

# Floral Crops: Diseases

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The conditions under which many floral and foliage crops are produced, i.e., high humidity, low light intensity, and frequent watering, are favorable for the development of fungal and bacterial diseases. If insects are uncontrolled in the greenhouse, viruses can become a major problem. Nematodes may be introduced on infected plant material or unsterilized soil.

There are three principles in the management of floral crop health. The first principle is to prevent pathogens from entering production systems. Applications of this principle include use of disease-free propagating materials, noncontaminated or decontaminated containers, soil-less media and irrigation water, etc. The second principle is to create environments that are working against pathogens. Some common practices of this principle are to (i) use of disease-resistant or tolerant plant species and varieties, (ii) remove diseased plants and planting materials from production beds once

they are noticed, to reduce disease potential and dissemination risk, (iii) irrigate crops in early morning instead of evening to shorten the wet period on foliage that is essential for many pathogen germination, infection, and growth, and (iv) use of biopesticides such as Actino-Iron. The third principle is to control the disease when it does arise. The keys to successfully implementing this principle include early detection of a disease, correct diagnosis of its cause and selection of the right chemicals. Fungicides should be only used for fungal diseases, so should bactericides for bacterial diseases, oomycetocides for downy mildew, Phytophthora and Pythium diseases. The rest of this section provides general recommendations for control of major floral crop diseases. It is important that growers carefully consult and strictly follow the label when applying a fungicide, bactericide, oomycetocide or nematocide for disease control.

Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>African Violet</b> Botrytis blight (Gray mold)	Decree 0.7-1.5 lb; fenhexamid	Spray 7- to 14-day intervals.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>African Violet</b> Phytophthora root rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt phosphite	Apply every 7 days.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	Treat soil at 3-week to 3-month intervals.
	Disarm (40.3% SC) 1.0-6.0 fl oz fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Subdue Maxx 0.5-1.0 fl oz; mefenoxam	Apply in 100 gal of water over 400-800 sq ft (1.0 pt/sq ft). For soil depth greater than 4 inches apply 1.5-2.0 pts solution/sq ft. Repeat at 1- to 2-month intervals. Irrigate to thoroughly wet soil after application. For Subdue 5G do not apply rate of 9 oz more often than once every 6 weeks.
<b>African Violet</b> Powdery mildew	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Apply at 7- to 14-day intervals.
	Systhane (40% WSP) 4 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Ageratum</b> Botrytis blight (Gray mold)	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Apply at 7- to 14-day intervals.
	Decree 0.70-1.5 lb fenhexamid	Spray 7- to 14-day intervals.

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Ageratum</b> Botrytis blight (Gray mold) (continued)	Exotherm (Terminil) 3.5 oz/1000 sq ft; chlorothalonil	Fumigate every 7 to 14 days.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Ageratum</b> Powdery mildew	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Apply at 7- to 14-day intervals.
	Systhane (40% WSP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Ageratum</b> Root Rot ( <i>Pythium</i> )	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt phosphite	Apply every 7 days.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	Treat soil at 3-week to 3-month intervals.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
<b>Ageratum</b> Root rot ( <i>Rhizoctonia</i> )	Subdue Maxx 0.5-1.0 fl oz; mefenoxam	<b>Drench at seeding</b> (soil 2-3 inches deep). Mix Subdue with 100 gal of water and apply 1 pt of solution/sq ft. <b>Transplanting</b> mix 0.5-2.0 fl oz with 100 gal of water and apply 1 pt solution/sq ft or 1.5-2.0 pt for soil depth greater than 4 inches. Do not apply rates of 1.5-2.0 fl oz more often than once every six weeks.
	Terrazole (35% WP) 3.0-10.0 oz; etridiazole	Apply on 400 sq ft or saturate the soil medium, such as 1/2 pt/6-inch container.
	Chipco 26019 (50% WP) 0.4 lb Sextant (23.3%) 1.0-2.5 lb iprodione	Apply 1.0- to 2.0 pt/sq ft every 14 days.
	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Hurricane (48%) 1.5 oz; fludioxonil and mefenoxam	Drench to completely wet root zone at 21- to 28-day intervals
	Medallion (50% WP) 1 packet; fludioxonil	Drench at 3- to 4-week intervals.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Drench to completely wet root zones at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals	
<b>Annual Vinca</b> (Madagascar periwinkle) Phytophthora blight	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt phosphite	Apply every 7 days.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Spray plants at a 28-day interval.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Annual Vinca</b> (Madagascar periwinkle) Phytophthora blight (continued)	Stature (43.5% SC) 6.0-13.0 fl oz dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
	Segway (34.5% SC) 2.0-6.0 fl oz cyazoflamid	Apply at 14- to 28-day intervals.
	Subdue Maxx 0.5-1.0 fl oz; mefenoxam	<b>Drench at seeding</b> (soil 2 to 3 inches deep). Mix Subdue with 100 gal of water and apply 1 pt of solution/sq ft. <b>Transplanting</b> mix 0.5-2.0 fl oz with 100 gal of water and apply 1 pt solution/sq ft or 1.5- 2.0 pt for soil depth greater than 4 inches. Do not apply rates of 1.5-2.0 fl oz more often than once every six weeks.
<b>Azalea</b> (Rhododendron) Botrytis blight (Gray mold)	Broadform 4.0 to 8.0 fl oz fluopyram and trifloxystrobin	Spray at 7 to 14 day intervals.
	Chipco 26019 (50% WP) 1.0-2.0 lb; iprodione	Spray every 10 to 14 days.
	Daconil Weather Stik 2.0 pt Concorde (54% SST) 1.3 pt; chlorothalonil	Spray every 7 to 10 days during wet weather. Apply at early bloom.
	Exotherm (Termil) 3.5 oz/1000 sq ft chlorothalonil	Fumigate every 7 to 14 days.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Azalea</b> Cylindrocladium root rot	Cleary 3336-WP 0.8 lb; thiophanate methyl	Drench Cleary 3336 on the surface of growing medium to prevent disease development. Repeat at 2- to 4-week intervals during disease pressure.
	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply every 14 to 21 days
	Fore Rainshield NT Fore WSP Rainshield Dithane T/O Rainshield NT Dithane WF Junction (15% DF); 1.5 lb mancozeb	Apply in a full coverage spray every 7 to 10 days while flowers are opening spray ground under bushes and into open flowers.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days
	Spectro TM (90% WDG) 1.0 to 2.0 lb chlorothalonil and thiophanate-methyl	Apply every 14 days
	Terragard, 50 W; triflumizole	Soil drench 6.0-8.0 oz or 1-1 1/3 tps/gal on propagation beds. On established plants apply a drench at 6.0-12.0 oz or 1.0-2.0 tsp/gal.
	Torque (38.7%) 4.0 to 10.0 fl oz; tebuconazole	Apply every 14 to 21 days
<b>Azalea</b> Ovulinia flower blight	Daconil Weather Stik 2.0 pt Concorde (54% SST) 1.1 pt; chlorothalonil	Spray every 7 to 10 days. Apply at new leaf emergence.
	Strike (25% WDG) 8.0-16.0 oz; triadimefon	Begin applications at the expanded bud stage.
	Cleary 3336-WP 0.5 lb; thiophanate methyl	Apply as flowers open. Repeat every 4 to 6 days as needed during disease periods.
	Fore Rainshield NT Fore WSP Rainshield Dithane T/O Rainshield NT Dithane WF Junction (15% DF); 1.5 lb mancozeb	Apply in a full coverage spray every 7 to 10 days while flowers are opening also spray ground under bushes.
<b>Azalea</b> Powdery mildew	Banner Maxx 2.0-4.0 fl oz; propiconazole	Apply at 2- to 3-week intervals.
	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Cygnus (50%) 1.6-3.2 oz; Kresoxim-methyl	Apply every 10 to 14 days.
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Apply to run-off when mildew first appears.
	Systhane (40% WSP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days	

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Azalea</b> Phytophthora shoot blight	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Aliette (80% WDG) 2.5-5.0 lbs; fosetyl-AI	Apply as a spray to wet, repeat at monthly intervals.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 days.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Spray plants at a 28-day interval.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz cyazoflamid	Apply at 14- to 28-day intervals.
<b>Azalea</b> Phytophthora root and crown rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Aliette (80% WDG) 0.4-0.8 lb; fosetyl-AI	Apply as a drench with 100 gal of water/400 sq ft (2 pt solutions/sq ft) or 0.5-0.8 lb (8.0-12.8 oz)/cubic yard of potting soil at transplanting.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 days.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	See African Violet.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Subdue Maxx 0.6-1.3 fl oz; mefenoxam	Apply 1.0 pt solution/sq ft. For soil depth greater than 4 inches apply 1.5-2.0 pts solution/sq ft.
<b>Azalea</b> Septoria leaf spot	Terrazole (35% WP) 8.0 oz; etridiazole	Container & Bed grown Plants: Mix 8 oz with 100 gal of water/400 sq ft or apply in sufficient amount to saturate the soil mixture such as 0.5 pt/6-inch pot. Irrigate immediately with additional water equal to at least half the volume of the fungicidal drench for improved soil penetration of the fungicide. Repeat at 4-week intervals if necessary.
	Cleary 3336-F 12.0-16.0 fl oz or 1 tsp/gal thiophanate methyl	Repeat at a 10- to 14-day interval throughout the growing season.
<b>Bedding</b> various flowering plants	Soil Gard (12% G) 1.0-1.5 lb/cubic yd microbial / (biocontrol)	Mix with soilless media before seeding/plants.
<b>Bedding</b> Damping-off, <i>Rhizoctonia</i> , <i>Pythium</i>	Captan (50% WP) 2.0-4.0 lb; captan	Apply at 7- to 10-day intervals.
	Terrazole (35% WP) 3.5-10.0 oz; etridiazole	Apply at 4- to 12-week intervals.
<b>Begonia</b> Botrytis flower spot (Gray mold)	Broadform 4.0 to 8.0 fl oz fluopyram and trifloxystrobin	Spray at 7 to 14 day intervals.
	Cleary 3336-F 12.0-16.0 fl oz; thiophanate methyl	Spray every 10 to 14 days.
	Exotherm (Termil) 3.5 oz/1000 cu ft; chlorothalonil	Fumigate every 7 to 14 days.
	Fore Rainshield NT Fore WSP Rainshield Dithane T/O Rainshield NT Dithane WF Junction (15% DF) 1.5 lb; mancozeb	Apply in a full coverage spray every 7 to 10 days while flowers are opening spray ground under bushes and into open flowers.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Begonia</b> Powdery mildew	Concert II (41.4%) 22.0 to 35.0 fl ozpropiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Rubigan 3.0-5.0 fl oz; fenarimol	Apply at 10- to 14-day intervals.
	Strike (25% WDG) 2.0-4.0 oz	Spray every 7 to 14 days. Follow label instructions. Spray triadimefon to run-off when mildew first appears.
	Systhane (40% WSP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Begonia</b> Pythium root rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Aliette (80% WDG) 1.25-4.0 lb; fosetyl-Al	Apply as a foliar spray. Do not exceed one application every 30 days.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 days.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	See African Violet.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Terrazole (35% WP) 3.0-10.0 oz; etridiazole	Apply on 400 sq ft or saturate the soil medium, such as 0.5 pt/6-inch container.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
	Subdue Maxx 0.6-1.3 fl oz; mefenoxam	See African Violet.
<b>Black-eyed Susan</b> (rudbeckia) Septoria leaf spot	Daconil WeatherStik 2.0 pt Concord (54% SST) 2.0 pt; chlorothalonil	Apply at 7- to 10-day intervals.
<b>Black-eyed Susan</b> Downy mildew	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 to 10 days.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Spray plants at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
<b>Cactus</b> Root rot ( <i>Rhizoctonia</i> )	Cleary 3336-F 12.0-16.0 fl oz; thiophanate methyl	Apply as drench (1.0-2.0 pt/sq ft).
	Chipco 26019 (50% WP) 0.4 lb; iprodione	Apply 1.0-2.0 pt/sq ft every 14 days.
	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Hurricane (48%) 1.5 oz; fludioxonil and mefenoxam	Drench to completely wet root zone at 21- to 28-day intervals
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Drench to completely wet root zones at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals



Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Caladium</b> Various tuber rots	Cleary 3336-F 12.0-16.0 fl oz 2.0 tsp/gal Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Dip tubers in solution prior to planting.
	Chipco 26019 (50% WP) 0.4 lb Sextant (23.3%) 1.0 lb; iprodione	Dip tubers in solution prior to planting.
<b>Caladium</b> Pythium root rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	Treat soil every 3 weeks to 3 months.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
Subdue Maxx 0.5-1.0 fl oz; mefenoxam	See African Violet.	
<b>Calendula</b> powdery mildew rust	Banner Maxx 2.0-4.0 fl oz; propiconazole	Apply every 14 to 21 days.
	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Rubigan 3.0-5.0 fl oz; fenarimol	Apply at 10- to 14-day intervals.
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Apply as a spray at 14- to 21-day intervals.
	Systhane (40% WSP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Calibrachoa</b> Phytophthora crown rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 days.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	Treat soil at 3-week to 3-month intervals.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
Subdue Maxx 0.5-1.0 fl oz; mefenoxam	Apply in 100 gal of water over 400-800 sq ft (1.0 pt/sq ft). For soil depth greater than 4 inches apply 1.5-2.0 pts solution/sq ft. Repeat at 1- to 2-month intervals. Irrigate to thoroughly wet soil after application. For Subdue 5G do not apply rate of 9 oz more often than once every 6 weeks.	
<b>Calibrachoa</b> Black root rot (thielaviopsis)	Cleary 3336 12.0-16.0 fl oz; thiophanate methyl	Drench at 1.0-2.0 pts/sq ft.
<b>Carnation</b> (Dianthus) Alternaria leaf spot and petal blight	Daconil Weather Stik 1.4 pt Concorde (54% SST) 1.4 pt; chlorothalonil	Apply every 7 to 14 days.
	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Apply as a spray every 10 to 14 days.
	Maneb 80 (80% WP) or Maneb Plus Zinc F4 Fungicide (37% F) 1.0-1.5 lb; maneb	Begin when new growth starts. Repeat weekly.

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Carnation</b> Botrytis flower spot (Gray mold)	Chipco 26019 (50% WP) Sextant (23.3%) 1.0-2.5 lb; iprodione	Spray every 10 to 14 days.
	Cleary 3336-WP 0.8 lb; thiophanate methyl	Spray every 7 to 14 days.
	Exotherm (Termil) 3.5 oz/1000 cu ft; chlorothalonil	Fumigate every 7 to 14 days.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Carnation</b> Fusarium stem and root rot	Cleary 3336-WP 0.8 lb Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Heavy spray or drench during cool, moist conditions.
<b>Carnation</b> Rhizoctonia stem rot	Chipco 26019 0.4 lb iprodione	Apply 1.0-2.0 pt/sq ft every 14 days.
	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Apply at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Terraclor (75% WP) 0.5 lb; pentachloronitrobenzene	Apply 1.0 pt of solution/sq ft or 100 gal to 800 to 1000 sq ft.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals
<b>Chrysanthemum</b> Botrytis blight (Gray mold)	Broadform 4.0 to 8.0 fl oz fluopyram and trifloxystrobin	Spray at 7 to 14 day intervals.
	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb iprodione	Apply every 10 to 14 days.
	Cleary 3336-WP 0.8 lb; thiophanate methyl	Spray every 10 to 14 days under normal weather.
	Cleary 3336-F (4.5 F) 10.0 fl oz or 0.75 tsp/gal; thiophanate methyl	Apply as foliar spray every 7 to 14 days.
	Cygnus (50%) 1.6-3.2 oz; Kresoxim-methyl	Apply every 10 to 14 days.
	Daconil Weather Stik 2.0 pt Concorde (54% SST) 2.0 pt; chlorothalonil	
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Chrysanthemum</b> Bacterial blight	Camelot 3.0 pt copper salts	Apply every 7 days.
<b>Chrysanthemum</b> Powdery mildew	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Rubigan 3.0-5.0 fl oz; fenarimol	Apply at 10- to 14-day intervals.
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Spray to run-off when mildew first appears.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Chrysanthemum</b> Puccinia horiana white rust	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Control of this rust consists of avoiding wetting of the foliage when watering and spraying with Bayleton when disease is first observed. If not controlled, cut back plants to the ground, gather all plant material and debris and incinerate. Spray Bayleton to run-off when rust first appears.
	Sythane (40%WSP) 4.0 oz myclobutanil	Apply at 10- to 14-day intervals.
<b>Chrysanthemum</b> Mycosphaerella ray blight	Banner Maxx 2.0-4.0 fl oz; propiconazole	Apply at 14-day intervals.
	Daconil Weather Stik 1.4 pt Concorde (54% SST) 1.4 pt; chlorothalonil	Apply at transplant of cuttings.
	Chipco 26019 (50% WP) 1.0-2.0 lb or 1.0-2.0 tbs/gal Sextant (23.3%) 1.0-2.5 lb; iprodione	Apply as a spray every 10 to 14 days.

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Chrysanthemum</b> Pythium root rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply at 7-day intervals.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	Treat soil every 3 weeks to 3 months.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Subdue Maxx 0.5-1.0 fl oz; mefenoxam	See African Violet.
	Terrazole (35% WP) 4.0 oz; etridiazole	Retreat bedding plants with etridiazole at 4- to 8-week intervals. Retreat container plants at 4- to 12-week intervals.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
<b>Chrysanthemum</b> Rhizoctonia root rot	Captan (50% WP) 2.0-4.0 lb; captan	Apply at 7- to 10-day intervals.
	Cleary 3336-WP 0.8 lb; thiophanate methyl	Apply 1.0-2.0 pt/sq ft every 14 days.
	Chipco 26019 (50% WP) 0.4 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Apply 1.0-2.0 pt/sq ft every 14 days.
	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Hurricane (48%) 1.5 oz; fludioxonil and mefenoxam	Drench to completely wet root zone at 21- to 28-day intervals
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Drench to completely wet root zones at 7- to 14-day intervals
	Medallion (50% WP) 1 packet; fludioxonil	Drench at 3- to 4-week intervals.
	Palladium (63.5% WDG) 2.0 to 4.0 oz; Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Soil Gard (12% G) 1.0-1.5 lb/cubic yd microbial / (biocontrol)	Mix with soilless media before seeding/plants.
	Terrazole (35% WP) 3.5-10.0 oz; etridiazole	Apply at 4- to 12-week intervals.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals
<b>Chrysanthemum</b> Septoria leaf spot	Cleary 3336-WP 0.8 lb; thiophanate methyl	Apply at weekly intervals when a new shoot growth begins. Cover lower leaf surfaces completely. Apply thiophanate methyl at 10- to 14-day intervals.
	Daconil Weather Stik 1.4 pt; chlorothalonil	Spray chlorothalonil every 7 to 14 days. Apply at transplanting of cuttings.
<b>Cineraria</b> Powdery mildew ( <i>Erysiphe cichoracearum</i> )	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Strike (25% WDG) 2.0-4.0 oz or 0.5-1.0 tsp/gal; triadimefon	Spray to run-off when mildew first appears.
	Triact 70 0.5-1.0 gal; neem oil	Spray every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Cyclamen</b> Botrytis leaf blight (Gray mold)	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb	Spray every 10 to 14 days.
	Cleary 3336-WP 0.8 lb; thiophanate methyl	Apply every 10 to 14 days and reduce humidity.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Daylily</b> Leaf streak	Cleary 3336 WP 1.5 lb Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Repeat at 7- to 14-day intervals.
	Systhane (40% WSP) 4.0 oz; myclobutanil	



Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Daylily</b> Rust	Synthane (40% WSP) 4.0 oz; myclobutanil	Repeat every 7 to 14 days.
	Daconil Weather Stik 2.0 pt Concorde (54% SST) 1.4 pt; chlorothalonil	
	Banner Maxx 2.0-4.0 fl oz; propiconazole	Apply at 2- to 3-week intervals.
	Heritage 1.0-4.0 oz; azoxystrobin	Apply every 1 to 4 weeks.
<b>Foliage Plants</b> Pythium root rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Aliette (80% WDG) 0.4-0.8 lb; fosetyl-Al	Apply as a drench with 100 gal of water/400 sq ft (2.0 pt solutions/sq ft) or 0.5-0.8 lb (8.0-12.8 oz)/cu yd of potting soil at transplanting.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Spray every 7 days.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	Treat soil every 3 weeks to 3 months.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
	Subdue Maxx 0.5-1.0 fl oz; mefenoxam	
	Terrazole (35% WP) 12.0 oz; etridiazole	Use well-drained growing medium, sanitation, above ground benches. Avoid overhead watering. Drench at 4-week intervals.
<b>Geranium</b> Botrytis leaf blight (Gray mold)	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Spray every 10 to 14 days.
	Compass 2.0-4.0 oz	Spray every 7- to 14 days.
	Decree 0.7-1.5 lb; fenhexamid	Spray at 7- to 14-day intervals.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Geranium</b> Bacterial blight		Purchase clean stock plants. Practice good sanitation procedures.
	Camelot 3.0 pt; copper salts	Apply every 7 days.
<b>Geranium</b> Pythium blackleg or black rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Chipco 26019 (50% WP) 0.4 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Apply 1.0-2.0 pt/sq ft every 14 days.
	Cleary 3336-WP 0.8 lb; thiophanate methyl	Apply as a drench or heavy spray (1.0-2.0 pt/sq ft) after transplanting into containers or propagation beds.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
Terrazole (35% WP) 3.0-10.0 oz; etridiazole	Apply 0.5 pt/6-inch container. Sterilize rooting media, pots, and benches with steam-flow sanitation program.	

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Geranium</b> Rhizoctonia root and stem rot	Chipco 26019 (50% WP) 0.4 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Apply 1.0-2.0 pt/sq ft every 14 days.
	Cleary 3336-WP 0.8 lb; thiophanate methyl	Apply as a drench or heavy spray (1.0-2.0 pt/sq ft) after transplanting into containers or propagation beds.
	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Hurricane (48%) 1.5 oz; fludioxonil and mefenoxam	Drench to completely wet root zone at 21- to 28-day intervals.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Drench to completely wet root zones at 7- to 14-day intervals.
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals.
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals.
<b>Geranium</b> Rust	Sythane (40% WSP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Daconil Weather Stik 1.4 pt Concorde (54% SST) 1.4 pt; chlorothalonil	Apply during cool, moist conditions.
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Spray at first sign of disease.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
<b>Geranium</b> Powdery mildew	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Cygnus (50%) 1.6-3.2 oz; Kresoxim-methyl	
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Spray to run-off when mildew first appears.
	Sythane (40% WP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Gerbera</b> Botrytis blight (Gray mold)	Cleary 3336-WP (50% WP) 0.8 lb Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Spray every 10 to 14 days to run-off.
	Decree 0.7-1.5 lb; fenhexamid	Apply at 7- to 14-day intervals.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Gerbera</b> Powdery mildew ( <i>Erysiphe cichoracearum</i> )	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Strike (25% WDG) 2.0-4.0 oz or 0.5-1.0 tsp/gal; triadimefon	Spray to run-off when mildew first appears.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Gerbera</b> Root/stem rot (non-water molds)	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Medallion (50% WP) 1 packet; fludioxonil	Drench at 3- to 4-week intervals.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Apply at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Gerbera</b> Root/stem rot (Pythium and Phytophthora)	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 days.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
	Terrazole (35% WP) 3.0-10.0 oz; etridiazole	Apply as a drench at 0.5 pt/6-inch pot at 4- to 12-week intervals.
<b>Gladiolus</b> Botrytis blight	Daconil Weather Stick 2.0 pts Concorde (54% SST) 1.4 pt; chlorothalonil	Apply as a spray with a sticker-spreader on a 10-day interval.
	Cleary 3336-WP 0.8 lb Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Apply as a spray plus sticker-spreader just as first flowers show color. Repeat at 10- to 14-day intervals.
	Fore Rainshield NT Fore WSP Rainshield Dithane T/O Rainshield Dithane WF Junction (15% DF) 1.5 lb; mancozeb	Apply at a 7- to 14-day interval.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
	<b>Gerbera</b> Fusarium basal rot ( <i>Fusarium oxysporium</i> <i>F. gladioli</i> )	Cleary 3336-F 12.0-16.0 fl oz Fungo 50 AGC 12.0-16.0 oz thiophanate methyl
<b>Gerbera</b> Leaf and flower spot ( <i>Curvularia lunata</i> )	Cleary 3336-WP 0.8 lb Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Apply as a spray with a sticker-spreader on a 10-day interval.
	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Spray every 10 to 14 days.
	Maneb 80 (80% WP) 1.5 lb; maneb	Begin when flower spikes develop. Repeat 2 to 3 times at weekly intervals.
<b>Impatiens</b> Rhizoctonia stem rot	Chipco 26019 (50% WP) 1.0-2.0 lb iprodione	Do not use iprodione as a drench treatment on Impatiens. Apply as a foliar spray on a 7- to 14-day interval.
	Cleary 3336-F 12.0-16.0 fl oz or 1.0 tsp/2 gal water Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Apply as a drench or heavy spray at the rate of 1.0-2.0 pts/sq ft.
	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Apply at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz; Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals
<b>Impatiens</b> necrotic spot virus	Transmitted by thrips feeding	See insect control section on thrips control.
<b>Impatiens</b> Downy mildew	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; Phosphite Pagent (38.0% WDG) 4.0-18.0 oz; Pyraclostrobin + boscalid Stature (43.5% SC) 6.0--13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals
	Fenstop 7.0-14.0 fl oz; fenamidone Segway (34.5% SC) 3.5 fl oz; cyazoflamid	Spray with protection of plants up to 4 weeks.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Subdue Maxx 1.0 fl oz	Spray or drench with control up to 3 months.

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Impatiens</b> Soft rot		Disinfect tools when cutting rhizomes. Avoid overwatering. Rotate with resistant plants if damage is severe.
<b>Kalanchoe</b> Botrytis blight	Decree 0.7-1.5 lb; fenhexamid	Spray at 7- to 14 day intervals.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Impatiens</b> Powdery mildew		See African violet.
<b>Leucanthemum</b> Phytophthora root rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 days.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	Treat soil at 3-week to 3-month intervals.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz; pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
	Subdue Maxx 0.5-1.0 fl oz; mefenoxam	Apply in 100 gal of water over 400-800 sq ft (1.0 pt/sq ft). For soil depth greater than 4 inches apply 1.5-2.0 pts solution/sq ft. Repeat at 1- to 2-month intervals. Irrigate to thoroughly wet soil after application. For Subdue 5G do not apply rate of 9 oz more often than once every 6 weeks.
<b>Leucanthemum</b> Rhizoctonia root rot	Chipco 26019 (50% WP) 0.4 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Apply 1.0–2.0 pt/sq ft every 14 days.
	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Hurricane (48%) 1.5 oz; fludioxonil and mefenoxam	Drench to completely wet root zone at 21- to 28-day intervals
	Medallion (50% WP) 1 packet; fludioxonil	Drench at 3- to 4-week intervals.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Drench to completely wet root zones at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals
<b>Lily</b> Botrytis blight	Chipco 26019 (50% WP) 1.0-2.0 lb; iprodione	Spray every 10 to 14 days.
	Cleary 3336-WP 0.8 lb; thiophanate methyl	Spray every 10 to 14 days.
	Daconil Weather Stik 2.0 pt Concorde (54% SST) ;chlorothalonil	Spray every 7 to 14 days. Apply at prebloom.
	Decree 0.7-1.5 lb; fenhexamid	Apply at 7- to 14-day intervals.
	Exotherm (Termil) 3.5 oz/1000 cu ft; chlorothalonil	Fumigate every 7 to 14 days.
	Fore Rainshield NT Fore WSP Rainshield Dithane T/O Rainshield Dithane WF Junction (15% DF) 1.5 lb; mancozeb	Spray at a 7- to 14-day interval.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
Lily Penicillium and Fusarium bulb rot	Cleary 3336-F 12.0-16.0 fl oz Fungo 50 AGC 12.0-16.0 oz thiophanate methyl	Soak cleaned bulbs for 15 to 30 minutes in warm dip (80° to 85°F), preferably within 48 hours after digging.
Lily Root rot complex ( <i>Pythium</i> spp. and <i>Rhizoctonia solani</i> )	See Chrysanthemum.	
Narcissus Bulb rot	See Gladiolus Fusarium basal rot.	
Pansy Botrytis blight	Broadform 4.0 to 8.0 fl oz fluopyram and trifloxystrobin	Spray at 7 to 14 day intervals.
	Cleary 3336-F (4.5 F) 10.0 fl oz Cleary 3336-WP (50% WP) 0.8 lb; thiophanate methyl	Apply every 10 to 14 days.
	Daconil Weather Stik 2.0 pt; chlorothalonil	Spray every 7 to 10 days.
	Decree 0.7-1.5 lb; fenhexamid	Spray at 7- to 14-day intervals.
	Fore Rainshield NT Fore WSP Rainshield Dithane T/O Rainshield NT Dithane WF Junction (15% DF) 1.5 lb; mancozeb	
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
Pansy Root rot ( <i>Rhizoctonia</i> )	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Medallion (50% WP) 1 packet; fludioxonil	Drench at 3- to 4-week intervals.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Apply at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14 day intervals
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals
Pansy <i>Sclerotinia</i> , <i>Fusarium</i> , and <i>Thielaviopsis</i>	Cleary 3336-F 12.0-16.0 fl oz Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Apply as a drench at 1.0-2.0 pts/sq ft.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days
	Palladium (62.5% WDG) 2.0 to 4.0 oz cyprodinil and fludioxonil	Apply at 7- to 14-da intervals
Pansy Phytophthora root/crown rot	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 days.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	Treat soil at 3-week to 3-month intervals.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	FenStop 7.0-14.0 fl oz; fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
	Pageant (38.0% WDG) 4.0-18.0 oz pyraclostrobin + boscalid	Apply at 7- to 14-day intervals, but not to petunias and impatiens.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
Subdue Maxx 0.5-1.0 fl oz; mfenoxam	Apply in 100 gal of water over 400 to 800 sq ft (1.0 pt/sq ft). For soil depth greater than 4 inches apply 1.5-2.0 pts solution/sq ft. Repeat at 1- to 2-month intervals. Irrigate to thoroughly wet soil after application. For Subdue 5G do not apply rate of 9 oz more often than once every 6 weeks.	



Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Petunia</b> Phytophthora root/ crown rot	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 days.
	Subdue Maxx 0.5-1.0 fl oz; mefenoxam	Apply in 100 gal of water over 400-800 sq ft (1.0 pt/sq ft). For soil depth greater than 4 inches apply 1.5-2.0 pts solution/sq ft. Repeat at 1- to 2-month intervals. Irrigate to thoroughly wet soil after application. For Subdue 5G do not apply rate of 9 oz more often than once every 6 weeks.
	FenStop 7.0-14.0 fl oz fenamidone	Drench 1.0-2.0 pt/sq ft and repeat at a 28-day interval if necessary.
	Banol (66.5%) 20.0-30.0 fl oz; propamocarb hydrochloride	Treat soil at 3-week to 3-month intervals.
	Adorn (39.5%) 1.0-4.0 fl oz; fluopicolide	Apply at 14- to 28-day intervals but no more than twice per crop cycle.
	Disarm (40.3% SC) 1.0-6.0 fl oz; fluoxastrobin	Apply at 14- to 28-day intervals.
	Segway (34.5% SC) 2.0-6.0 fl oz; cyazoflamid	Apply at 14- to 28-day intervals.
	Stature (43.5% SC) 6.0-13.0 fl oz; dimethomorph	Apply at 10- to 14-day intervals. Constant agitation required.
<b>Petunia</b> Fungus root rot ( <i>Rhizoctonia</i> and <i>Fusarium</i> )	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Hurricane (48%) 1.5 oz; fludioxonil and mefenoxam	Drench to completely wet root zone at 21- to 28-day intervals
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscali	Drench to completely wet root zones at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Terrazole (35% WP) 3.5-10.0 oz; etridiazole	Apply every 4 to 12 weeks.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals
<b>Petunia</b> Botrytis blight	Broadform 4.0 to 8.0 fl oz; fluopyram and trifloxystrobin	Spray at 7 to 14 day intervals.
	Cleary 3336-F (4.5 F) 10.0 fl oz Cleary 3336-WP (50% WP) 0.8 lb; thiophanate methyl	Apply every 10 to 14 days.
	Daconil Weather Stik 2.0 pt; chlorothalonil	Spray every 7 to 10 days.
	Decree 0.7-1.5 lb; fenhexamid	Spray at 7- to 14-day intervals.
	Fore Rainshield NT Fore WSP Rainshield Dithane T/O Rainshield NT Dithane WF Junction (15% DF) 1.5 lb; mancozeb	
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
	<b>Poinsettia</b> Botrytis blight	Broadform 4.0 to 8.0 fl oz fluopyram and trifloxystrobin
Chipco 26019 (50% WP) 1.0-2.0 lb; iprodione		Spray every 10 to 14 days.
Cleary 3336-WP 0.8 lb Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl		Spray every 10 to 14 days.
Daconil Weather Stik 2.0 pt Concorde (54% SST) 1.4 pt; chlorothalonil		
Exotherm (Termil) 3.5 oz/1000 cu ft; chlorothalonil		Fumigate every 7 to 14 days. Do not apply when foliage is wet or when temperature is above 75°F.
Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid		Apply every 7 to 14 days as needed
<b>Poinsettia</b> Root rot complex ( <i>Rhizoctonia solani</i> , <i>Pythium</i> spp., and <i>Thielaviopsis basicola</i> )		Cleary 3336-WP (50% WP) 1.0 lb Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl + Terrazole (35% WP) 3.0-10.0 oz or 0.5 pt/6-inch pot; etridiazole
	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Hurricane (48%) 1.5 oz; fludioxonil and mefenoxam	Drench to completely wet root zone at 21- to 28-day intervals
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscali	Drench to completely wet root zones at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Poinsettia</b> Rhizoctonia leaf blight	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Fungo 50 AGC 12.0-16.0 oz Cleary 3336-WP 0.8 lb; thiophanate methyl	Spray every 10 to 14 days.
	Medallion (50% WP) 1-2 packet; fludioxonil	Spray only before bract formation and at 7- to 10-day intervals in greenhouses and closed structures.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Apply at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Terraguard 50W 4.0-8.0 oz; triflumizole	Controls Rhizoctonia as a drench at 3- to 4-week intervals.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals
<b>Rose</b> Botrytis blight, black spot	Broadform 4.0 to 8.0 fl oz fluopyram and trifloxystrobin	Spray at 7 to 14 day intervals.
	Cleary 3336-WP (50% WP) 0.8 lb Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Apply as a spray at 10- to 14-day intervals.
	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Apply as a spray at 10- to 14-day intervals.
	Cygnus (50%) 1.6-3.2 oz; Kresoxim-methyl	
	Daconil Weather Stik 2.0 pt Concorde (54% SST) 1.3 pt; chlorothalonil	Repeat at 7- to 14-day intervals.
	Decree 0.7-1.5 lb; fenhexamid	Apply every 7 to 14 days.
	Torque (38.7) 4.0 to 10.0 fl oz; tebuconazole	Apply every 14 to 21 days as needed
<b>Rose</b> Powdery mildew	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Cygnus (50%) 1.6-3.2 oz; Kresoxim-methyl	
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Spray to run-off when mildew first appear.
	Systhane (40% WSP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Terraguard 50W 4.0-16.0 oz; triflumizole	Apply at 7- to 14-day intervals as needed. Use higher rate on existing initial infection.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Snapdragon</b> Botrytis blight	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	
	Daconil Weather Stik 2.0 pt Concorde (54% SST) 1.4 pt; chlorothalonil	Repeat on a 7- to 14-day interval.
	Decree 0.7-1.5 lb; fenhexamid	Apply every 7 to 14 days.
	Exotherm (Termil) 3.5 oz/1000 cu ft; chlorothalonil	Fumigate every 7 to 14 days.
	Fungo 50 AGC 12.0-16.0 oz Cleary 3336-WP 0.8 lb; thiophanate methyl	Spray every 10 to 14 days.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Snapdragon</b> Downy mildew	Alude 1.0-2.0 qt Vital 2.0-4.0 pt; phosphite	Apply every 7 days.
	Micora (23.3%) 8.0 fl oz; mandipropamid	Apply every 7 to 14 days
	Orvego (46.2%) 14.0 fl oz; ametoctradin and dimethomorph	Apply at 10 to 14 day intervals
<b>Snapdragon</b> Rust	Banner Maxx, 2-4 fl oz propiconazole	Apply every 14 to 21 days.
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Spray to run-off when rust first appears.
	Systhane (40% WSP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Cygnus (50%) 3.2-6.4 oz; Kresoxim-methyl	

Table 6.1 - Common Diseases and Chemical Control Options (continued)		
Plant Disease	Fungicide & Formulation; Rate/100 gal	Remarks
<b>Snapdragon</b> Powdery mildew	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Cygnus (50%) 1.6-3.2 oz; Kresoxim-methyl	
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Spray to run-off when mildew first appears.
	Systhane (40% WSP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days
<b>Snapdragon</b> Rhizoctonia root rot	Chipco 26019 (50% WP) 0.4 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Apply 1.0-2.0 pt/sq ft every 14 days.
	Cleary 3336-F (4.5 F) 20.0 fl oz; thiophanate methyl	
	Empress (23.3%) 2.0 to 6.0 fl oz; Pyraclostrobin	Repeat application at 7- to 28-day intervals as needed.
	Hurricane (48%) 1.5 oz; fludioxonil and mefenoxam	Drench to completely wet root zone at 21- to 28-day intervals
	Medallion (50% WP) 1 packet; fludioxonil	Drench at 3- to 4-week intervals.
	Pageant (38%) 12.0 to 18.0 oz; pyraclostrobin and boscalid	Drench to completely wet root zones at 7- to 14-day intervals
	Palladium (63.5% WDG) 2.0 to 4.0 oz; Cyprodinil and fludioxonil	Apply at 7- to 14-day intervals
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7- to 14-day intervals
	Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply at 14- to 28-day intervals
<b>Tulip</b> Botrytis blight (Gray mold)	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb; iprodione	Spray every 10 to 14 days.
	Fore Rainshield NT Fore WSP Rainshield Dithane T/O Rainshield NT Dithane WF Junction (15% DF) 1.5 lb; mancozeb	Spray at a 7- to 14-day interval.
	Pageant (38%) 12.0-18.0 oz; pyraclostrobin and boscalid	Apply every 7 to 14 days as needed
<b>Tulip</b> Fusarium and Penicillium bulb rot	Cleary 3336-F 12.0-16.0 fl oz Fungo 50 AGC 12.0-16.0 oz; thiophanate methyl	Soak cleaned bulbs for 15 to 30 minutes in warm dip (80° to 85°F). Dry bulbs after treatment.
<b>Zinnia</b> Alternaria blight	Chipco 26019 (50% WP) 1.0-2.0 lb Sextant (23.3%) 1.0-2.5 lb iprodione	Spray every 10 to 14 days.
	Fore Rainshield NT Fore WSP Rainshield Dithane T/O Rainshield NT Dithane WF Junction (15% DF) 1.5 lb; mancozeb	Spray every 10 to 14 days.
	Maneb 80 (80% WP) or Maneb Plus Zinc F4 Fungicide (37%) 1.0-1.5 lb; maneb	Spray every 10 to 14 days.
<b>Zinnia</b> Bacterial blight		Purchase clean stock plants. Practice good sanitation procedures.
<b>Zinnia</b> Powdery mildew	Concert II (41.4%) 22.0 to 35.0 fl oz propiconazole and chlorothalonil	Apply at 14 to 21 day intervals
	Cygnus (50%) 1.6-3.2 oz; Kresoxim-methyl	Apply at 10- to 14-day intervals.
	Daconil Weather Stik 1.4 pt; chlorothalonil	Treat at 7- to 10-day intervals at first sign of disease.
	Rubigan 3.0-5.0 fl oz; fenarimol	Spray every 10 to 14 days.
	Strike (25% WDG) 2.0-4.0 oz; triadimefon	Spray every 7- to 10 days.
	Systhane (40% WSP) 4.0 oz; myclobutanil	Apply at 10- to 14-day intervals.
	Terraguard 50W 4.0-8.0 oz; triflumizole	Foliar spray at weekly intervals.
	Triact 70 0.5-1.0 gal; neem oil	Apply every 14 days.
	Trinity (19.2%) 8.0 to 12.0 fl oz; triticonazole	Apply at 7 to 14 day intervals
Tourney (50% WDG) 1.0 to 4.0 oz; metconazole	Apply every 14 to 28 days	

# Floral Crops: Organic Controls for Insect Pests

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Table 6.2 - Organic Chemicals, Predators, and Pathogens		
Product	Insects Controlled	Remarks
<b>Products or pathogens</b>		
Azadirachtin	Beetles, aphids, caterpillars, others	Sold under various trade names
<i>Bacillus thuringiensis</i>	Leaf-feeding caterpillars	Known as Bt, sold under many trade names. A strain of this bacterium controls fungus gnats.
<i>Beauveria bassiana</i>	Beetles, aphids, others	Various trade names
<i>Capsicum oleoresin</i> extract, garlic and soybean oils	Thrips and mites	Sold as Captiva Prime
<i>Chromobacterium subsugae</i> strain PRRA4-1	Caterpillars, whiteflies, aphids, thrips, azalea lacebug, lygus and mites	Sold as Grandevo. See label for rates for specific pests.
d-limonene	Imported fire ants	Provides quick kill for workers.
Entomopathogenic nematodes ( <i>Steinernema</i> and <i>Heterorhabditis</i> )	Fungus gnats, shore flies, western flower thrips, root mealybugs, borers, root feeders	Rates are on product label; soil temperature should exceed 60 F. Apply late in the day, irrigate immediately. Available commercial products: Nemasys, NemaShield, and others.
Entomopathogenic fungi <i>Beauveria bassiana</i> , <i>Metarhizium anisopliae</i> (Met52EC), <i>Isaria fumosorosea</i> (NoFly WP)	Whiteflies, thrips, aphids, mealybugs, fungus gnats, vine weevils, psyllids, plant bugs, beetles, leafhoppers	See label for proper material for target pest. Beauveria is sold under several trade names. Follow label for mixing directions, application timing and intervals and if a foliar spray or drench. NoFly WP can be applied with a cold fogger.
Insecticidal soap	Works well on soft bodied insects, in particular aphids, mites, lacebugs, mealybugs	This product is sold under many trade names and is a fatty acid soap.
<i>Isaria fumosorosea</i> Apopka Strain 97	Aphids, thrips, whiteflies, weevils, psyllids, leafminers, spider mites, mealybugs	See label. Foliar and soil applications.
Kaolin clay	Beetles, aphids, caterpillars, others	Various trade names
<i>Paecilomyces fumosoroseus</i> Strain FE 9901	Whiteflies, aphids and thrips	Sold as NoFly
Pyrethrins	Broad spectrum, works on a wide variety of insects and mites.	Usually sold mixed with other botanical insecticides. Some formulations combined with canola oil. Some products are labeled for flowers, fruits, vegetables, and herbs. Check label prior to applying.
Spinosad	Many insect pests, including thrips, caterpillars, and leaf beetles	Entrust is for organic production.
<b>Predators</b>		
Lady beetles	Feed on aphids and other soft bodied insects	Lady beetles may leave to find other prey. <i>Cryptolaemus</i> for mealybug, <i>Delphastus</i> for whitefly. <i>Stethorus</i> for spider mites.
Lacewings	Aphids, scales, mealybugs, other soft bodied insects	Immature <i>Chrysoperla carnea</i> are called aphid lions.
Predatory bugs	thrips	<i>Orius insidiosus</i> for all stages of western flower thrips
Predatory midges	Aphids, thrips, fungus gnat larvae	<i>Aphidoletes aphidimiza</i> for aphids
Predatory mites	Whitefly, spider mites, thrips, fungus gnat larvae	<i>Amblyseius swirskii</i> for whiteflies and thrips; <i>Phytoseilus persimilis</i> for red and 2-spotted spider mites; <i>Hypoaspis</i> for fungus gnat larvae; <i>Amblyseius californicus</i> for 2-spotted spider mite and carmine mite; <i>Amblyseilus cucumeris</i> for western flower thrips; <i>Amblyseius andersoni</i> for red and 2-spotted spider mites.
Parasitic wasps	Leafminers, whiteflies	<i>Diglyphus isaea</i> for leafminers; <i>Encarsia formosa</i> and <i>Eretmocerus eremicus</i> for whiteflies.
Rove beetle	Fungus gnat larvae	Rove beetle for fungus gnat larvae

<b>Table 6.3 – Organic Controls, Predators and Pathogens</b>				
UPDATED List of Commercial Suppliers and Insectaries/Laboratories selling predators and parasitoids for augmentative biocontrol				
*The following table was completed using information from the 2015 Directory of Least-Toxic Pest Control Products, published on The IPM Practitioner Magazine ( <a href="https://www.birc.org/Final2015Directory.pdf">https://www.birc.org/Final2015Directory.pdf</a> ). There are more companies/suppliers offering beneficial arthropods and are not included in this table. Appearance on this table does not reflect endorsement by VCE.				
**Companies might offer additional products, besides the ones listed in this table. Check the respective company's website for a complete list of products, prices and availability.				
<b>Company Name*</b>	<b>City</b>	<b>State</b>	<b>Products**</b>	<b>Website for Ordering</b>
A-1 Unique	Citrus Height	California	Lacewings, Lady beetles	<a href="http://a-1unique.com/">http://a-1unique.com/</a>
American Insectaries	Escondido	California	Lacewings	<a href="http://www.americaninsectaries.com/">http://www.americaninsectaries.com/</a>
Arbico Organics	Oro Valley	Arizona	Lacewings, Lady beetles	<a href="https://www.arbico-organics.com/">https://www.arbico-organics.com/</a>
Associates Insectaries	Santa Paula	California	Lady beetles	<a href="http://www.associatesinsectary.com/">http://www.associatesinsectary.com/</a>
Beneficial Insectaries	Redding	California	Parasitic wasps, Lacewings, Predatory mites	<a href="https://www.insectary.com/">https://www.insectary.com/</a>
BFG Supply	Burton	Ohio	Lacewings	<a href="https://www.bfgsupply.com/">https://www.bfgsupply.com/</a>
Biobest	Romulus	Michigan	Parasitic wasps, Lady beetles	<a href="http://www.biobestgroup.com/en/">http://www.biobestgroup.com/en/</a>
Biofac	Mathis	Texas	Lacewings	<a href="http://www.biofac.com/">http://www.biofac.com/</a>
Bioline Agrosiences	Oxnard	California	Parasitic wasps, Lacewings, Predatory mites	<a href="http://www.biolineagrosiences.com/">http://www.biolineagrosiences.com/</a>
Buglogical	Tucson	Arizona	Lacewings, Lady beetles	<a href="https://www.buglogical.com/">https://www.buglogical.com/</a>
Evergreen Grower Supply	Clackamas	Oregon	Parasitic wasps, Lacewings	<a href="http://www.evergreengrowers.com/">http://www.evergreengrowers.com/</a>
Garden Alive	Lawrenceburg	Indiana	Lacewings, Lady beetles	<a href="https://www.gardensalive.com/">https://www.gardensalive.com/</a>
Greenmethods	Redding	California	Parasitic wasps, Lacewings, Lady beetles	<a href="https://greenmethods.com/">https://greenmethods.com/</a>
Hydro-Gardens	Colorado Springs	Colorado	Lacewings, Lady beetles	<a href="https://hydro-gardens.com/">https://hydro-gardens.com/</a>
IPM Laboratories Inc.	Locke	New York	Parasitic wasps, Lacewings, Lady beetles	<a href="http://www.ipmlabs.com/">http://www.ipmlabs.com/</a>
Koppert	Howell	Michigan	Parasitic wasps, Lacewings, Lady beetles, Predatory mites	<a href="https://www.koppertus.com/">https://www.koppertus.com/</a>
Kunafin	Quemado	Texas	Lacewings	<a href="http://www.kunafin.com/">http://www.kunafin.com/</a>
Natural Pest Control	Orangevale	California	Lacewings, Lady beetles	<a href="http://www.natpestco.com/">http://www.natpestco.com/</a>
Nature's Control	Medford	Oregon	Parasitic wasps, Lacewings, Lady beetles	<a href="http://www.naturescontrol.com/">http://www.naturescontrol.com/</a>
Organic Control	Harbor City	California	Lacewings	<a href="https://www.organiccontrol.com/">https://www.organiccontrol.com/</a>
Peaceful Valley	Grass Valley	California	Lacewings, Lady beetles	<a href="https://www.groworganic.com/">https://www.groworganic.com/</a>
Planet Natural	Bozeman	Montana	Lacewings, Lady beetles	<a href="https://www.planetnatural.com/">https://www.planetnatural.com/</a>
Rincon-Vitova Insectaries	Ventura	California	Parasitic wasps, Lacewings, Lady beetles	<a href="http://www.rinconvitova.com/">http://www.rinconvitova.com/</a>
Tip Top	Westlake Village	California	Parasitic wasps, Lacewings, Lady beetles	<a href="https://tiptopbiocontrol.com/">https://tiptopbiocontrol.com/</a>



# Floral Crops: Insects

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Relatively few kinds of insects and related pests occur on greenhouse and floral crops, but they attack a wide range of plants, can be highly destructive, and are difficult to control.

Many insecticide and miticide formulations are available to growers, but specific uses may be quite limited for any one crop, and plant varieties vary greatly in susceptibility to chemical injury. Your local Extension faculty may be able to help you obtain the technical information you need.

## ■ Proper Use of Pesticides

Insecticides are poisonous, and their use in the greenhouse can present a serious danger to both the applicator and plant material if handled carelessly or improperly. Restricted pesticides must be applied only by certified pesticide applicators.

In order to use a pesticide safely and effectively, the product label should be read thoroughly before using. By law, pesticides must be used in accordance with label directions.

Effective application of pesticides depends on: proper timing, favorable treatment conditions of temperature, humidity, moisture, and time of day; plant condition; and thorough coverage, especially the undersides of leaves and in dense or low-growing foliage. Thorough wetting is especially important on waxy foliage and waxy insects such as mealybugs and scales. Most insecticides do not act efficiently at temperatures below 50-55°, and may cause plant injury if used when the temperature is above 90°, especially when coupled with high humidity. Overhead irrigation or watering should be avoided for at least 12 hours after applying pesticide treatments. Plants should be well watered, with foliage allowed to dry, before applying chemicals.

Non-chemical control methods should not be overlooked, particularly preventative measures such as making sure not to introduce infested plants into production areas. Weeds and excess plants left around can harbor pests and may be sources of infestation. Parasites (*Encarsia formosa* for whiteflies) and predators (*Cryptolaemus montrouzieri* for mealybugs) can be introduced for biological control. Others are listed in the Organic Controls chapter.

## PLANT INJURY

Phytotoxicity is a term referring to plant injury caused by chemicals, particularly pesticides. Greenhouse plants seem to be especially prone to this problem, in part because of the wide variety of plants often grown or held in one common area. Signs of phytotoxicity include: 1) tip or marginal burn of leaves; 2) chlorosis in spots, at tips, or on margins of the leaves; 3) leaf distortion, including curling, twisting, or cupping; 4) stunting or growth reduction in the size of entire plants or certain parts; and 5) abnormal or excessive growth of certain plant parts. Flower parts and bracts are especially sensitive. Treatments may cause root injury resulting in decline, stunting, and damage to older leaves.

The following suggestions will reduce phytotoxic potential:

- 1) Do not apply pesticides to plants under stress; 2) Avoid spraying under extremely hot, sunny, or humid conditions; 3) Apply sprays in the mornings between 6:00 a.m. and 10:00 a.m; 4) Avoid treating when temperature extremes or severe fluctuations are likely; 5) Apply pesticides when foliage is dry and conditions are conducive to drying; 6) Use wettable powders rather than emulsifiable concentrates; 7) Do not mix pesticides without prior experience; check compatibility; 8) Keep nozzles of aerosols or mist blowers at least 18-24" from plants being treated; 9) Never spray insecticides in equipment that has been used for applying herbicides (tanks, pumps, hoses, guns); 10) Clean sprayer, tank, pump, hose, and gun after each use; 11) Do not let spray mixes stand in the sprayer; do not expose spray concentrates to extreme heat or freezing; 12) Read **ALL** of the label directions every time you use each pesticide.

## FORMULATIONS AND APPLICATION METHODS

Pesticides are available in various formulations: as concentrates for spraying, granular soil treatments, or aerosols. In some cases, only one or a few application methods may be registered for use of a specific pesticide.

Dilute sprays are applied with pressurized tank sprayers or high-pressure powered spraying machines. Formulations to be used may be wettable powders (WP), emulsifiable concentrates (E or EC), soluble powders (SP), liquids or liquid concentrates (L, LC), or flowables (F). Wettable powders are less likely to cause phytotoxicity problems.

Concentrate sprays are applied with motor-driven or electric mist sprayers and deliver droplets 5 to 20 times as concentrated as dilute sprayers.

Rates of application from aerosol bombs, generators, and foggers are based on air volume in closed greenhouses in terms of amount of pesticide/cubic feet. It is important to close the greenhouse tightly for the recommended length of time followed by adequate prescribed ventilation.

## COMPATIBILITY AND COVERAGE

Care should be taken in mixing different chemicals. Mixing different formulations such as wettable powders and emulsifiable concentrates is not recommended. Never mix herbicides or fungicides, and never use a sprayer that has been used to apply herbicides for insecticide or fungicide application.

For especially waxy foliage, the addition of a wetting agent or spreader-sticker may be desirable when applying sprays. However, it is unnecessary if two or more pesticides are added together, since a greater amount of wetting agent or emulsifier will be present in the tank. The use of two (2) or more emulsifiable concentrates mixed together in the same quantity of water results in twice as much or more solvent applied to the plants and may cause plant injury. Read the pesticide label carefully for compatibility statements and mixing precautions. Highly alkaline water (pH 8.0 or higher) may cause rapid breakdown of many pesticide chemicals.

## SAFETY AND TOXICITY

Pesticides are readily absorbed through the skin, as well as being poisonous by ingestion, by inhalation, or by contact in the eyes. Penetration of the skin occurs immediately on contact and is most hazardous when handling undiluted concentrates. It is essential to wear protective clothing, proper gloves, boots, and adequate face shields and respirators or gas masks as directed on the label. Frequent changes to clean clothing and protective devices are essential. With some chemicals, potential eye damage warrants a danger or warning category on the label even though oral and dermal toxicities are in the caution range.

## SPECIAL PRECAUTIONS FOR POLLINATORS

Some insecticides may be acutely or chronically toxic to bees. Read the label for special precautions. Certain labels contain special precaution

section titled "Protection of Pollinators". A bee hazard icon may warn applicators of special application restrictions to protect pollinators.

## How to Use These Recommendations

Once the pest problem has been identified, consult Table 6.4. Find the pest or pest group (arranged alphabetically) to determine which control measures are available, the formulations that are registered, and remarks. Then consult Table 6.5 for specific use and precautionary information on the control measure chosen. Be sure to check the potential phytotoxicity statements. If in doubt about a crop, treat a small sample area. Observe sprayed plants for several days for indications of plant injury.

After using the recommendations here, read and follow the directions on the pesticide label prior to mixing and application.

**Table 6.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group**

Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks <sup>1</sup>
<b>Aphids (<a href="https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-220/ENTO-350.pdf">https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-220/ENTO-350.pdf</a>)</b>						
Abamectin	warning	0.15EC	—	—	—	See label
Acephate	caution	75SP, 97	3A	—	—	Aerosol is labeled for most crops. See label for phytotoxicity
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label
Afidopyropen	caution	0.83DC	—	—	—	Do not reapply within 7 days of last application
Azadirachtin	caution	EC	—	—	—	All crops
<i>Beauveria bassiana</i>	caution	22WF, ES	—	—	—	All crops
Bifenazate + Abamectin	caution	EC	—	—	—	See label
Cyclaniliprole	caution	EC	—	—	—	See label
Cyantraniliprole	warning	—	—	—	SC	See label. Soil drench or irrigation system application
Cyfluthrin	warning	20WP	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG, 2G	Soil application as drench, granules
Fenoxycarb	caution	25WP	0.6A	—	—	All crops
Fenpropathrin	warning	2.4EC	1A	—	—	See label
Flonicamid	caution	SG	—	—	—	See label for rate range
Flupyradifurone	caution	1.67SC	—	—	—	See label; only one application per crop cycle
Fluvalinate	caution	2AF	—	—	—	All crops; see label for phytotoxicity
Imidacloprid	caution	II	—	—	1%G,60WP	See label
Insecticidal soap	warning	—	—	—	—	See label
Kinoprene	warning	II	—	—	—	All crops
Pymetrozine	caution	50WG	—	—	—	All crop; spray and drench applications
Pyrethrins	caution	—	A	—	—	See label
Pyriproxyfen	caution	—	—	—	—	See label
Spinetoram + Sulfoxaflor	caution	SC	—	—	—	See label for precautions and restrictions
Spirotetramat	caution	240SC	—	—	240SC	Soil application as drench
Thiamethoxam	caution	25WG	—	—	25WG	See label
Tolfenpyrad	warning	EC	—	—	—	See label for phytotoxicity
Ultra-fine oil	caution	—	—	—	—	See label

Table 6.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group						
Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks <sup>1</sup>
<b>Caterpillars, Cutworms, Loopers, Armyworms</b>						
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label for pest species
Azadirachtin	caution	EC	—	—	—	All crops
<i>Bacillus thuringiensis</i> (BT)	caution	WP	—	—	—	Consult label of this and other brands of BT available for specific pest uses.
Bifenthrin	warning	.667F	A	—	—	Greenhouse-grown ornamentals
Chlorfenapyr	caution	2S	—	—	—	All crops
Cyantraniliprole	warning	SC	—	—	—	See label
Cyclaniliprole	caution	EC	—	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Diflubenzuron	caution	25WSB	—	—	—	Armyworm listed on label
Fenoxycarb	caution	—	0.6A	—	—	See label
Fenpropathrin	warning	2.4EC	1A	—	—	For beet armyworm; see label
Fluvalinate	caution	2AF	—	—	—	All crops
Methoxyfenozide	caution	EC	—	—	—	See label
Novaluron	caution	10SC	—	—	—	Armyworm listed on label
Permethrin	caution	3.2EC	—	—	—	All crops
Pyrethrins	caution	EC	—	—	—	See label
Pyridalyl	caution	35WP	—	—	—	See label for insect species
Spinosad	caution	11.6SC	—	—	—	All crops
Spinetoram + Sulfoxaflor	caution	SC	—	—	—	See label for precautions and restrictions
Tebufenozide	caution	2S	—	—	—	All crops
Tolfenpyrad	warning	EC	—	—	—	See label for phytotoxicity. For early instars only.
<b>Centipedes (see Millipedes) (<a href="https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/3104/3104-1574/3104-1574_jpg.pdf">https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/3104/3104-1574/3104-1574_jpg.pdf</a>)</b>						
Bifenthrin	warning	.667F	—	—	—	See label
<b>Cyclamen Mite</b>						
Abamectin	warning	0.15EC	—	—	—	See label
Bifenazate + Abamectin	warning	FP	—	—	—	See label
Chlorfenapyr	caution	2S	—	—	—	All crops
Fenazaquin	warning	200SC	—	—	—	All crops
Fenproximate	caution	EC	—	—	—	See label
Spiromesifen	caution	4F	—	—	—	Also labeled for broad mite
Spirotetramat	caution	240SC	—	—	240SC	Soil application as drench
<b>Fungus Gnats (Adults)</b>						
Bifenthrin	caution	—	A	—	—	All crops
Cyfluthrin	warning	20WP	—	—	—	
Fenpropathrin	warning	—	1A	—	—	All crops
Fluvalinate	caution	22.3F	—	—	—	See label
Insecticidal soap	warning	—	—	—	—	See label, formulations vary
Permethrin	caution	3.2EC	—	—	—	See label for sensitive plants
Ultra-fine oil	caution	—	—	—	—	See label

Table 6.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group						
Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks <sup>1</sup>
<b>Fungus Gnats (Larvae)</b> ( <a href="https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/3104/3104-1579/3104-1579_PDF.pdf">https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/3104/3104-1579/3104-1579_PDF.pdf</a> )						
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label
Azadirachtin	caution	EC	—	—	—	All crops
<i>Bacillus thuringiensis (BT)</i>	non-toxic	—	—	—	AS	All crops
Chlorfenapyr	caution	2S	—	—	—	All crops
Cyfluthrin	warning	20WP	—	—	—	See label
Cyromazine	caution	75WP	—	—	—	All crops
Diflubenzuron	caution	—	—	—	25WSB	See label
Dinotefuran	caution	20SG	—	—	20SG	Soil application as drench
Fenpropathrin	warning	—	1A	—	—	All crops
Fenoxycarb	caution	25WP	—	—	—	All crops
Flupyradifurone	caution	1.67SC	—	—	—	See label. Only one application per crop cycle
Imidacloprid	caution	II	—	—	1%G	
Kinoprene	warning	II	—	—	—	All crops
Pyriproxyfen	caution	.86EC	—	—	—	See label
<i>Steinernema feltiae</i>	non toxic	—	—	—	—	See label
Thiamethoxam	caution	25WG	—	—	25WG	See label
<b>Leafminers</b>						
Abamectin	warning	0.15EC	—	—	—	Flower crops, foliage plants
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label
Azadirachtin	caution	EC	—	—	—	All crops
Bifenthrin	warning	.667F	A	—	—	See label
Cyantraniliprole	warning	SC	—	—	—	See label
Cyclaniliprole	caution	EC	—	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Cyromazine	caution	75WP	—	—	—	All crops
Diflubenzuron	caution	25WSB	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG	Soil application as drench
Fenpropathrin	warning	—	1A	—	—	All crops
Fenoxycarb	caution	25WP	—	—	—	Lepidopterous leaf miners only all crops
<i>Isaria fumosorosea</i>	non toxic	—	—	—	—	See label
Novaluron	caution	10SC	—	—	—	Serpentine, citrus leafminers only
Permethrin	caution	3.2EC	—	—	—	Chrysanthemum only
Spinosad	caution	11.6SC	—	—	—	All crops
Thiamethoxam	caution	25WG	—	—	25WG	See label
<b>Leafrollers</b>						
Acephate	caution	75SP, 97	3A	—	—	Labeled on roses
Bifenthrin	warning	.667 F	A	—	—	Greenhouse-grown ornamentals
Cyfluthrin	warning	20WP	—	—	—	See label
Fenpropathrin	warning	—	1A	—	—	All crops

Table 6.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group						
Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks <sup>1</sup>
<b>Mealybugs (Foliar)</b>						
Acephate	caution	75SP, 97	3A	—	—	Labeled on foliage plants, orchids, anthurium, cacti, poinsettia
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label
Afidopyropen	caution	0.83DC	—	—	—	Do not reapply within 7 days of last application
Azadirachtin	caution	EC	—	—	—	All crops
<i>Beauveria bassiana</i>	caution	22WP, ES	—	—	—	All crops
Bifenthrin	warning	667F	A	—	—	Greenhouse-grown ornamentals
Buprofezin	caution	70WSP	—	—	—	All crops
Cyfluthrin	warning	20WP	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG, 2G	Soil application as drench, granule
Fenoxycarb	caution	—	0.6A	—	—	See label
Fenpropathrin	warning	2.4EC	1A	—	—	See label
Fonicamid	caution	SG	—	—	—	See label for rate range
Flupyradifurone	caution	1.67SC	—	—	—	See label. Only on application per crop cycle
Fluvalinate	caution	22.3F	—	—	—	See label
<i>Isaria fumosorosea</i>	non toxic	—	—	—	—	See label
Imidacloprid	caution	II	—	—	1%G	See label
Insecticidal soap	warning	—	—	—	—	Concentration varies with formulation; see label
Kinoprene	warning	II	—	—	—	See label
Permethrin	caution	3.2EC	—	—	—	See label for sensitive plants
Pyrethrins	caution	—	A	—	—	See label
Pyrifluquinazon	caution	—	—	—	—	See label
Spinetoram + Sulfoxaflor	caution	SC	—	—	—	See label for precautions and restrictions
Spirotetramat	caution	240SC	—	—	240SC	Soil application as drench
Thiamethoxam	caution	25WG	—	—	25WG	See label
Tolfenpyrad	warning	EC	—	—	—	See label for phytotoxicity
<b>Mealybugs (Root)</b>						
Kinoprene	warning	II	—	—	—	All crops
<b>Millipedes</b>						
Bifenthrin	warning	.667F	—	—	—	See label
<b>Scale Insects (<a href="https://www.pubs.ext.vt.edu/2909/2909-1414/scale-insects/index.html">https://www.pubs.ext.vt.edu/2909/2909-1414/scale-insects/index.html</a>)</b>						
Acephate	caution	75SP, 97	3A	—	—	See crops listed on label
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label
Azadirachtin	caution	EC	—	—	—	All crops
Buprofezin	caution	70WSP	—	—	—	All crops
Cyantraniliprole	warning	SC	—	—	—	See label. Soft scales only.
Cyclaniliprole	caution	EC	—	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label directions
Dinotefuran	caution	20SG	—	—	20SG, 2G	Soil application as drench, granules
Fenoxycarb	caution	25WP	0.6A	—	—	All crops, soft scales only
Fenpropathrin	warning	—	1A	—	—	See label
Fonicamid	caution	SG	—	—	—	See label for rate range
Imidacloprid	caution	II	—	—	1%G	See label
Insecticidal soap	warning	—	—	—	—	Formulations vary; see label
Kinoprene	warning	II	—	—	—	All crops



Table 6.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group						
Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks <sup>1</sup>
<b>Scale Insects (<a href="https://www.pubs.ext.vt.edu/2909/2909-1414/scale-insects/index.html">https://www.pubs.ext.vt.edu/2909/2909-1414/scale-insects/index.html</a>) continued</b>						
Pyriproxyfen	caution	.86EC	—	—	—	See label
Spinetoram + Sulfoxaflor	caution	SC	—	—	—	See label for precautions and restrictions
Thiamethoxam	caution	25WG	—	—	25WG	Labeled for soft scales
Tolfenpyrad	warning	EC	—	—	—	See label for phytotoxicity
<b>Shore Flies</b>						
Azadirachtin	caution	EC	—	—	—	All crops
Cyromazine	caution	75WP	—	—	—	All crops
Diflubenzuron	caution	—	—	—	25WSB	See label
Fenoxycarb	caution	25WP	0.6A	—	—	All crops
Pyriproxyfen	caution	.86EC	—	—	—	See label
<b>Slugs, Snails</b>						
Metaldehyde	caution	—	—	—	bait	All crops
<b>Sowbugs</b>						
Cyfluthrin	warning	20WP	—	—	—	See label
<b>Spider Mites (<a href="https://www.pubs.ext.vt.edu/2909/2909-1414/spider-mites/index.html">https://www.pubs.ext.vt.edu/2909/2909-1414/spider-mites/index.html</a>)</b>						
Abamectin	warning	0.15EC	—	—	—	See label
Acequinocyl	caution	15SC	—	—	—	See label. Two-spotted spider mite.
Azadirachtin	caution	70	—	—	—	All crops
Bifenazate	caution	50SP	—	—	—	All crops
Bifenthrin	warning	.667 F	A	—	—	Greenhouse-grown ornamentals.
Chlorfenapyr	caution	2S	—	—	—	All crops
Clofentezine	caution	5SC	—	—	—	All crops
Cyflumetofen	caution	1.67SC	—	—	—	See label
Etoxazole	caution	5WDG	—	—	—	See label for resistance management
Fenazaquin	warning	200SC	—	—	—	All crops.
Fenpropathrin	warning	2.4EC	1A	—	—	See label
Fenpyroximate	warning	5SC	—	—	—	Labeled for other mite species
Fluvalinate	caution	22.3F	—	—	—	See label
Hexythiazox	caution	50DF	—	—	—	See label
Insecticidal soap	warning	25EC	—	—	—	Formulations vary; see label
Pyrethrins	caution	—	A	—	—	See label
Pyridaben	danger	75WP	—	—	—	See label
Spinosad	caution	SC	—	—	—	See label for rate range
Spiromesifen	caution	4F	—	—	—	See label for species
Spirotetramat	caution	240SC	—	—	240SC	Soil application as drench
Ultra-fine oil	caution	—	—	—	—	See label for rate
<b>Springtails (<a href="https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/ENTO/ENTO-23/ENTO-262.pdf">https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/ENTO/ENTO-23/ENTO-262.pdf</a>)</b>						
Bifenthrin	warning	.667F	—	—	—	See label
<b>Thrips (<a href="https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-281/ENTO-373.pdf">https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-281/ENTO-373.pdf</a>)</b>						
Abamectin	caution	0.15EC	—	—	—	All crops
Acephate	caution	75WP, 97	3A	—	—	All crops
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label
Azadirachtin	caution	EC	—	—	—	All crops

Table 6.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group						
Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks <sup>1</sup>
<b>Thrips (<a href="https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-281/ENTO-373.pdf">https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-281/ENTO-373.pdf</a>) continued</b>						
<i>Beauveria bassiana</i>	caution	22WP, EC	—	—	—	All crops
Bifenthrin	warning	.667 F	—	—	—	See label
Chlorfenapyr	caution	2S	—	—	—	All crops
Cyantraniliprole	warning	SC	—	—	—	See label
Cyclaniliprole	caution	EC	—	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG, 2G	Soil application as drench, granules
Fenoxycarb	caution	25WP	A	—	—	All crops
Fenpropathrin	warning	—	1A	—	—	
Flonicamid	caution	SG	—	—	—	See label for rate range
Fluvalinate	caution	2AF	—	—	—	All crops
Imidacloprid	caution	II	—	—	1%G,60WP	See label
<i>Isaria fumosorosea</i>	non toxic	—	—	—	—	See label
Lambda-cyhalothrin	caution	10WSP	—	—	—	All crops
Novaluron	caution	10SC	—	—	—	See label for listed species
Pyridalyl	caution	35WP	—	—	—	See label for special instructions
Pyrifluquinazon	caution	1.80SC	—	—	—	See label. Chili thrips only.
Spinetoram + Sulfoxaflor	caution	SC	—	—	—	See label for precautions and restrictions
Spinosad	caution	11.6SC	—	—	—	All crops
Spirotetramat	caution	240SC	—	—	240SC	Soil application as drench
Thiamethoxam	caution	25WG	—	—	25WG	See label
Tolfenpyrad	warning	EC	—	—	—	See label for phytotoxicity
<b>Whiteflies (<a href="https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-280/ENTO-378.pdf">https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-280/ENTO-378.pdf</a>)</b>						
Abamectin	caution	0.15E	—	—	—	See label
Acephate	caution	75SP	3A	—	—	All crops
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label
Afidopyropen	caution	0.83DC	—	—	—	Do not reapply within 7 days of last application
Azadirachtin	caution	EC	—	—	—	All crops
<i>Beauveria bassiana</i>	caution	22WP, ES	—	—	—	See label
Bifenthrin	warning	.667 F	A	—	—	Greenhouse-grown ornamentals
Buprofezin	caution	70WSP	—	—	—	All crops
Cyantraniliprole	warning	SC	—	—	SC	See label. Foliar and soil applications
Cyclaniliprole	caution	EC	—	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Diflubenzuron	caution	25WSB	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG, 2G	Soil application as drench, granules
Fenazaquin	warning	200SC	—	—	—	All crops, see label for phytotoxicity
Fenoxycarb	caution	25WP	0.6A	—	—	All crops
Fenpropathrin	warning	2.4EC	1A	—	—	See label
Flonicamid	caution	SG	—	—	—	See label for rate range
Flupyradifurone	caution	1.67SC	—	—	—	See label. Only one application per crop cycle
Fluvalinate	caution	2F	—	—	—	All crops
Imidacloprid	caution	II	—	—	1%G, 60WP	See label

Table 6.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group						
Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks <sup>1</sup>
<b>Whiteflies (<a href="https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-280/ENTO-378.pdf">https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-280/ENTO-378.pdf</a>) continued</b>						
Insecticidal soap	caution	L	—	—	—	See label
<i>Isaria fumosorosea</i>	non toxic	—	—	—	—	See label
Kinoprene	caution	II	—	—	—	See label
Novaluron	caution	10SC	—	—	—	See label for listed species
Permethrin	caution	3.2EC	—	—	—	See label for sensitive plants
Pymetrozine	caution	50WG	—	—	—	All crops; spray and drench applications
Pyrethrins	caution	—	A	—	—	See label
Pyridaben	danger	75WP	—	—	—	See label
Pyriproxyfen	caution	.86EC	—	—	—	See label
Spinetoram + Sulfoxaflor	caution	SC	—	—	—	See label for precautions and restrictions
Spiromesifen	caution	4F	—	—	—	See label for species
Spirotetramat	caution	240SC			240SC	Soil application as drench
Thiamethoxam	caution	25WG			25WG	See label
Tolfenpyrad	warning	EC	—	—	—	See label for phytotoxicity

<sup>1</sup>Be sure to check precautions for phytotoxicity for each pesticide in table.

Table 6.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions & Remarks
<b>Abamectin</b> (Avid) aphids, leafminers, eriophyid and spider mites, thrips, whiteflies	0.15EC	2.0-4.0 fl oz	0.75-1.5 T	0.75-1.5 t	Generic products exist. See label. Sirocco also contains bifentazate. See label for rate. 12-hr REI. SIGNAL WORD - WARNING
<b>Acephate</b> (Orthene) aphids, leafroller, mealybugs, scale crawler, thrips, whitefly	75SP	See label for rates.	See label for rates.	See label for rates.	Repeated applications may cause phytotoxicity. See label for rate and species list. Generics exist. 24-hr REI. SIGNAL WORD - CAUTION
<b>Acephate</b> (1300 Orthene TR) aphids, leafroller, mealybugs, scale crawler, thrips, whitefly	12% aerosol	—	—	—	Apply 5-10 seconds/100 sq ft. Do not use under high temperature and humidity conditions or where gas heating systems are unvented. See label for sensitive plant list. 24-hr REI. SIGNAL WORD - CAUTION
<b>Acequinocyl</b> (Shuttle) spider mites	15SC	3.2-6.4 fl oz	1.25-2.5 T	1.25-2.5 t	Do not use on miniature roses or impatiens. Use low rate on standard roses. See label for resistance management. 12-hr REI. SIGNAL WORD - CAUTION
<b>Acetamiprid</b> (Tristar) aphids, mealybug, leafhopper, whiteflies, thrips, scales, fungus gnat larvae, leafminers, caterpillars	70WSP, 30SG	See label for rates.	See label for rates.	See label for rates.	See label for restrictions. 70WSP in water soluble packets. 12-hr REI. SIGNAL WORD - CAUTION
<b>Afidopyropen</b> (Ventigra) aphids, whiteflies	0.83DC	See label for rates	See label for rates	See label for rates	See label for resistance management, restrictions, and precautions. 12-hr REI. SIGNAL WORD - CAUTION
<b>Azadirachtin</b> (Azatin, Aza-Direct and others) aphids, caterpillars, leafminers, mealybugs, thrips, whiteflies	various	See label for rates.	See label for rates.	See label for rates.	Product is available at several concentrations and sold under many trade names. 4-hr REI. SIGNAL WORD - CAUTION
<b>Bacillus thuringiensis subsp. israelensis</b> (Gnatrol) fungus gnats	AS	1.0-4.0 pts	3.0-13.0 oz	2.0-8.0 T	Consult label for proper rate. Use 3 weekly applications for heavy infestations. 4-hr REI. SIGNAL WORD - CAUTION
<b>Bacillus thuringiensis subsp. kurstaki</b> (Dipel) caterpillars, loopers, budworm, omnivorous leafroller, armyworm	various	See label for rates.	See label for rates.	See label for rates.	Many formulations exist. Check rate and use labeled rate only. Use full coverage foliar spray when larvae are small. Use lower rate for light infestations. 4-hr REI. SIGNAL WORD - CAUTION
<b>Beauveria bassiana strain GHA</b> (BotaniGard, Mycotrol) aphids, mealybugs, thrips, whiteflies	22WP, ES	See label for rates.	See label for rates.	See label for rates.	A mycoinsecticide. See label for rate for each pest.
<b>Beauveria bassiana strain PPRI 5339</b> (Velifer) aphids, mealybugs, mites, thrips, whiteflies	Oil dispersion	1.5-6.5 fl oz	—	—	12-hr REI. SIGNAL WORD - CAUTION
<b>Bifentazate + Abamectin</b> (Sirocco) spider mites	50SP	1.0-2.0 oz	—	—	See label for species controlled. Do not use in successive applications. See label for rate. 12-hr REI. SIGNAL WORD - CAUTION
<b>Bifenthrin</b> (Attain) armyworms, caterpillars, mealybugs, leafrollers, plant bugs, scale, mites, whiteflies	0.5%/A	1 lb can/3000 sq ft			Generic products exist. See label for total release directions. 12-hr REI. SIGNAL WORD - CAUTION
<b>Abbreviations:</b> AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)					
<b>Useful Equivalents</b> 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt					

Table 6.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names continued					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions & Remarks
<b>Bifenthrin</b> (Talstar) whiteflies, mealybugs, spider mites, leafroller, armyworms	0.667F	4.0-20.0 oz	0.8-4.0 oz	2.0-6.0 t	Apply as full-coverage foliar spray. Repeat as necessary. Do not handle plants till dry. Rate depends on pest. 12-hr REI. SIGNAL WORD - CAUTION
<b>Buprofezin</b> (Talus) leafhoppers, mealybugs, planthoppers, scales, whiteflies	70WSP	—	—	—	Consult label for proper rate. Sold in water-soluble bags. 12-hr REI. SIGNAL WORD - CAUTION
<b>Chlorfenapyr</b> (Pylon) spider mites, cyclamen mites, thrips, caterpillars, foliar nematodes	2S Aerosol	1.3-2.6 fl oz See label for rates	1.5-3.0 t	0.5-1.0 t	Labeled for greenhouse ornamentals. See label for thrips rate. 12-hr REI. SIGNAL WORD - CAUTION
<b>Clofentezine</b> (Novato) spider mites	5SC	1.0 oz	—	—	One application per crop cycle. Apply at first sign of mite activity. 12-hr REI. SIGNAL WORD - CAUTION
<b>Cyantranilprole</b> (Mainspring) Lace bugs, leaf-feeding caterpillars, soft scales, thrips and whiteflies	SC	—	—	—	See label for rates. Foliar spray or drench. 4-hr REI. SIGNAL WORD - WARNING
<b>Cyclanilprole</b> (Sarisa) leaf-feeding caterpillars and beetles, leafminers, whiteflies	SC	—	—	—	See labels for rates. 4-hr REI. SIGNAL WORD - CAUTION
<b>Cyclanilprole + Flonicamid</b> (Pradia) aphids, caterpillars, mealybugs, soft scales, psyllids, thrips	SC	5.0-8.7 fl oz	—	—	12-hr REI. SIGNAL WORD - CAUTION
<b>Cyflumetofen</b> (Sultan) spider mites	18.7SC	6.85 fl oz	—	—	See label. 12-hr REI. SIGNAL WORD - CAUTION
<b>Cyfluthrin</b> (Decathlon) caterpillars, lace bug, aphids, leafrollers, mealybugs, thrips, whiteflies, sowbugs	20WP	3.0-4.5 T	2.0-3.0 t	0.75-1.0 t	Addition of a spreader-sticker may improve control. Discus contains imidacloprid. See label. 12-hr REI. SIGNAL WORD - WARNING
<b>Cyfluthrin + Imidacloprid</b> (Discus) aphids, mealybugs, caterpillars	EC	12-25 fl oz	—	—	See label for additional pest targets. 12-hr REI. SIGNAL WORD - CAUTION
<b>Cyromazine</b> (Citation) Leafminers, fungus gnats, shore flies	75WP	1.33 oz	—	—	Apply as foliar spray or drench; will not control adults. Sold in water-soluble pouches. SIGNAL WORD - CAUTION
<b>Diflubenzuron</b> (Adept, Dimilin) armyworms, fungus gnats, leafminers, shore flies, whiteflies	25SC	—	—	—	Read label before using as a drench. Under cover uses are registered. Sold in water soluble bags. Rates differ for foliar feeders. Do not use on poinsettia, hibiscus or Reiger begonia 12-hr REI. SIGNAL WORD - CAUTION
<b>Dinotefuran</b> (Safari) aphids, scale, Japanese beetles, leafminers, mealybugs, thrips, whiteflies	20SG 2G	See label for rates.	See label for rates.	See label for rates.	For foliar insects. Apply as foliar spray or soil applications as drenches. See label for scale species. See label for vegetable transplant use. Do not apply while bees are foraging, or to flowers where bees may forage (See "Bee advisory" box on label). 12-hr REI. SIGNAL WORD - CAUTION
<b>Abbreviations:</b> AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)					
<b>Useful Equivalents</b> 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt					



Table 6.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names continued					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions & Remarks
<b>Etoxazole</b> (TetraSan, Beethoven)	5WDG Aerosol	See label for rates.	—	—	Etoxazole is sold in water soluble packets. 12-hr REI. SIGNAL WORD - CAUTION
<b>Fenazaquin</b> (Magus) mites, whiteflies	200SC	6.0-12.0 fl oz	2.2-4.5 T	2.0 t -1.5 T	Maintain agitation during mixing. One application per crop cycle. Do not apply to roses. 12-hr REI. SIGNAL WORD - WARNING.
<b>Fenoxycarb</b> (Preclude) whiteflies, soft scales, fungus gnats, shore flies, lepidopterous leaf miners, and thrips	0.6A	5-10seconds/100 sq ft	—	—	See label for dosage for specific pest; WP sold in 1.0 oz pouches. Insect growth regulator. 12-hr REI. Signal Word - CAUTION
<b>Fenpropathrin</b> (Tame) aphids, beet armyworm, leafhoppers, mealybugs, mites, whiteflies, Japanese beetle	2.4EC, 1A Aerosol	2.67-8.0 oz	1.0-3.0 T	1.0-3.0 t	See label for dosage for specific pest, and for mixing instructions. Aerosol formulation contains acephate. 24-hr REI. SIGNAL WORD - WARNING
<b>Fenpyroximate</b> (Akari) spider mites	5SC	8.0-12.0 oz	3.0-4.5 T	1.0-1.5 T	See label for resistance management. 12-hr REI. SIGNAL WORD - WARNING
<b>Flonicamid</b> (Aria) aphids, mealybugs, thrips, whiteflies	SG	See label for rates			Each packet contains 20g of product. Registered for greenhouse and interiorscapes. 12-hr REI. SIGNAL WORD - CAUTION
<b>Flupyradifurone</b> (Altus) aphids, mealybugs, whiteflies	1.67SC	—	See label for soil and foliar rates	—	Apply as a foliar spray or soil drench. 12-hr REI. SIGNAL WORD - CAUTION
<b>Fluvalinate</b> (Mavrik) aphids, thrips, mites, whiteflies, leaf-feeding caterpillars	2AF	2.0-5.0 fl oz	1.0 T-2.5 T	1.0 t-2.5 t	May repeat at 5- to 10-day intervals if needed. See label for precautions. 12-hr REI. SIGNAL WORD - CAUTION
<b>Hexythiazox</b> (Hexygon) spider mites	50DF	See label for rates	See label for rates	See label for rates	Rates differ for high- and low-volume applications. 12-hr REI. SIGNAL WORD - CAUTION
<b>Imidacloprid</b> (Marathon) aphids, thrips and whiteflies	1%G, 60 WP, II	See label for rates	See label for rates	See label for rates	Generic products exist. Do not over irrigate following application. Do not apply while bees are foraging, or to flowers where bees may forage (See "Bee advisory" box on label). 12-hr REI. SIGNAL WORD - CAUTION
<b>Isaria fumosorosea strain 97</b> (Ancora) <b>FE 9901</b> (NoFly) aphids, mealybugs, thrips, whiteflies	Oil suspension	—	—	—	See labels for rates and additional pest targets. 12-hr REI. SIGNAL WORD - CAUTION
<b>Insecticidal soap</b> (Various product names) aphids, mealybugs, mites, scale insects	50.5EC	4.0-10.0 pt	0.8-2.0 pts	8.0-20.0 T	See label. Repeated applications of high rates may cause plant damage. Numerous formulations are available. 12-hr REI.
	25EC	2.0 gal	50.0 oz	15.0 oz	
<b>Kinoprene</b> (Enstar) aphids, fungus gnats, mealybugs, scales, whitefly	II	2.5-5.0 oz	2.5-5.0 t	0.75-1.5 t	See label for usage directions. Labeled for carnations, mums, roses. Foliage should be dry. Fogging rate - 1 oz/3,000 cu ft 4-hr REI. SIGNAL WORD - WARNING
	Fog				
<b>Abbreviations:</b> AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)					
<b>Useful Equivalents</b> 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt					

Table 6.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names continued					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions & Remarks
<b>Lambda-cyhalothrin</b> (Scimitar) adult leaf miners, armyworms, brown soft scale, caterpillars, mealybugs, spider mites, thrips, whiteflies	GC	0.75-2.5 oz	—	—	Generic products exist. See label for rates. 24-hr REI. SIGNAL WORD - CAUTION
<b>Metaldehyde</b> (Deadline, Metarex) slugs, snails	3.25% pellets	1.0 lb/1,000 sq ft			Apply bait only to soil surface around plants, not foliage or other plant parts. 12-hr REI. SIGNAL WORD - CAUTION
<b>Metarhizium brunneum</b> <b>strain F52</b> (Met52) weevils and thrips	Oil suspension	—	—	—	See labels for rates and additional pest targets. 4-hr REI. SIGNAL WORD - CAUTION
<b>Methoxyfenozide</b> (Intrepid) caterpillars	2F	See label for rates	See label for rates	See label for rates	4-hr REI. SIGNAL WORD - CAUTION
<b>Novaluron</b> (Pedestal) thrips, caterpillars, whiteflies, leafminers	10SC	3.0-4.0 fl oz	4.0-5.0 tsp	1.0-1.5 tsp	See label for precautions. Do not use on poinsettias. 12-hr REI. SIGNAL WORD - CAUTION
<b>Permethrin</b> (Perm-up, Astro) leafminers, caterpillars, aphids, fungus gnats, mealybugs	3.2EC	10.0 oz	2.0 oz	1.0 T	Apply as full-coverage foliar spray. Listed rate is for leafminers; lower rate for other pests. 12-hr REI. SIGNAL WORD - CAUTION
<b>Pymetozine</b> (Endeavor) aphids, whiteflies	50SP	1.25-2.5 oz	—	—	Only sold in water soluble packets. 12-hr REI. spray and drench applications SIGNAL WORD - CAUTION
<b>Pyrethrin</b> (X-clude) aphids, scale, mealybugs, spider mites, whiteflies	Aerosol	Use 5-10 second application for each 100 sq ft	Use 5-10 second application for each 100 sq ft	Use 5-10 second application for each 100 sq ft	See label. NO - REI. SIGNAL WORD - CAUTION
<b>Pyrethrins</b> (Pyreth-It, Pyrethrum) <b>+ oils</b> (Pycana) aphids, scales, mealybugs, mites, whiteflies	EC	—	—	—	See labels for rates and additional pest targets. 12-hr REI. SIGNAL WORD - CAUTION
<b>Pyridaben</b> (Sanmite) mites, whiteflies	75WP	1.0-3.0 oz	—	—	Sold in 1 oz pouches. See label for dosage for specific pest. 12-hr REI. SIGNAL WORD - DANGER
<b>Pyridalyl</b> (Overture) thrips, caterpillars	35WP	4.0 oz	—	—	Only sold in water-soluble packets. 12-hr REI.. SIGNAL WORD - CAUTION
<b>Pyrifluquinazon</b> (Rycar) Aphids, leafhoppers, chili thrips, mealybugs, whiteflies	20SC	—	—	—	See label. 12-hr REI. SIGNAL WORD - CAUTION
<b>Pyriproxyfen</b> (Distance, Pyrigro, Fulcrum) whiteflies, fungus gnats, shoreflies, scale	0.86 EC	3.0-6.0 fl oz	0.5-1.0 fl oz	1.0-2.0 t	See label for restrictions on application per cropping cycle. Rate differs for scale. 12-hr REI. SIGNAL WORD - CAUTION
<b>Spinetoram + Sulfoxaflor</b> (XXpire) aphids, lepidopterous larvae, mealybugs, plant bugs, thrips, whiteflies and scales	SC	1.0-1.75 oz	—	0.06-0.1 oz	See label for rates for target pests. 12-hr REI. SIGNAL WORD - CAUTION
<b>Abbreviations:</b> AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)					
<b>Useful Equivalents</b> 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt					

Table 6.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names continued					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions & Remarks
<b>Spinosad</b> (Conserve) thrips, spider mites, dipterous leafminers, dipterous gall midges, lepidopterous larvae, sawfly larvae, leaf-feeding beetles.	SC	3.0-11.0 fl oz	1.0-11.0 T	1.0-11.0 t	Compatible with IPM programs. See label for resistance management and rates for specific pests. 4-hr REI. SIGNAL WORD - CAUTION
<b>Spiromesifen</b> (Forbid, Judo, Savate) mites, whiteflies	4F	1.0-2.0 fl oz	1.2-2.4 t	0.38-0.75 t	See label for species and number of applications per season. Do not apply on geraniums, Peperomia, Dracoera, and 'Classy', 'Attache' or 'Vogue' varieties of roses. 12-hr REI. SIGNAL WORD - CAUTION
<b>Spirotetramat</b> (Kontos) aphids, whiteflies, mealybugs, spider mites	240SC	0.8 fl oz (25.0 ml)	0.2 fl oz (5.0 ml)	0.07 fl oz (2.0 ml)	See label for resistance management. Registered for vegetable transplants. Will not control heavy populations of spider mites. 24-hr REI. for sprays, no REI. for drench. SIGNAL WORD - CAUTION
<b>Steinernema feltiae</b> (Nemasys, NemaShield, others) gnats and thrips	Trays	—	—	—	See labels for rates and additional information.
<b>Tebufenozide</b> (Confirm) lepidopterous larvae	2E	2.0-8.0 oz	1.0-4.0 T	1.0-4.0 t	See label regarding spray adjuvants. 4-hr REI. SIGNAL WORD - CAUTION
<b>Thiamethoxam</b> (Flagship) aphids, whiteflies, mealybugs, soft scales	25WG	See label	—	—	See label for rate directly to soil or media. 12-hr REI. SIGNAL WORD - CAUTION
	.22G	See label	—	—	See label for granular product rate. 12-hr REI. SIGNAL WORD - CAUTION
<b>Tolfenpyrad</b> (Hachi-Hachi) aphids, leafhoppers, Lepidopteran early instars, scale, thrips, whitefly	15%EC	See label	—	—	See label for phytotoxicity. Rate for cuttings (cut flowers) is lower than other plants. 12-hr REI. SIGNAL WORD - WARNING
<b>Ultra-fine spray oil</b> (Various product names) aphids, leafminers, whiteflies, mites, scales, mealybugs	6E	0.5-1.0 gal	13.0-26.0 oz	4.0-7.5 oz	Applicator should conduct phytotoxicity tests. 4-hr REI. SIGNAL WORD - CAUTION
<p><b>Abbreviations:</b> AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)</p> <p><b>Useful Equivalents</b> 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt</p>					

# Floral Crops: Weed Control in Greenhouses

This chapter was not reviewed in 2021.

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## ■ Nonchemical Control

Hand-weeding and good sanitation are the safest ways to control weeds in greenhouses. Remove weeds from plugs or liners prior to planting. Use media that are free of weed seed or have been temporarily sterilized using steam or other methods. For steam sterilization of media, mix should be maintained at 180°F for at least 30 minutes. Some weed seed will not be controlled. Prevent weeds from flowering in and around the greenhouse. Allow the greenhouse to completely dry out between crops. Use concrete for the greenhouse floor. Clean up growing media that spill onto the floor.

## ■ Chemical Control

Most herbicides cannot be used in greenhouses due to the potential for chemical volatilization under high temperatures. Since greenhouses are enclosed structures, herbicide vapors are trapped around the crop and could cause severe injury. There are several herbicides that are registered for weed control under greenhouse benches. There are no preemergence herbicides registered for weed control in containers or flats located in a greenhouse. See the chapters on Home and Commercial Ornamentals for herbicides registered for annual and perennial flowers maintained outdoors.

**Table 6.7 - Nonselective Herbicides Registered for Weed Control Under Greenhouse Benches**

Chemical	Rate	Comments
Acetic Acid (Weed Pharm)	Rate Varies	Organic Control. For liverwort control, mix one part Weed Pharm to two parts water. For control of grasses and broadleaf weeds use full strength. Contact nonselective postemergence herbicide. Do not allow spray to contact desired plants.
Envoy Plus (clethodim)	0.5 fl oz + 1/3 fl oz nonionic surfactant/gal	Apply to weed foliage for control of annual bluegrass, crabgrass, bermudagrass, and other grassy weeds. Make sure that no ornamental grasses or other desired grasses are in the greenhouse. Will not control sedges or any broadleaf weed.
Finale (glufosinate)	1.5-4.0 fl oz/gal	Turn off air circulation fans during application. Contact nonselective herbicide with some systemic activity. No soil residual as it only has postemergence action.
Glyphosate (Roundup ProMax or other labeled formulations)	1.0-2.0 fl oz/gal check label for rates	Remove desired vegetation from the greenhouse and turn off air circulation fans prior to application. Systemic postemergence herbicide for control of all weeds. No soil residual action.
Marengo (indaziflam)	0.21-0.42 fl oz/1,000 sq ft	Apply to the floor of empty greenhouses for preemergence weed control. Add a labeled postemergence herbicide if there are emerged weeds. Irrigate after application and allow the area to dry before introducing plants in the greenhouse.
Reward (diquat)	0.75 fl oz + labeled rate of a nonionic surfactant/gal	Avoid spray drift to crops. Contact postemergence herbicide for control of all weeds. No residual action.
Scythe (pelargonic acid)	3.0%-7.0% solution	Avoid spray drift to crops. Contact postemergence herbicide for control of all weeds. No residual action. Has an odor that dissipates over time.