

# Vegetables – Commercial Greenhouse Tomatoes

Certain cultural practices play a significant role in reducing or eliminating many insect problems in greenhouses. The following cultural practices will aid in the control of insect pests:

1. Maintain a clean, closely mowed area adjacent to the greenhouse.
2. Dispose of any trash, boards, or old plant debris in the area.
3. Keep doors, screens, and ventilation fan screens in good repair.
4. Use clean sterile soils, tools, flats, and other equipment.
5. At the conclusion of the season remove all plants and any plant debris, clean the greenhouse thoroughly and fumigate. (See Insecticide Use Suggestions) “An ounce of prevention is worth a pound of cure.”

## Chemical Safety in the Greenhouse

When used as recommended on the labels, pesticides are safe and effective. All pesticides are poisonous, however, and if misused, they may be hazardous to humans and animals and may contribute to the pollution of the environment.

Before using any pesticide, read the label in its entirety. Note any special precautions such as the necessity of wearing special protective clothing when applying the chemical (PPE), re-entry intervals (REI), and pre-harvest intervals (PHI). Follow all safety precautions set forth on the label. The following suggestions will aid in developing safe pesticide-use practices in greenhouses.

1. Become familiar with the use of a pesticide before using it. Know its toxicity and the necessary precautions for its safe use.
2. Keep all safety equipment such as facemasks, respirators, and protective clothing on hand and in good working order.
3. When mixing pesticides use a well-ventilated area or mix outdoors. Avoid contact with skin and do not breathe vapors.
4. Do not save used pesticide containers. Dispose of old containers properly.
5. Store all pesticides in a secure place away from pets, children, and unknowledgeable persons. Never store pesticides in unmarked containers.
6. Post caution signs during fumigation and after treatment of the greenhouse to avoid contact with chemicals.
7. Apply the correct dosage of the pesticide. Using less than the correct amount may result in poor control of the pest. Using more than the correct amount may result in excessive residue or damage to plants.
8. Obey specified time intervals between treatments and cutoff dates before harvest. A failure to observe these restrictions may result in excessive residue or damage to plants.
9. The use of certain chemicals may be phytotoxic to some varieties of plants. This should be checked before using a chemical.
10. Special restrictions apply to greenhouses connected to living quarters. Read label restrictions where this applies and follow all restrictions carefully.

## Liquid and Weight Conversions

### Liquid

- 1 level tablespoon = 3 level teaspoonfuls
- 1 fluid ounce = 2 tablespoons = 29.57 milliliters
- 1 cupful = 8 fluid ounces
- 1 pint = 2 cups = 16 fluid ounces
- 1 quart = 2 pints = 32 fluid ounces
- 1 gallon = 4 quarts = 128 fluid ounces

### Weight

- 1 ounce = 28.3 grams
- 1 pound = 16 ounces = 454 grams
- 1 ton = 2,000 pounds

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## Greenhouse Dilution Tables

### Wettable Powders (WP)

Number of ounces of wettable powder to use in small sprayers when amount per 100 gallons is known:

Target Amount	100 gallons	10 gallons	5 gallons	2 gallons	1 gallon
WP Weight	0.5 pound	0.8 ounce	0.4 ounce	0.2 ounce	0.1 ounce
WP Weight	1.0 pound	1.6 ounces	0.8 ounce	0.3 ounce	0.2 ounce
WP Weight	2.0 pounds	3.2 ounces	1.6 ounces	0.6 ounce	0.3 ounce
WP Weight	3.0 pounds	4.8 ounces	2.4 ounces	1.0 ounce	0.5 ounce
WP Weight	4.0 pounds	6.4 ounces	3.2 ounces	1.3 ounces	0.6 ounce
WP Weight	5.0 pounds	8.0 ounces	4.0 ounces	1.6 ounces	0.8 ounce

### Emulsifiable Concentrates (EC)

Number of fluid ounces of emulsifiable concentrate to use in small sprayers when amount per 100 gallons is known:

Target Amount	100 gallons	10 gallons	5 gallons	2 gallons	1 gallon
EC Volume	1 pint	1.6 fluid ounces	0.8 fluid ounce	0.3 fluid ounce	0.2 fluid ounce
EC Volume	1 quart	3.2 fluid ounces	1.6 fluid ounces	0.7 fluid ounce	0.3 fluid ounce
EC Volume	2 quarts	6.4 fluid ounces	3.2 fluid ounces	1.3 fluid ounces	0.6 fluid ounce
EC Volume	1 gallon	12.8 fluid ounces	6.4 fluid ounces	2.6 fluid ounces	1.3 fluid ounces

### Mist Blower

Quantity of emulsifiable concentrate (EC) needed to make a 25X concentrate:

If amount per 100 gallons for a high volume spray is:	Use this amount in a 25 gallon mist blower	Use this amount in a 10 gallon mist blower	Use this amount in a 2 gallon mist blower	Use this amount in a 1 gallon mist blower
1 pint	6.25 pints	2.5 pints	8.0 fluid ounces	4.0 fluid ounces
1 quart	6.25 quarts	5.0 pints	1.0 pint	8.0 fluid ounces
2 quarts	3.13 gallons	5.0 quarts	1.0 quart	1.0 pint
1 gallon	6.25 gallons	2.5 gallons	2.0 quarts	1.0 quart

**Note:** Your county agent can give you further help with dilutions.

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## Pesticide Recommendations

Insect	Insecticide and Formulation	Amount of Formulation	Re-entry Interval	Preharvest Interval	Precautions and Remarks
Aphid	Acetamiprid (TriStar 8.5 SL)		12 hours	1 day	
	Azadiractin (various)		4 hours	0	OMRI approved
	Imidacloprid (Admire pro) 4.6F	0.6 fl. oz./1,000 plants	12 hours	0	Apply in minimum of 21 gal. water using soil drenches or drip irrigation. Do not apply to immature plants. Make only one application per crop per season.
	Insecticidal Soap (M-Pede) 49EC	2.5-5 fl oz./gal stand alone 1.25 fl oz/gal tank mix	12 hours	0	Plant injury may occur if applied to heat or drought stressed plants, or at more than 3 sequential applications at 7-day intervals. OMRI approved
	Malathion (various) 10 A 57 EC 25 WP	1lb./50,000 cu.ft. 1qt./100 gal. water 4lb./100 gal. water	12 hours	15 hours 1 day 1 day	
Broad mite, russet mite, spider mite	Acequinocyl 15.8% (Kanemite 15 SC)		12 hours	7 day	Limited control of russet mite. Do not use adjuvants or surfactants. Do not exceed two applications per crop with minimum of 21 days between treatments.
	Bifenazate (Floramite) SC	4-8 fl.oz/100 gal ¼ to ½ tsp./gal	12 hours	3 days	Limited control of russet mite. For use on tomatoes greater than 1 inch diameter at maturity. Do not exceed two applications per year. Not registered on pepper.
	Chlorfenapyr 2 SC (Pylon)	2.6-5.2 fl oz/100 gal	12 hours	0	Use on tomatoes greater than 1 inch diameter at maturity. Do not make two consecutive applications. Alternate with another product 5-7 days after application as needed. Do not exceed three applications per crop.
	Etoxazol 5% WDG (TetraSan 5 WDG)	8-20 oz/100 gal	12 hours	1 day	Limited control of russet mites. Controls eggs and nymphs only. Do not use adjuvants or surfactants. Do not exceed two applications per crop with minimum of 21 days between treatments.
	Fenproximate 5% SC (Akari 5SC)	16-32 fl oz/100 gal	12 hours	1 day	Do not make two consecutive applications. Alternate with another product 5-7 days after application as needed. Do not exceed two applications per crop.
	Insecticidal Soap (M-Pede) 49EC	2.5-5 fl oz/gal stand alone 1.25 fl oz/gal tank mix	12 hours	0	Plant injury may occur if applied to heat or drought stressed plants, or at more than 3 sequential applications at 7-day intervals. OMRI approved

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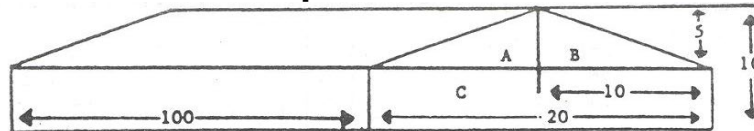
Insect	Insecticide and Formulation	Amount of Formulation	Re-entry Interval	Preharvest Interval	Precautions and Remarks
	Sulphur 90%	Thorough coverage dust 4 tbs/gal	24 hours		Do not mix with oil or apply within 2 weeks of an oil spray. OMRI approved
Caterpillars: armyworm, cabbage looper, catworm, fruitworm	<i>Bacillus thuringiensis</i> (various)	See label	4 hours	0	
	Chlorfenapyr (Pylon 2SC)	6.5 to 13 oz./100 gal. water or per acre area	12 hours	0	For use on tomatoes more than 1 inch in diameter at maturity. Do not make more than 2 applications at 5- to 10-day intervals.
	Malathion(various) 10 A 57 EC 25 WP	1lb./50,000 cu.ft. 1qt./100 gal. water 4qt./100 gal. water	12 hours	15 hours 1	Hazardous to honey bees.
	Spinosad (Entrust SC)	3 fl.oz./100 gal	4 hours	1 day	Do not make more than 2 consecutive applications. Do not apply to seedling tomatoes or peppers grown for transplants. OMRI approved
Cricket, millipede	Malathion (various) 5D	Follow label	12 hours		Apply to soil at base of plants, Do not contaminate fruit.
Leafminer	Malathion (Various) 10A	1lb./50,000 cu.ft.	12 hours	15 hours	See aphid.
	Spinosad (Entrust SC)	10 fl.oz/100 gal	4 hours	1 day	Do not apply to seedlings grown for transplants.
Slug	Metaldehyde (various)	Follow label			Apply to soil surface around plants. Do not contaminate fruit.
Thrips	Chlorfenapyr (Pylon 2SC)	9.8 to 13 fl.oz./gal. water or per acre area	12 hours	0	For use on tomatoes more than 1 inch at maturity. Do not make more than 2 applications at 5- to 10- day intervals.
	Spinosad (Entrust SC)	5.5 fl. oz./100 gal. water	4 hours	1 day	Do not make more than 2 consecutive applications. Do not apply more than 6 times in a 12-month period against thrips. Do not apply to seedlings grown for transplants. OMRI approved.
Whitefly	Buprofezin (Talus 70DF)	9 to 13.6 oz./100 gal. water or per acre area	12 hours	1 day	Insect growth regulator that only controls immatures.. Does not kill adults. For use on tomatoes only.
	Imidacloprid (Admire Pro) 4.6F (Macho 4)	0.6 fl. oz./1,000 plants 0.05 fl.oz/1,000 plants	12 hours	0	Apply in minimum of 16 gal water using soil drenches or drip irrigation to field typ soils. Do not apply to immature plants or those in rock wool, perlite, or other hydroponic method. Remove bees prior to treatment. Make only 1 application per crop per season.
	Insecticidal soap (M-Pede) 49EC	2.5-5 fl oz./gal stand alone 1.25 fl oz/gal tank mix	12 hours	0	Plant injury may occur if applied to heat or drought stressed plants, or at more than 3 sequential applications at 7-day intervals. OMRI approved

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Insect	Insecticide and Formulation	Amount of Formulation	Re-entry Interval	Preharvest Interval	Precautions and Remarks
	Pyrethrins and PBO (pyrenone)	12 oz./20 gal. water		0	May be used alone or tank-mixed with a companion insecticide.
	Pyriproxyfen (Distance 0.86EC)	6 fl. oz./100 gal. water		14 days	Insect growth regulator that affects immature stages of whiteflies; will not kill adults.

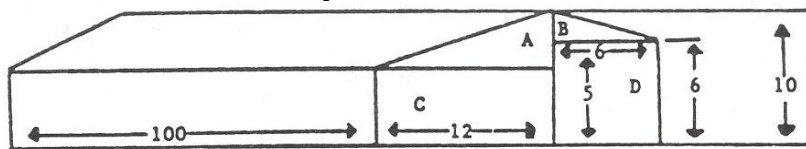
## CALCULATION OF GREENHOUSE VOLUME

### Even Span Structure



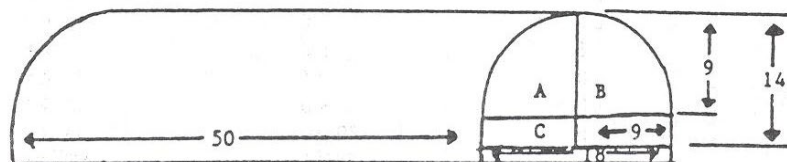
$$\begin{aligned} \text{Area A and B} &= .5(5 \times 10) = 25 \\ \text{Area C} &= 20 \times 5 = 100 \\ \text{Total Area} &= A + B + C = 100 + 25 + 25 = 150 \\ \text{Volume} &= \text{Length} \times \text{Total Area} = 100 \times 150 = 15,000 \text{ cu.ft.} \end{aligned}$$

### 3/4 Span House



$$\begin{aligned} \text{Area A} &= .5(12 \times 5) = 30 \\ \text{Area B} &= .5(4 \times 6) = 12 \\ \text{Area C} &= 6 \times 6 = 36 \\ \text{Total Area} &= A + B + C + D = 30 + 12 + 60 + 36 = 138 \text{ sq.ft.} \\ \text{Volume} &= \text{Length} \times \text{Total Area} = 100 \times 138 = 13,800 \text{ cu.ft.} \end{aligned}$$

### Roundtop Structure



$$\begin{aligned} \text{Area A + B} &= .5(r^2) = 127 \\ \text{Area C} &= 5 \times 18 = 90 \text{ sq.ft.} \\ \text{Total Area} &= A + B + C = 127 + 90 = 217 \\ \text{Volume} &= \text{Length} \times \text{Total Area} = 50 \times 217 = 10,850 \text{ cu.ft.} \end{aligned}$$