 WDG	4.8 to 6.4 oz (soil) 1.6 to 2.1 oz (foliar)	12 hrs	— 7 (foliar)	Soil applications at planting only.	
	dimethoate 4 EC, MOA 1B	0.5 to 1 pt	48 hrs	7	Do not exceed rate with dimethoate as leaf injury may result.	
	flonicamid, MOA 9C (Beleaf) 50 SG	2 to 2.8 oz	12 hrs	0	Will not control flea beetle.	
	imidacloprid, MOA 4A <i>Soil treatment</i> (Admire Pro) 4.6 F (various) 2 F	7 to 10.5 fl oz 16 to 24 fl oz	12 hrs	21 21	For short-term protection at planting. Admire Pro may also be applied to transplants in the planthouse not more than 7 days before planting at the rate of 0.44 (4.6 F formulation) or 1 oz (2 F formulation) per 10,000 plants. See label for soil application instructions.	
	<i>Foliar treatment</i> (Admire Pro) 4.6 F (various) 1.6 F	1.2 fl oz 3.75 fl oz	12 hrs	0 0		
	pymetrozine, MOA 9B (Fulfill) 50 WDG	2.75 oz	12 hrs	0	For aphids only.	
	spirotetramat, MOA 23 (Movento) 2SC	4 to 5 fl oz	24 hrs	1	Do not exceed 10 fl oz per season. Requires surfactant.	
	thiamethoxam, MOA 4A (Platinum) 75 SG	1.66 to 3.67 oz	12 hrs	30	Platinum may be applied to direct-seeded crops in-furrow seeding or transplant depth, post seeding or transplant as a drench, or through drip irrigation. Do not exceed 11 oz per acre per season of Platinum. Check label for plant-back restrictions for a number of crops.	
	(Actara) 25 WDG	2 to 3 oz	12 hrs	0	Actara is for foliar applications.	
	Armyworm	<i>Bacillus thuringiensis</i> , MOA 11A (Crymax) WDG (Dipel) 2X (Xentari)	0.5 to 1.5 lb 0.5 to 1 lb 0.5 to 1 lb	4 hrs	0 0 0	Start applications when larvae are small, and continue at 5- to 7-day intervals during periods of infestation.
chlorantraniliprole, MOA 28 (Coragen) 1.67 SC		3.5 to 4 fl oz	4 hrs	1	Foliar or drip chemigation. Drip chemigation must be applied uniformly to the root zone. See label for instructions.	
emamectin benzoate, MOA 6 (Proclaim) 5 WDG		2.4 to 4.8 oz	12 hrs	7	Apply when larvae are first observed.	
flubendiamide, MOA 28 (Belt) 4SC		1.5 fl oz	12 hrs	1		
indoxacarb, MOA 22 (Avaunt) 30 DG		3.5 oz	12 hrs	3	Do not apply more than 14 oz of Avaunt (0.26 lb ai) per acre per crop. The minimum interval between sprays is 5 days.	
methoxyfenozide, MOA 18 (Intrepid) 2 F		4 to 10 fl oz	4 hrs	1	Use low rates for early-season applications to young or small plants and 6 to 10 oz for mid- and late-season applications.	
novaluron, MOA 15 (Rimon) 0.83 EC		9 to 12 fl oz	12 hrs	1	Do not make more than 3 applications per season.	
spinetoram, MOA 5 (Radiant) 1 SC		5 to 10 fl oz	4 hrs	1		
Colorado potato beetle		acetamiprid, MOA 4A (Assail) 30 SG	1.5 to 2.5 oz	12 hrs	7	
		chlorantraniliprole, MOA 28 (Coragen) 1.67 SC	3.5 to 5 fl oz	4 hrs	1	Foliar or drip chemigation. Drip chemigation must be applied uniformly to the root zone. See label for instructions.
		imidacloprid, MOA 4A <i>Soil treatment</i> (Admire Pro) 4.6 F (various) 2 F	7 fl oz 16 fl oz	12 hrs	21 21	Use Admire Pro for soil or transplant drench treatment and 1.6 F formulation for foliar applications.
	<i>Foliar treatment</i> (Admire Pro) 4.6 F (various) 1.6 F	1.2 fl oz 3.75 fl oz	12 hrs	0 0		
	spinetoram, MOA 5 (Radiant) 1 SC	5 to 10 fl oz	4 hrs	1		
	thiamethoxam, MOA 4A (Platinum) 75 SG	1.66 to 3.67 oz	12 hrs	30	Platinum may be applied to direct-seeded crops in-furrow seeding or transplant depth, post seeding or transplant as a drench, or through drip irrigation. Do not exceed 11 oz per acre per season of Platinum. Check label for plant-back restrictions for a number of crops.	
(Actara) 25 WDG	2 to 3 oz	12 hrs	0	Actara is for foliar applications.		

## Tomato Disease and Insect Control Manual with Variety Selection

Insect	Insecticide, Mode of Action Code, and Formulation	Amount of Formulation Per Acre	Restricted Entry Interval (REI)	Pre harvest Interval (PHI) (Days)	Precautions and Remarks
Cabbage looper, Hornworm, Tomato fruitworm, Pinworm	<i>Bacillus thuringiensis</i> , MOA 11A (Dipel) DF, MOA (Crymax) WDG	0.5 to 1 lb 0.5 to 1.5 lb	4 hrs	0 0	
	pyrethroid, MOA 3A		12 hrs		See Table 2-26 for list of registered pyrethroids & pre-harvest intervals.
	chlorantraniliprole, MOA 28 (Coragen) 1.67 SC	3.5 to 5 fl oz	4 hrs	1	Foliar or drip chemigation. Drip chemigation must be applied uniformly to the root zone. See label for instructions.
	emamectin benzoate, MOA 6 (Proclaim) 5 WDG	2.4 to 4.8 oz	12 hrs	7	
	flubendiamide, MOA 28 (Belt) 4 SC	1.5 fl oz	12 hrs	1	
	indoxacarb, MOA 22 (Avaunt) 30 WDG	2.5 to 3.5 oz	12 hrs	3	Do not apply more than 14 oz of Avaunt (0.26 lb ai) per acre per crop. The minimum interval between sprays is 5 days.
	methomyl, MOA 1A (Lannate) 2.4 LV	1.5 to 3 pt	48 hrs	1	Methomyl may induce leafminer infestation.
	methoxyfenozide, MOA 18 (Intrepid) 2 F	4 to 10 fl oz	4 hrs	1	Use low rates for early-season applications to young or small plants and 6 to 10 oz for mid- and late-season applications. Intrepid provides suppression of pinworm only.
	novaluron, MOA 15 (Rimon) 0.83 EC	9 to 12 fl oz	12 hrs	1	Do not make more than 3 applications per season.
	spinetoram, MOA 5 (Radiant) 1 SC	5 to 10 fl oz	4 hrs	1	
Cutworm	pyrethroid, MOA 3A				See Table 2-26 for list of registered pyrethroids & pre-harvest intervals.
Leafminer	abamectin, MOA 6 (Agri-Mek) 0.7 SC	1.75 to 3.5 fl oz	12 hrs	7	Do not exceed 48 fl oz per acre per season, or more than two sequential applications.
	chlorantraniliprole, MOA 28 (Coragen) 1.67 SC	5 to 7.5 fl oz	4 hrs	1	Foliar or soil chemigation. Drip chemigation must be applied uniformly to the root zone. See label for soil application instructions.
	cryomazine, MOA 17 (Trigard) 75 WP	2.66 oz	12 hrs	0	See label for plant-back restrictions.
	spinetoram, MOA 5 (Radiant) 1 SC	6 to 8 fl oz	4 hrs	1	Do not exceed 29 fl oz per acre per season.
Spider mite	abamectin, MOA 6 (Agri-Mek) 0.7 SC	1.75 to 3.5 fl oz	12 hrs	7	Do not exceed 48 fl oz per acre per season, or more than two sequential applications.
	acequinocyl, MOA 20B (Kanemite) 15SC	31 fl oz	12 hrs	1	The use of a surfactant/adjuvant with Kanemite on tomatoes is prohibited.
	bifenazate, MOA 25 (Acramite) 50 WS	0.75 to 1.0 lb	12 hrs	3	Do not make more than one application per season.
	fenpyroximate MOA 21 (Portal) 0.4EC	2 pts	12 hrs	3	Do not make more than two applications per season.
	spiromesifen, MOA 23 (Oberon) 2 SG	7 to 8.5 fl oz	12 hrs	7	Do not exceed 3 applications per season.
Stink bug	pyrethroid, MOA 3A		12 hrs		See Table 2-26 for list of registered pyrethroids & pre-harvest intervals.
	dinotefuran MOA 4A <i>Soil treatment</i> (Venom) 70 SG	5 to 6 oz	12 hrs	21	
	(Scorpion) 35 SL <i>Foliar treatment</i>	9 to 10.5 fl oz		21	
	(Venom) 70 SG	1 to 4 oz	12 hrs	1	
	(Scorpion) 35 SL	2 to 7 fl oz		1	
thiamethoxam, MOA 4A (Actara) 25 WDG	3 to 5.5 oz		0	Do not exceed 11 oz Actara per acre per season.	
Thrips	dimethoate 4 EC, MOA 1B	0.5 to 1 pt	48 hrs	7	
	dinotefuran, MOA 4A (Venom) 70 SG	1 to 4 oz (foliar) 5 to 6 oz (soil)	12 hrs	1 (foliar) 21 (soil)	See comments under Whitefly for application instructions and restrictions.

## Tomato Disease and Insect Control Manual with Variety Selection

Insect	Insecticide, Mode of Action Code, and Formulation	Amount of Formulation Per Acre	Restricted Entry Interval (REI)	Pre harvest Interval (PHI) (Days)	Precautions and Remarks
Thrips (cont'd)	(Scorpion) 35SL	2 to 7 fl oz (foliar) 9 to 10.5 fl oz (soil)	12 hrs	1 (foliar) 21 (soil)	
	methamidophos, MOA 1B (Monitor) 4 E	1.5 to 2 pt		7	Check 24(c) label for state registration.
	methomyl, MOA 1A (Lannate) 2.4 LV	1.5 to 3 pt	48 hrs	1	On foliage as needed.
	novaluron, MOA 15 (Rimon) 0.83 EC	9 to 12 fl oz	12 hrs	1	Do not make more than 3 applications per season.
	spinetoram, MOA 5 (Radiant) 1 SC	6 to 10 fl oz	4 hrs	1	Will control thrips on foliage, not in flowers.
	<b>For resistance management of whiteflies, do not follow a soil application of a neonicotinoid (MOA 4A's) with a foliar application of any neonicotinoid.</b>				
Whitefly	acetamiprid, MOA 4A (Assail) 30 SG	2.5 to 4 oz	12 hrs	7	Do not apply more than once every 7 days, and do not exceed 5 applications per season.
	buprofezin, MOA 16 (Courier) 40 SC	9 to 13.6 fl oz	12 hrs	7	Use sufficient water to ensure good coverage. Do not apply more than twice per crop cycle, and allow 28 days between applications.
	chlorantraniliprole, MOA 28 (Coragen) 1.67 SC	5 to 7.5 fl oz	4 hrs	1	Foliar or soil application. Drip chemigation must be applied uniformly to the root zone. See label for soil application instructions.
	dinotefuran MOA 4A <i>Soil treatment</i> (Venom) 70 SG (Scorpion) 35 SL	5 to 6 oz 9 to 10.5 fl oz	12 hrs	21 21	Soil applications of Venom or Scorpion may be made in a narrow band under the plant row, as a post-transplant drench, as a soil incorporated sidedress after plants are established, or in drip irrigation water. See label for instructions.
	<i>Foliar treatment</i> (Venom) 70 SG (Scorpion) 35 SL	1 to 4 oz 2 to 7 fl oz	12 hrs	1 1	
	imidacloprid, MOA 4A (Admire Pro) 4.6 F (various) 2 F	16 to 24 fl oz 7 to 10.5 fl oz	12 hrs	21 21	Apply through a drip irrigation system or as a transplant drench with sufficient water to reach root zone. As a sidedress, apply 2 to 4 in. to the side of the row and incorporate 1 or more in. Residual activity will increase with increasing rates applied. Use higher rate for late-season or continuous infestations. Trickle irrigation applications will also control aphids and stinkbugs.
	pyriproxyfen, MOA 7C (Knack) 0.86EC	8 to 10 fl oz	12 hrs	14	Do not apply more than two applications per growing season, and do not make applications closer than 14 days.
	spiromesifen, MOA 23 (Oberon) 2 SC	7 to 8.5 fl oz	12 hrs	7	Do not make more than 3 applications per season.
	spirotetramat, MOA 23 (Movento) 2SC	4 to 5 fl oz	24 hrs	1	Do not exceed 10 fl oz per season. Requires surfactant.
	thiamethoxam, MOA 4A (Platinum) 75 SG	1.66 to 3.67 oz	12 hrs	30	Platinum may be applied to direct-seeded crops in-furrow seeding or transplant depth, post seeding or transplant as a drench, or through drip irrigation. Do not exceed 11 oz per acre per season of Platinum. Check label for plant-back restrictions for a number of crops. Actara is for foliar applications.
	(Actara) 25 WDG	3 to 5.5 oz	12 hrs	0	
	Wireworm	diazinon, MOA 1B (Diazinon) AG 500 or 50 WP	2 to 4 qt	48 hrs	—

# Varieties

## Varieties for Greenhouses

### *Recommended for Bag Culture*

'Trust'  
'Match'  
'Switch'  
'Blitz'

### *Recommended for Ground Planting*

Determinate

'Celebrity'  
'Empire'  
'Emperador'

Indeterminate

'Big Beef'

## Varieties for Field Production

### *Local Sales Varieties*

'Red Delight'  
'Red Pride'  
'Indy'

## *Truck Cropping Varieties*

'Celebrity'  
'Empire'  
'Emperador'  
'Joker'  
'Fabulous'  
'Carolina Gold'  
'Big Beef'  
'BHN 589'

## *Shipping Varieties*

'Amelia'  
'Floralina'  
'Florida 47'  
'Mountain Fresh'  
'Mountain Spring'  
'Sebring'

## Spray Schedule

This schedule is only meant to be used as a suggestive guide. The amount of money and severity of disease pressure will determine which produces need to be used. If you have any questions, ask your local Extension Agent. Prices are subject to change at moments notice.

### Tomato Fungicides and Insecticides

Weeks after Transplanting	Fungicide	Rate (product/A)	PHI (days)	Cost (\$/A)	Insecticide	Rate (product/A)	PHI (days)	Cost (\$/A)
0	Dithane Rainshield 75DF	2 lb/A	5	\$6	Baythroid 2EC <sup>A</sup>	2.8 fl oz/A	0	\$8
1	Tanos	8 oz/A	3	\$13	Dimethoate 4EC <sup>A</sup>	1 pint/A	7	\$5
	Dithane Rainshield 75DF	3 lb/A	5	\$9				
	Cuprofix	2.5 lb/A	0	\$5				
2	Dithane Rainshield 75DF	2 lb/A	5	\$6	Baythroid 2EC <sup>A</sup>	2.8 fl oz/A	0	\$8
	Actigard	0.5 oz/A	14	\$27				
3	Fontelis –Early Blight(p)	20 oz/A	0	\$40	Dimethoate 4EC <sup>A</sup>	1 pint/A	7	\$5
	Cuprofix	2.5 lb/A	0	\$5				
4	Dithane Rainshield 75DF	2 lb/A	5	\$6	Baythroid 2EC <sup>A</sup>	2.8 fl oz/A	0	\$8
	Cuprofix	2.5 lb/A	0	\$5				
5	Fontelis –Early Blight(p)	20 oz/A	0	\$40	Platinum (drip)	5 fl oz/A	30	\$50
	Cuprofix	2.5 lb/A	0	\$5	Dimethoate 4EC	1 pint/A	7	\$5
6	Dithane Rainshield 75DF	3 lb/A	5	\$9	Danitol 2.4EC	10.67 fl oz/A	3	\$13
	Cuprofix	2.5 lb/A	0	\$5				

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7	Cabrio Actigard	12 oz/A 0.75 oz/A	0 14	\$18 \$41	Thionex 3EC Xentari	1 quart/A 0.5 - 2 lb/A	4 0	\$9 \$6 - 24
8	Dithane Rainshield 75DF Cuprofix	3 lb/A 2.5 lb/A	5 0	\$9 \$5	Danitol 2.4EC	10.67 fl oz/A	3	\$13
9	Cabrio Cuprofix	12 oz/A 2.5 lb/A	0 0	\$18 \$5	Thionex 3EC DiPel DF	1 quart/A 1 - 2 lb/A	4 0	\$9 \$8 - 16
10	Bravo Weatherstik 6FL Cuprofix	3 pints/A 2.5 lb/A	0 0	\$18 \$5	Danitol 2.4EC	10.67 fl oz/A	3	\$13
11	Bravo Weatherstik 6FL Cuprofix	3 pints/A 2.5 lb/A	0 0	\$18 \$5	Actara Xentari	3 oz/A 0.5 - 2 lb/A	0 0	\$11 \$6 - 24
12	Bravo Weatherstik 6FL Cuprofix	3 pints/A 2.5 lb/A	0 0	\$18 \$5	Baythroid 2EC	2.8 fl oz/A	0	\$8
13	Bravo Weatherstik 6FL Cuprofix	3 pints/A 2.5 lb/A	0 0	\$18 \$5	Actara DiPel DF	3 oz/A 1 - 2 lb/A	0 0	\$11 \$8 - 16
14	Bravo Weatherstik 6FL Cuprofix	3 pints/A 2.5 lb/A	0 0	\$18 \$5	Baythroid 2EC	2.8 fl oz/A	0	\$8
15	Bravo Weatherstik 6FL Cuprofix	3 pints/A 2.5 lb/A	0 0	\$18 \$5	Actara Xentari	3 oz/A 0.5 - 2 lb/A	0 0	\$11 \$6 - 24
16	Bravo Weatherstik 6FL Cuprofix	3 pints/A 2.5 lb/A	0 0	\$18 \$5	Baythroid 2EC	2.8 fl oz/A	0	\$8

<sup>A</sup> If Admire 2F is applied to transplants at 1 to 2.8 (2) oz/1,000 plants (\$48/A) or 1 pint/A (\$73/A), or if Platinum is applied @ 5 - 8 oz/A (\$50 - 80/A) omit 0-4 week insect control treatments.

If mites become a problem, apply Kelthane 50WSP (2 day PHI) @ 1.25 lb/A at a cost of \$17/A.

If whiteflies become a problem, apply Knack 0.86EC (14 day PHI) @ 8 to 10 fl oz/A at a cost of \$31 - 39/A.

If Early Blight is an issue Fontelis or Inspire Super is great preventers. If Early Blight is present, then Switch, Bravo or Manzate should be used.

### Tomato Irrigation and Fertigation Schedule

Weeks after Transplanting	Irrigation Rate (inches/A/day) <sup>a</sup>	Irrigation Rate (gallons/A/week) <sup>b</sup>	N Rate (lb N/A/day) <sup>c</sup>	Fertilizer Product	Fertilizer Rate (lb/A/week) <sup>d</sup>
Preplant				12-24-24 <sup>e</sup>	500 <sup>e</sup>
0	0.10 - 0.15	6,300 - 9,500			
1	0.10 - 0.15	6,300 - 9,500			
2	0.10 - 0.15	6,300 - 9,500			
3	0.10 - 0.15	6,300 - 9,500			
4	0.20 - 0.25	12,600 - 15,800	1	Calcium Nitrate	50
5	0.20 - 0.25	12,600 - 15,800	1	Potassium Nitrate	50
6	0.20 - 0.25	12,600 - 15,800	1	Calcium Nitrate	50
7	0.25 - 0.30	15,800 - 19,100	1	Potassium Nitrate	50
8	0.25 - 0.30	15,800 - 19,100	1	20-20-20	50
9	0.25 - 0.30	15,800 - 19,100	1	Calcium Nitrate	50
10	0.25 - 0.30	15,800 - 19,100	1	Potassium Nitrate	50
11	0.25 - 0.30	15,800 - 19,100	1	20-20-20	50
12	0.25 - 0.30	15,800 - 19,100	1	Potassium Nitrate	50
13	0.20 - 0.25	12,600 - 15,800	1	20-20-20	50

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14	0.20 - 0.25	12,600 - 15,800	1	Potassium Nitrate	50
15	0.20 - 0.25	12,600 - 15,800	1	20-20-20	50
16	0.20 - 0.25	12,600 - 15,800	1	Potassium Nitrate	50

- <sup>a</sup> The water requirement of a plant increases as the plants become larger. In addition, as temperatures increase, more water is lost through transpiration. After the peak of production, the watering rate may be reduced.
- <sup>b</sup> The gallons of water/A/week is based on 27,156 gallons of water/A inch and 2 ft wide beds on 6 ft centers. Therefore, only 1/3 of the soil area is receiving water (2 ft out of 6 ft). If 2 ft beds were spaced on 5 ft centers, then the gallons required would be 15% higher.
- <sup>c</sup> This is a broadcast rate (the entire acreage, not just the area under the plastic). If calculating on a treated acre (the acre under the plastic), the rate would be 2.5 - 3 lb N/A/day.
- <sup>d</sup> This is a broadcast rate (the entire acreage, not just the area under the plastic). This rate can be applied once a week or split over several applications.
- <sup>e</sup> If a soil test is generated, then apply 60 lb/A N and P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O according to the soil test recommendations. However, if no soil test is generated, then apply a fertilizer that results in 50 - 60 lb/A N and 100 - 120 lb/A of each P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (50-100-100 to 60-120-120).

### Tomato Herbicides

Time of Application	Herbicide	Rate (product/A)	PHI (days)	Cost (\$/A)
Burndown	Gramoxone Max 3SL Non-ionic Surfactant (NIS)	1 qt/A 0.25% (v/v) (8 oz)	30	\$10 \$1
	or Roundup Weathermax 5.5	1 - 2 qt/A		\$15 - 30
Pretransplant or Post-transplant <sup>A</sup>	Sencor 75DF	0.5 - 0.67 lb/A	7	\$10 - 13
	Sencor 75DF Select 2EC COC	0.5 - 0.67 lb/A 8 fl oz/A 1% (v/v) (32oz)	7 20	\$10 - 13 \$11 \$3
Directed <sup>A</sup> Post-transplant	Sencor 75DF Select 2EC COC	0.5 - 0.67 lb/A 8 fl oz/A 1% (v/v) (32 oz)	7 20	\$9 - 13 \$11 \$3
	or Sencor 75DF Gramoxone Max 3SL Non-ionic Surfactant	0.5 - 0.67 lb/A 1 qt/A 0.25% (v/v) (8 oz)	7 30	\$10 - 13 \$10 \$1

<sup>A</sup> Poast 1.5EC (20 day PHI) can be applied @ 1.5 pints/A at a cost of \$13/A. Use COC @ 1% v/v.

## Admire Treatment of Tomato Transplants

1. Mix 2 to 2.8 fl oz of Admire in 1 quart of water.
2. Treat 1,000 tomato plants with the 1 quart of water.
3. Rinse the plants with another quart of water.

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