

## Floral, Nursery, and Landscape Diseases

## Fungicides and Bactericides for Disease Control of Greenhouse Floriculture Crops

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NOTE: Consult product label to ensure that the variety of ornamental plant that you wish to treat is listed on the label. Check for phytotoxicity by making trial applications on a smaller number of plants before you treat an entire crop.

Table 10-11. Disease Control of Annual, Perennial, Bedding, and Flowering Potted Plants in Greenhouses

Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Bacterial Leaf Spot (<i>Pseudomonas</i>, <i>Xanthomonas</i>)</b>		
<i>Bacillus subtilis</i> (Rhapsody, Cease)	2 to 8 qt/100 gal	Begin applications when conditions favor disease development prior to the onset of disease. Thorough coverage is essential. Repeat at 7-day intervals.
copper hydroxide  (Champ WG) (Nu-Cop) 50DF (CuPRO 2005)	0.5 lb/100 gal 1 lb/100 gal 0.75 to 2.0 lb/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals. Do not tank mix copper formulations with Aliette. Avoid contact with metal surfaces. Discoloration of blooms may occur on certain plant varieties- check label.
copper hydroxide + mancozeb (Junction)	1.5 to 3.5 lb/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals.
copper, metallic (Copper-Count-N)	1 qt/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals.
copper octanoate (Camelot O)	0.5 to 2.0 gal/100 gal	Begin at first sign of disease, and repeat at 7- to 10-day intervals. Camelot O may cause copper toxicity on some plant species.
copper sulfate pentahydrate (Phyton 27)	See label	See label.
didecyl dimethyl ammonium chloride (KleenGrow)	0.06 to 0.38 fl. oz. per gallon of water	Apply starting at week 3 or earlier if conditions are favorable for disease. Use a watering device to drench the top and bottom of the leaves and stems, avoiding flowers in full bloom, every 14 days to prevent the spread of spores and the build-up of organic material. Remove severely infected plants and disinfect the area with 1.0 fl. oz. KleenGrow per gallon of water.
<b>Black root rot (<i>Thielaviopsis basicola</i>)</b>		
etridiazole + thiophanate-methyl (Banrot) 40W	6 to 12 oz/100 gal	Apply in sufficient volume to saturate the soil mixture. Irrigate immediately. Repeat at 4- to 12-week intervals if necessary. Protects against <i>Thielaviopsis</i> and Pythium but is not as effective against <i>Thielaviopsis</i> as thiophanate-methyl only products that have a higher concentration of active ingredient.
fludioxonil (Medallion)	1 to 2 oz/100 gal	Apply as a preventive drench at seeding or transplanting. Make only one application to seeding crop. If needed, re-treat transplants 21 to 28 days after initial application. Do not apply as a seed or soil drench to impatiens or New Guinea impatiens.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F  (OHP 6672) 50WP, (T-Storm) 50WSB (SysTec 1998) FL (T-Storm Flowable), OHP 6672 (4.5L)	7.5 to 20 oz/100 gal 8 to 16 fl oz/100 gal  12 to 16 oz/100 gal 10 to 20 fl oz/100 gal 20 fl oz/100 gal	Apply as a heavy spray or drench at the rate of 1/2 to 2 pints per sq ft. Repeat at 4- to 8-week intervals. Apply 8 oz as a drench or directed spray after seeding, or apply 12 to 16 oz after transplanting. Repeat at 21- to 28-day intervals. Apply 1 to 3 pt/sq ft after transplanting to thoroughly soak growing medium. Repeat at 21- to 28-day intervals. Apply as heavy spray or drench at a rate of 1 to 2 pints per sq ft. Repeat at 2- to 4-week intervals. Apply as heavy spray or drench at a rate of 1 to 2 pints per sq ft. Repeat at 2- to 4-week intervals.
triflumizole (Terraguard) 50W	1 to 4 oz/100 gal	Apply as soil drench at 2- to 4-week intervals. Use higher rate under heavy disease pressure.
<b>Botrytis Blight</b>		
azoxystrobin (Heritage)	4 to 8 oz/100 gal	Apply every 7 to 21 days prior to infection. Do not exceed 2 oz/100 gal on impatiens, pansy, or viola. Do not make more than three sequential applications before switching to a nonstrobilurin fungicide.
<i>Bacillus subtilis</i> (Rhapsody, Cease)	2 to 8 qt/100 gal	Repeat at 7-day intervals. Thorough coverage is essential. Begin applications when conditions favor disease development prior to the onset of disease.
chlorothalonil (Chlorothalonil DF) (Chlorothalonil 500ZN) (Chlorothalonil 720 SFT) (Chlorostar VI, Daconil Weather Stik, Echo 720, Manicure 6F) (Daconil Ultrex) 82.5WDG (Echo) 90DF, (Echo Ultimate) (Exotherm Termil)	See label 1.9 pt/100 gal 1.37 pt/100 gal 1 3/8 pt/100 gal  1.4 lb/100 gal 1.25 lb/100 gal 1 can/1,000 sq ft	Repeat at 7- to 14-day intervals. Apply to foliage or flowers when plants are dry or nearly dry. Discontinue applications prior to bract formation on poinsettia. Rotate with fenhexamid, iprodione, or fludioxonil.  On rose, use 1 pt/100 gal.  On rose, use 1 lb/100 gal. On rose, use 0.78 lb/100 gal (Echo 90) DF or 0.9 lb/100 gal (Echo Ultimate). See label for method of application.
chlorothalonil + thiophanate-methyl (Spectro) 90WDG	1 to 2 lb/100 gal	Minimum re-treat interval is 7 days. Do not apply to green or variegated pittosporium or schefflera more than once.
(Consyst WDG, TM/C WDG)	0.75 to 1.5 lb/100 gal	Repeat every 7 to 10 days as needed during disease period.
copper hydroxide  (Champ WG) (Nu-Cop) 50DF (CuPRO 2005)	0.5 lb/100 gal 1 lb/100 gal 0.75 to 2 pounds/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals. Do not tank mix copper formulations with Aliette. Avoid contact with metal surfaces. Discoloration of blooms may occur on certain plant varieties- check label. See label for rate on Easter Lily.
copper hydroxide + mancozeb (Junction)	1.5 to 3.5 lb/100 gal	Repeat at 7- to 14-day intervals.
copper, metallic (Copper-Count-N)	1 qt/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals.
copper octanoate (Camelot O)	0.5-2.0 gal/100 gal	Begin at first sign of disease, and repeat at 7- to 10-day intervals. Camelot O may cause copper toxicity on some plant species.
copper sulfate pentahydrate (Phyton 27)	See label	See label.

**Table 10-11. Disease Control of Annual, Perennial, Bedding, and Flowering Potted Plants in Greenhouses**

Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Botrytis Blight (continued)</b>		
cyprodinil + fludioxonil (Palladium)	4 to 6 oz/100 gal	Spray on a 7-14 day interval while conditions are conducive to disease development. After two applications, alternate with another fungicide with a different MOA for two applications. Cautionary statement on label for applications to Geraniums, Impatiens and New Guinea Impatiens.
dichloran (Botran) 75W	1 lb/150 to 200 gal See label	Apply to stock cuttings or greenhouse plants. Begin when disease is anticipated or first appears. Spray foliage and flowers at 7- to 14-day intervals.
fenhexamid (Decree) 50WDG	0.75 to 1.5 lb/100 gal	RESISTANCE TO THIS CHEMICAL HAS BEEN REPORTED IN BOTRYTIS. Avoid making more than two consecutive applications of this product. Treat at 7- to 14-day intervals. Rotate with chlorothalonil, copper, mancozeb, or iprodione. Make trial application before treating poinsettia.
fludioxonil (Medallion) 50WSP	2 to 4 oz/100 gal	Spray to runoff. Repeat at 7- to 14-day intervals. Use no more than two consecutive applications before switching to another fungicide with a different mode of action. Do not use after bract formation on poinsettia. Foliar applications on impatiens, New Guinea impatiens, and some geranium cultivars may cause stunting or chlorosis, especially on young plants.
iprodione (Chipco 26019 N/G) (18 Plus, Iprodione Pro 2SE)	1.0 to 2.5 lb/100 gal 1 to 2.5 qt/100 gal	Spray to ensure thorough coverage. Repeat at 7- to 14-day intervals. Do not make more than four applications per year. Do not apply to Spathiphyllum. Do not apply as a soil drench on impatiens or pothos.
iprodione + thiophanate-methyl (26/36)	33 to 84 fl oz/100 gal	Spray to ensure thorough coverage. Repeat at 7 to 14 day intervals. Do not use as a drench on impatiens or pothos. Do not use on Spathiphyllum.
mancozeb (Dithane) 75DF, (Fore) 80WSP, (Mancozeb DG) (Pentathlon DF) (Pentathlon LF) (Protect DF)	1.5 lb/100 gal 1 to 2 lb/100 gal 0.8 to 1.6 qt/100 gal 1 to 2 lb/100 gal 1 to 2 bags/100 gal	Do not use on French dwarf or signet-type marigolds. Begin at first sign of disease. Repeat at 7- to 10-day intervals. Most effective when applied prior to infection. Not for use on marigold. Begin at first sign of disease. Repeat at 7- to 10-day intervals. Begin at first sign of disease. Repeat at 7- to 10-day intervals. To improve performance, add 2 to 4 oz of an effective spreader-sticker. Apply at 7- to 21-day intervals.
mancozeb + myclobutanil (MANhandle)	2 lb/100 gal	Addition of Latron B-1956 will improve performance. Apply at 7- to 10-day intervals.
polyoxin D zinc salt (Endorse 2.5WP)	1.1 to 2.2 lb/100 gal	Apply as a foliar spray every 7 to 10 days. Apply prior to disease development and when conditions are conducive for disease.
pyraclostrobin + boscalid (Pageant Intrinsic)	12 to 18 oz/100 gal	Apply prior to disease development. Repeat at 7- to 14-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.
thiophanate-methyl + mancozeb (Zyban) 79WSB	4 bags/100 gal (24 oz/100 gal)	Do not use on French marigold or gloxinia. Apply weekly.
trifloxystrobin (Compass O) 50WDG	2 to 4 oz/100 gal	Repeat at 7- to 14-day intervals until the threat of disease is over. Rotate to another nonstrobilurin fungicide after each application of Compass O. Make no more than four foliar applications per crop cycle or season.
triflumizole (Terraguard) 50W	4 to 8 oz/100 gal	Make initial application prior to or at first sign of disease. Repeat at 7- to 14-day intervals. Do not use on impatiens plugs.
<b>Bulb and Corm Rots (<i>Fusarium</i>, <i>Penicillium</i>)</b>		
iprodione (Chipco 26019 N/G) (18 Plus, Iprodione Pro 2SE)	2 lb/100 gal 2 qt/100 gal	Dip 5 minutes prior to storage.
didecyl dimethyl ammonium chloride (KleenGrow)	Immerse both crate and bulbs in a solution of 0.15 to 1.5 fl. oz. KleenGrow per gallon of water for 30 sec.	For control of Botrytis, Rhizoctonia, Fusarium and Penicillium bulb rots and other fungal and bacterial diseases of tulip, narcissus, gladiolus, crocus, dahlia, freesia, iris, lily, daylily, amaryllis, hyacinth, iris, scilla and ornamental onion. Remove from solution and allow to drain prior to planting or storage. Test solution regularly using QAC test strips, (La Motte #2949-BJ or equivalent). Add KleenGrow when necessary to maintain an a.i. concentration between 90 and 900 ppm.
iprodione + thiophanate-methyl (26/36)	66 fl oz/100 gal	Dip 5 minutes prior to storage.
thiabendazole (Merfect) 340-F	30 fl oz/100 gal	Clean and treat bulbs and corms within 24 to 48 hours of digging. Warm solution prior to dipping. Mix fresh solution per label guidelines. Dip bulbs 15 to 30 minutes and corms 15 minutes for <i>Fusarium</i> control, or dip bulbs 10 to 15 minutes for <i>Penicillium</i> (blue mold) control.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F (OHP-6672) 50WP, (T-Storm) 50WSB (T-Storm Flowable) (SysTec 1998) FL, (OHP 6672) 4.5L	14.5 to 33 fl oz/100 gal 12 to 16 fl oz/100 gal foliar spray; 16 to 24 fl oz/100 gal dip 16 to 24 oz/100 gal  12 to 16 oz/100 gal 20 fl oz/100 gal	Soak clean bulbs for 15 to 30 minutes in warm (80-85 degrees F) solution. Treat bulbs within 48 hours of digging. Dry well before storing.
<b>Cylindrocladium Stem Canker or Root Rot</b>		
chlorothalonil (Chlorothalonil DF) (Chlorothalonil 500ZN) (Chlorothalonil 720 SFT) (Chlorostar VI, Daconil Weather Stik, Echo 720, Manicure 6F) (Daconil Ultrex, Daconil Weatherstik) 82.5WDG (Echo) 90DF, (Echo Ultimate) (Exotherm Termil)	See label 1.9 pt/100 gal 1.37 pt/100 gal 1 3/8 pt/100 gal  1.4 lb/100 gal 1.25 lb/100 gal 1 can/1,000 sq ft	Repeat at 7- to 14-day intervals. Apply to foliage or flowers when plants are dry or nearly dry. See label for method of application.
chlorothalonil + thiophanate-methyl (Spectro) 90WDG	1.0 to 2.15 lb per 100 gallons	For best results use spray mixture the same day it is prepared. Spray uniformly over the area to be treated with a properly calibrated power sprayer, apply as a full coverage spray to run-off when conditions are favorable for disease development.

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Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Cylindrocladium Stem Canker or Root Rot (continued)</b>		
fludioxonil (Medallion) 50WSP	1 to 2 oz/100 gal	Completely drench the growing medium. Repeat at 21- to 28-day intervals. Two applications per year when conditions favor disease development are usually adequate for control.
pyraclostrobin + boscalid (Pageant Intrinsic)	12 to 18 oz/100 gal	Apply prior to disease development. Completely drench the growing medium. Repeat at 7- to 14-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray, as injury may occur.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F	7.5 to 20 fl oz/100 gal 8 to 16 fl oz/100 gal	Apply as drench or heavy spray at 0.5 to 2 pints per sq ft. Repeat at 4- to 8-week intervals. Apply 8 oz after seeding or sticking, or 12 to 16 oz after transplanting as a drench or directed spray at a rate that thoroughly soaks the growing media through the root zone. Repeat every 21 to 28 days.
(OHP-6672) 50W, (T-Storm) 50WSB	12 to 16 oz/100 gal	Apply as a drench or heavy spray at a rate of 1 to 3 pints per sq ft. Repeat at 21- to 28-day intervals.
(SysTec 1998) FL (T-Storm Flowable), (OHP 6672) 4.5L	10 to 20 fl oz/100 gal 20 fl oz/100 gal	Apply as a drench or heavy spray at a rate of 1 to 2 pints per sq ft. Repeat at 2- to 4-week intervals. Apply as a drench or heavy spray at a rate of 1 to 2 pints per sq ft. Repeat at 2- to 4-week intervals.
triflumizole (Terraguard) 50W	See label	Can be used as a cutting soak or soil drench.
<b>Downy Mildew</b>		
azoxystrobin (Heritage)	1 to 4 oz/100 gal 2 to 4 oz/100 gal (rose)	Apply every 7 to 14 days prior to infection. Do not apply 2-oz rate on less than 14-day intervals. May damage snapdragons; use 1 oz rate and rotate. Apply every 7 to 21 days on rose.
<i>Bacillus subtilis</i> (Rhapsody, Cease)	2 to 8 qt/100 gal	Repeat at 3- to 10-day intervals. Thorough coverage is essential. Begin applications when conditions favor disease development, prior to the onset of disease.
copper hydroxide  (Champ WG) (Nu-Cop) 50DF (CuPRO 2005)	0.5 lb/100 gal 1 lb/100 gal 0.75 to 2.0 lb/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals. Do not tank mix copper formulations with Aliette. Avoid contact with metal surfaces. Discoloration of blooms may occur on certain plant varieties; check label.
copper, metallic (Copper-Count-N)	1 qt/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals. To avoid phytotoxicity, do not use any copper compound on alyssum.
copper octanoate (Camelot O)	0.5-2.0 gal/100 gal	Begin at first sign of disease, and repeat at 7- to 10-day intervals. Camelot O may cause copper toxicity on some plant species.
copper sulfate pentahydrate (Phyton 27)	See label	See label. To avoid phytotoxicity, do not use any copper compound on alyssum.
cyazofamid (Segway)	2.1 to 3.5 fl oz/100 gal	14 to 21 day intervals using another registered fungicide with a different mode of action. Apply sufficient volume to wet all foliage until runoff (normally 50 to 100 gallons per acre).
dimethomorph (Stature SC)	6.12 to 12.25 oz/100 gal	Apply at first sign of disease. Apply to obtain complete coverage of flowers, foliage, and stems. Repeat at 10- to 14-day intervals throughout the production cycle.
dimethomorph + ametoctradin (Orvego)	11 to 14 fl oz/100 gal	Apply on 10 to 14 day intervals using another registered fungicide with a different mode of action. Apply sufficient volume to wet all foliage until runoff (normally 50 to 100 gallons per acre).
fenamidone (Fenstop)	7 to 14 fl oz/100 gal	Apply as a foliar spray until wet. Repeat as necessary on a 28-day schedule. Do not apply more than 2 applications per crop per season.
fluopicolide (Adorn)	1 to 4 fl oz/100 gal	Adorn MUST be tank mixed for resistance management with another product that is registered for use against the target disease.
fosetyl-AI (Aliette) 80WDG	1.25 to 4 lb/100 gal (bedding plants) 2.5 lb/100 gal (rose)	Systemic. Repeat as necessary, but do not make more than one application every 14 days.
mancozeb (Dithane) 75DF, (Fore) 80WSP, (Mancozeb DG) (Pentathlon DF) (Pentathlon LF) (Protect DF)	1.5 lb/100 gal 1 to 2 lb/100 gal 0.8 to 1.6 qt/100 gal 1 to 2 lb/100 gal 1 to 2 bags/100 gal	Repeat at 7- to 10-day intervals. Begin at first sign of disease. Repeat 7- to 10-day intervals. Begin at first sign of disease. Repeat 7- to 10-day intervals. To improve performance, add 2-4 oz of an effective spreader-sticker. Repeat at 7- to 21-day intervals.
mancozeb + copper hydroxide (Junction)	1.5 to 3.5 lb/100 gal	Begin applications at first sign of disease and repeat at 7- to 14-day intervals.
mancozeb + myclobutanil (Clevis, MANhandle)	16 oz/100 gal	Begin applications at first sign of disease and repeat at 7- to 10-day intervals. Limited trials have shown very good to excellent control of downy mildew on alyssum, stock, and snapdragon.
mandipropamid (Micora)	4 to 8 fl oz/100 gal	This product can also be used on vegetables sold to the retail market in GH with permanent flooring. Apply prior to disease development. Repeat sprays at 7- to 14-day intervals. Make no more than two sequential applications, then rotate to another fungicide with a different MOA.
mefenoxam (Subdue Maxx, Subdue Gr)	0.5 to 1 fl oz/100 gal See label for rates	Apply Subdue Maxx as a foliar spray or soil drench treatment. Apply Subdue GR as a soil surface or soil/planting media incorporation treatment.
phosphorous acid (Alude, Fosphite, Reliant)	See label for rates	Apply prior to disease development. Spray to thoroughly wet all foliage. Repeat at 14- to 21-day intervals.
polyoxin D zinc salt (Endorse 2.5WP)	1.1 to 2.2 lb/100 gal	Apply as a foliar spray every 7 to 10 days. Apply prior to disease development and when conditions are conducive for disease.
potassium phosphite (Vital)	4 pt/100 gal	Apply prior to disease onset, and repeat at 14-day intervals.
pyraclostrobin + boscalid (Pageant Intrinsic)	12 to 18 oz/100 gal	Apply prior to disease development. Repeat at 7- to 10-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.
thiophanate-methyl + mancozeb (Zyban)	1.5 lb/100 gal	Apply at first sign of disease, and repeat at 7-day intervals.
trifloxystrobin (Compass O) 50WDG	2 to 4 oz/100 gal	Apply as a foliar spray before disease is detected or when conditions are favorable for disease. Repeat at 7- to 14-day intervals until threat of disease is over.

**Table 10-11. Disease Control of Annual, Perennial, Bedding, and Flowering Potted Plants in Greenhouses**

Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Fungal Leaf Spots (Consult label for specific fungi controlled)</b>		
azoxystrobin (Heritage)	1 to 4 oz/100 gal	Repeat at 7- to 28-day intervals. Do not make more than three sequential applications before switching to a nonstrobilurin fungicide. Good control of <i>Alternaria</i> leaf spot.
<i>Bacillus subtilis</i> (Rhapsody, Cease)	2 to 8 qt/100 gal	Repeat at 7-day intervals. Thorough coverage is essential. Not effective on <i>Alternaria</i> .
chlorothalonil (Chlorothalonil DF) (Chlorothalonil 500ZN) (Chlorothalonil 720 SFT) (Chlorostar VI, Echo 720, Manicure 6 Flowable) (Daconil Ultrex) 82.5WDG (Echo) 90DF, (Echo Ultimate)	See label. 1.9 pt/100 gal 1.37 pt/100 gal 1 3/8 pt/100 gal 1.4 lb/100 gal 1.25 lb/100 gal	Repeat at 7- to 14-day intervals. Works well for control of <i>Alternaria</i> leaf spot. Discontinue applications prior to bract formation on poinsettias. Applications made during bloom may damage flowers. Apply to plants when both foliage and flowers are dry or nearly dry.
chlorothalonil + thiophanate-methyl (Spectro) 90WDG (Consyst WDG, TM/C WDG)	1 to 2 lb/100 gal 0.75 to 1 lb/100 gal	Apply when foliage and flowers are dry, or nearly dry. Repeat at 7-day intervals. Good control of <i>Colletotrichum</i> (anthracnose) and <i>Alternaria</i> . Not recommended for Swedish Ivy, Boston Fern, and Easter Cactus. Thorough, uniform coverage is essential for good control. Repeat in 7 to 10 days.
copper hydroxide (Champ WG) (Nu-Cop) 50DF (CuPRO 2005)	0.5 lb/100 gal 1 lb/100 gal 0.75 to 2.0 lb/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals. Do not tank mix copper formulations with Aliette. Avoid contact with metal surfaces. Discoloration of blooms may occur on certain plant varieties- check label.
copper hydroxide + mancozeb (Junction)	1.5 to 3.5 lb/100 gal	Repeat at 7- to 21-day intervals. Discoloration of foliage and/or blooms is possible on some varieties of azalea, carnation, chrysanthemum, and rose. Do not use on French marigold.
copper, metallic (Copper-Count-N)	1 qt/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals
copper octanoate (Camelot O)	0.5-2.0 gal/100 gal	Begin at first sign of disease, and repeat at 7- to 10-day intervals. Camelot O may cause copper toxicity on some plant species.
copper sulfate pentahydrate (Phyton 27)	See label	See label. To avoid phytotoxicity, do not use any copper compound on alyssum.
cyprodinil + fludioxonil (Palladium)	2 to 4 oz/100 gal	Spray on a 7-14 day interval while conditions are conducive to disease development. After two applications, alternate with another fungicide with a different MOA for two applications. Cautionary statement on label for applications to Geraniums, Impatiens and New Guinea Impatiens.
fludioxonil (Medallion)	1 to 2 oz/100 gal	Repeat at 7- to 14-day intervals. Good control of <i>Alternaria</i> leaf spot.
iprodione (Chipco 26019 N/G) (18 Plus, Iprodione Pro 2SE)	1.0 to 2.5 lb/100 gal 1 to 2.5 qt/100 gal	Spray plants to ensure thorough coverage. Repeat at 7- to 14-day intervals. Do not make more than 4 applications per crop per year. Do not drench impatiens or pothos. Do not use on Spathiphyllum. Good control of <i>Alternaria</i> leaf spot.
iprodione + thiophanate-methyl (26/36)	33 to 84 fl oz/100 gal	Spray plants to ensure thorough coverage. Repeat at 7- to 14-day intervals. Do not make more than 4 applications per crop per year. Do not drench impatiens or pothos. Do not use on Spathiphyllum.
mancozeb (Dithane) 75DF, (Fore) 80WSP, (Mancozeb DG) (Pentathlon DF) (Pentathlon LF) (Protect DF)	1.5 lb/100 gal 1 to 2 lb/100 gal 0.8 to 1.6 qt/100 gal 1 to 2 lb/100 gal	Do not use on French dwarf or signet-type marigolds. Begin at first sign of disease. Repeat at 7- to 10-day intervals. Most effective when applied prior to infection. Begin at first sign of disease. Repeat at 7- to 10-day intervals. Begin at first sign of disease. Repeat at 7- to 10-day intervals. To improve performance, add 2-4 oz of an effective spreader-sticker. Apply at 7- to 21-day intervals.
mancozeb + myclobutanil (Clevis, MANhandle)	1 to 2 lb/100 gal	Apply at first sign of disease, and repeat at 7- to 10-day intervals. The addition of Latron B-1956 will improve performance. Good control of <i>Alternaria</i> .
myclobutanil (Eagle) 20EW (Eagle) 40WP (Systhane) 40WSP	6 to 12 fl oz/100 gal 3 to 6 oz/100 gal 4 oz/100 gal	Apply at 10- to 14-day intervals, not to exceed 21 days. For chrysanthemums, see label for specific rates.
pyraclostrobin + boscalid (Pageant Intrinsic)	6 to 12 oz/100 gal	Apply prior to disease development. Repeat at 7- to 14-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.
polyoxin D zinc salt (Endorse 2.5WP)	2.2 lb/100 gal	Control of <i>Alternaria</i> blight, anthracnose ( <i>Colletotrichum</i> ), and <i>Curvularia</i> leaf spot. Apply as a foliar spray every 7 to 10 days. Apply prior to disease development and when conditions are conducive for disease.
tebuconazole (Torque)	4 to 8 fl oz/100 gal	Begin applications 14 to 21 days prior to when disease is expected, or at very first sign of disease.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F, (OHP 6672) 50WP, (T-Storm) 50WSB (SysTec 1998) FL, (T-Storm Flowable)	10 to 14.5 fl oz/100 gal 12 to 16 fl oz/100 gal 20 fl oz/100 gal	Begin applications 14 to 21 days prior to when disease is expected, or at very first sign of disease. Repeat at 7- to 10-day intervals. Poor control of <i>Alternaria</i> leaf spot. Begin when disease first appears and repeat at 7- to 14-day intervals. Begin when disease first appears and repeat at 10- to 14-day intervals.
triadimefon (Strike) 25WDG	2 to 4 oz/100 gal	Apply as needed at first sign of disease. Good control of <i>Alternaria</i> leaf spot.
trifloxystrobin (Compass O) 50WDG	1 to 4 oz/100 gal	Repeat at 7- to 14-day intervals until threat of disease is over. Rotate to another nonstrobilurin fungicide after each application. Good control of <i>Alternaria</i> leaf spot.
triflumizole (Terraguard) 50W	4 to 8 oz/100 gal	Apply at very first sign of disease. Do not use on impatiens plugs, and do not exceed 2 oz/100 gal for impatiens transplants. Repeat at 7- to 14-day intervals.
triconazole (Trinity) 19SC	4 to 12 fl oz/100 gal	See label as rate varies depending on fungal leaf spot pathogen. Use preventively. Begin applications when conditions favor fungal infection and before disease symptom development. Use of an adjuvant/spreader sticker can aid in control.

**Table 10-11. Disease Control of Annual, Perennial, Bedding, and Flowering Potted Plants in Greenhouses**

Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Fusarium Root and Crown Rot</b>		
azoxystrobin (Heritage)	1 to 4 oz/100 gal (directed spray)	Apply as a directed spray every 7 to 21 days.
azoxystrobin (Heritage)	0.2 to 0.9 oz/100 gal (drench)	Apply as a soil drench at 7-to 28 day intervals.
etridiazole + thiophanate-methyl (Banrot) 40W	6 to 12 oz/100 gal	Apply in sufficient volume to saturate the soil mixture. Irrigate immediately. Repeat at 4- to 12-week intervals if necessary.
pyraclostrobin (Empress Intrinsic)	1 to 6 fl oz/100 gal	Apply at 1 to 3 fl oz for plants in propagation, rooted cuttings, plugs and seedlings and at 2 to 6 fl oz to all other plants. Apply preventative to disease with sequential at 7 to 28 days after the first application if needed.
fludioxonil (Medallion)	1 to 2 oz/100 gal	Apply as a drench at seeding or transplanting. Make only one application to seeding crop. If needed, retreat transplants 21 to 28 days after initial application. See label for incorporation into potting mixture. Do not apply as a seed or soil drench to impatiens or New Guinea impatiens.
fludioxonil + mefenoxam (Hurricane) 48WP	See label	Apply as a pre-potting or growing media drench per label directions. Application to impatiens, New Guinea impatiens, pothos, geranium, and Easter lily may cause stunting and/or chlorosis.
pyraclostrobin + boscalid (Pageant Intrinsic)	12 to 18 oz/100 gal	Apply prior to disease development. Completely drench the growing medium. Repeat at 7- to 14-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray, as injury may occur.
<i>Streptomyces griseoviridis</i> (Mycostop)	See label	Apply inoculant as a seed dressing, soil drench spray, or transplant dip. Must be applied prior to onset of disease. See label.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F	7.5 to 20 fl oz/100 gal 8 to 16 fl oz/100 gal	Apply as a heavy spray or drench at a rate of 0.5 to 2 pints per sq ft. Repeat at 4- to 8-week intervals. Apply 8 oz as a drench or directed spray after seeding or sticking or 12 to 16 oz after transplanting. Repeat at 21- to 28-day intervals.
(OHP-6672) 50WP, (T-Storm) 50WSB (SysTec 1998) FL (T-Storm Flowable), (OHP 6672) 4.5L	12 to 16 oz/100 gal 10 to 20 fl oz/100 gal 20 fl oz/100 gal	Soak growing medium after transplanting. Repeat every 21 to 28 days. Apply as a drench or heavy spray at a rate of 1 to 2 pints per sq ft. Repeat at 2- to 4-week intervals. Apply as a drench or heavy spray at a rate of 1 to 2 pints per sq ft. Repeat at 2- to 4-week intervals.
triflumizole (Terraguard) 50W	4 to 8 oz/100 gal	Apply soil drenches weekly as needed. Use higher rate under heavy disease pressure.
triconazole (Trinity) 19SC	8 to 12 fl oz/100 gal	Use preventively. Begin applications when conditions favor fungal infection and before disease symptom development. The crown and base of the plant and the soil or potting medium surrounding the crown must be thoroughly covered.
<b>Myrothecium Leaf Blight, Crown, or Petiole Rot</b>		
azoxystrobin (Heritage)	1 to 4 oz/100 gal	Apply every 7 to 21 days. Do not exceed 2 oz per 100 gal on impatiens, pansy, or violas.
chlorothalonil (Chlorostar VI, Daconil Weather Stik, Echo 720, Manicure 6 Flowable) (Chlorothalonil DF) (Chlorothalonil 500 ZN) (Chlorothalonil 720 SFT) (Daconil Ultrex) 82.5WDG (Echo Ultimate)	1 3/8 pt/100 gal See label 1.9 pt/100 gal 1.37 pt/100 gal 1.4 lb/100 gal 1.25 lb/100 gal	Repeat applications at 7- to 14-day intervals.
cyprodinil + fludioxonil (Palladium)	2 to 4 oz/100 gal	Spray on a 7-14 day interval while conditions are conducive to disease development. After two applications, alternate with another fungicide with a different MOA for two applications. Cautionary statement on label for applications to Geraniums, Impatiens and New Guinea Impatiens.
fludioxonil (Medallion)	1 to 2 oz/100 gal	Spray to runoff at 7- to 14-day intervals. See label for media mix and drench applications. Drench applications to impatiens or New Guinea impatiens may cause stunting and/or chlorosis.
pyraclostrobin + boscalid (Pageant Intrinsic)	8 to 12 oz/100 gal	Apply prior to disease development. Repeat at 7- to 14-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.
triflumizole (Terraguard) 50W	4 to 8 oz/100 gal	Apply prior to or at first sign of disease. Repeat at 7- to 14-day intervals. Use higher rates for initial application under disease pressure. Do not use on impatiens plugs. Do not exceed 2 oz per 100 gallons on impatiens transplants.
triconazole (Trinity) 19SC	8 to 12 fl oz/100 gal	Use preventively. Begin applications when conditions favor fungal infection and before disease symptom development. Use of an adjuvant/spreader sticker can aid in control.
<b>Phytophthora Aerial Shoot Blight</b>		
azoxystrobin (Heritage)	1 to 2 oz/100 gal	Apply every 7 to 28 days. Do not make more than three sequential applications before switching to another effective fungicide with a different mode of action.
chlorothalonil + thiophanate-methyl (Spectro) 90 WDG	1 to 2 lb/100 gal	Apply when plants are dry. Spectro has protective and curative action. Repeat at 7-day intervals.
dimethomorph (Stature SC)	6.12 to 12.25 oz/100 gal	Begin spraying at first sign of disease. Use a full-coverage spray at 10- to 14-day intervals throughout production cycle.
dimethomorph + ametoctradin (Orvego)	14 fl oz/100 gal	Apply on 10 to 14 day intervals using another registered fungicide with a different mode of action. Apply sufficient volume to wet all foliage until runoff (normally 50 to 100 gallons per acre).
fenamidone (Fenstop)	7 to 14 fl oz/100 gal	Apply as a foliar spray until wet. Repeat as necessary on a 28-day schedule. Do not apply more than 2 applications per crop per season.
fluopicolide (Adorn)	1 to 4 fl oz/100 gal	MUST ALWAYS BE TANK MIXED WITH THE LABELED RATE OF ANOTHER FUNGICIDE WITH A DIFFERENT MODE OF ACTION. Apply before disease development. Use higher rate when treating plants with high potential for disease. Reapply after 14 to 28 days.
fosetyl-AI (Aliette) 80 WDG	1.25 to 4 lb/100 gal	Apply prior to disease development. Apply as a foliar spray. Repeat as necessary, but do not exceed one application every 14 days.
mandipropamid (Micora)	4 to 8 fl oz/100 gal	This product can also be used on vegetables sold to the retail market in GH with permanent flooring. Apply prior to disease development. Repeat at 7- to 14-day intervals. Make no more than two sequential applications before rotating to an alternate MOA.

**Table 10-11. Disease Control of Annual, Perennial, Bedding, and Flowering Potted Plants in Greenhouses**

Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Phytophthora Aerial Shoot Blight (continued)</b>		
phosphorous acid (Alude, Fosphite, Reliant)	See label for rates	Apply as a soil drench or foliar spray as a preventive.
potassium phosphite (Vital)	1 pt/100 gal	Apply preventatively as a soil drench or foliar spray.
pyraclostrobin + boscalid (Pageant Intrinsic)	18 oz/100 gal	Apply prior to disease development. Repeat at 7- to 10-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.
<b>Phytophthora or Pythium Root and Crown Rot</b>		
cyazofamid (Segway)	3.0 to 6.0 fl oz/100 gal	Apply ONLY to ornamentals grown in containers in greenhouses as a soil drench. Make applications on a 14- to 21-day interval using another registered fungicide with a different mode of action. Check label for recommended maximum drench volume based on pot diameter.
dimethomorph (Stature SC)	3.06 to 6.12 oz/50 to 100 gal	Apply when plant roots are well established, or at first sign of disease on 10- to 14-day intervals throughout production cycle. Use enough solution to wet root zone. Avoid watering plants for several hours after application. See label for rates for container-grown perennials and woody ornamentals. <b>Not effective against Pythium root rot.</b>
dimethomorph + ametoctradin (Orvego)	11 to 14 fl oz/100 gal	NOT LABELED FOR PYTHIUM. Apply on 10 to 14 day intervals using another registered fungicide with a different mode of action. Apply sufficient volume to wet all foliage until runoff (normally 50 to 100 gallons per acre).
dipotassium phosphonate + dipotassium phosphate (Biophos) 1% (v/v)	See label for rates	Apply as a soil drench or foliar spray as a preventive.
etridiazole (Truban) 30WP (TerraZole) 35WP	3 to 10 oz/100 gal 3.5 to 10 oz/100 gal	Apply in sufficient volume to saturate soil. Irrigate immediately. Repeat at 4- to 12-week intervals. Drench 4-in. pot with a minimum of 2 oz and a 6-in. pot with 4 oz. Re-treat at 4- to 12-week intervals. Use higher rates for peat or other high organic potting media.
etridiazole + thiophanate-methyl (Banrot) 40W	4 to 8 oz/100 gal	Apply in sufficient volume to saturate the soil mixture. Irrigate immediately. Repeat at 4- to 12-week intervals if necessary.
fenamidone (Fenstop)	7 to 14 fl oz/50 to 100 gal/400 sq ft	Apply as a drench using 1 to 2 pints per square foot. Repeat as necessary on a 28-day application schedule. Do not apply more than 4 applications of the maximum rate per crop per season. Higher rate has shown more consistent efficacy in research trials.
fludioxonil + mefenoxam (Hurricane) 48WP	See label	Apply as a pre-potting or growing media drench per label directions. Application to impatiens, New Guinea impatiens, pothos, geranium, and Easter lily may cause stunting and/or chlorosis.
fluopicolide (Adorn)	1 to 4 fl oz/100 gal	MUST ALWAYS BE TANK MIXED WITH THE LABEKED RATE OF ANOTHER FUNGICIDE WITH A DIFFERENT MODE OF ACTION. Apply before disease development. Use higher rate when treating plants with high potential for disease. Reapply after 14 to 28 days. Do not make more than one application per crop on poinsettia- phytotoxicity has been observed with repeat applications.
fosetyl-AI (Aliette) 80WDG	1.25 to 4 lb/100 gal	Apply as a foliar spray prior to disease development. Repeat as necessary, but do not exceed one application every 14 days.
mandipropamid (Micora)	4 to 8 fl oz/100 gal	This product can also be used on vegetables sold to the retail market in GH with permanent flooring. Apply prior to disease development. Repeat at 7- to 14-day intervals. Make no more than two sequential applications.
mefenoxam (Fenox ME, Mefenoxam 2, Subdue MAXX)	See label for rates	Can be applied as a drench, soil surface spray, or incorporated into the soil mix. Consult label for specific crops and applications.
phosphorous acid (Alude, FOSPHITE, Reliant)	See label for rates	Apply as a soil drench or foliar spray as a preventive.
potassium phosphite (Vital)	1 pt/100 gal	Apply preventatively as a soil drench or foliar spray.
propamocarb (Banol)	20 to 30 fl oz/100 gal	Apply at seeding or transplanting. See label. Effective for preventing Pythium infections.
pyraclostrobin (Empress Intrinsic)	1 to 3 fl oz/100 gal in propagation and 2 to 6 fl oz/100 gal for all other plants in production	Apply as a preventative drench – prior to onset of disease. Can be reapplied 7 to 28 days following the initial application.
<b>Powdery Mildew</b>		
azoxystrobin (Heritage)	1 to 4 oz /100 gal	Spray every 7 to 28 days as needed. To avoid fungicide resistance, do not make more than two sequential applications of Heritage before rotating with non-strobilurin products.
<i>Bacillus subtilis</i> (Rhapsody, Cease)	2 to 4 qt/100 gal	Repeat at 7-day intervals. Thorough coverage is essential. Begin applications when conditions favor disease development prior to the onset of disease.
chlorothalonil (Chlorostar VI, Daconil Weather Stik, Echo 720, Manicure 6 Flowable) (Chlorothalonil DF) (Chlorothalonil 500ZN)	1 3/8 pt/100 gal See label 1.9 pt/100 gal (1.6 pt/100 gal on rose)	Apply until runoff when flowers and foliage are dry. Repeat at 7- to 14-day intervals. Avoid applications during bloom where flower injury is unacceptable. Discontinue use on poinsettias prior to bract formation.
(Chlorothalonil 720 SFT) (Daconil Ultrex) 82.5WDG (Echo) 90DF, (Echo Ultimate)	1.37 pt/100 gal 1.4 lb/100 gal 1.25 lb/100 gal	
chlorothalonil + thiophanate-methyl (Spectro) 90WDG (ConSyst, TM/C) 50WDG	1 to 2 lb/100 gal 0.75 lb/100 gal	Apply when foliage and flowers are dry, or nearly dry. Re-treat at 7-day intervals. Repeat at 7- to 10-day intervals.
copper hydroxide (Champ WG) (Nu-Cop) 50DF (CuPRO 2005)	0.5 lb/100 gal 1 lb/100 gal 0.75 to 2.0 lb/100 gal	Begin at first sign of disease, and repeat at 7- to 14-day intervals. Do not tank mix copper formulations with Aliette. Avoid contact with metal surfaces. Discoloration of blooms may occur on certain plant varieties- check label.

**Table 10-11. Disease Control of Annual, Perennial, Bedding, and Flowering Potted Plants in Greenhouses**

Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Powdery Mildew (continued)</b>		
copper octanoate (Camelot O)	0.5-2.0 gal/100 gal	Begin at first sign of disease, and repeat at 7- to 10-day intervals. Camelot O may cause copper toxicity on some plant species.
copper sulfate pentahydrate (Phyton 27)	See label	See label. To avoid phytotoxicity, do not use any copper compound on allyssum.
cyprodinil + fludioxonil (Palladium)	4 to 6 oz/100 gal	Spray on a 7-14 day interval while conditions are conducive to disease development. After two applications, alternate with another fungicide with a different MOA for two applications.
mancozeb + myclobutanil (Clevis, MANhandle)	16 oz/100 gal	Begin at first sign of disease, and repeat at 7- to 10-day intervals. In a limited number of trials, gave excellent control of powdery mildew on rose.
myclobutanil (Eagle) 20EW (Eagle) 40WSP (Systhane) 40WSP	6 to 12 fl oz/100 gal 3 to 6 oz/100 gal 4 oz/100 gal	Apply at 10- to 14-day intervals. Use caution if applying to Gerbera daisy as phytotoxicity may occur.
neem oil (Triact 70)	1 gal/100 to 200 gal	Trial first on open blooms. Retreat at 7- to 14-day intervals. Use 1:200 rate as a preventive and 1:100 rate if disease is evident.
piperalin (Pipron) LC	4 to 8 fl oz/100 gal	See label for precautions on hydrangea, begonia, and poinsettia. Use high rate if disease is already present.
pyraclostrobin + boscalid (Pageant Intrinsic)	6 to 12 oz/100 gal	Apply prior to disease development. Repeat at 7- to 10-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.
potassium bicarbonate (Armcarb 100) (Kaligreen) (MilStop)	2 to 2.5 lb/100 gal 1 to 3 lb/100 gal 4 to 8 oz/100 gal	Apply every 10- to 14 days. Increase frequency to every 5 - to 7 days under heavy disease pressure. Begin at first sign of disease. Repeat at 7-10 day intervals. See label for precautions for poinsettia, impatiens, and pansy. Repeat at 7- to 14-day intervals.
polyoxin D zinc salt (Endorse 2.5WP)	1.1 to 2.2 lb/100 gal	Apply as a foliar spray every 7 to 10 days. Apply prior to disease development and when conditions are conducive for disease.
tebuconazole (Torque)	4 to 8 fl oz/100 gal	Begin applications 14 to 21 days prior to when disease is expected, or at very first sign of disease.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F, (OHP 6672) 50WP, (T-Storm) 50WSB ((SysTec 1998) FL, ((T-Storm Flowable)	10 to 20 fl oz/100 gal 12 to 24 oz/100 gal 10 fl oz/100 gal	Apply when disease first appears and repeat at 7- to 14-day intervals. Apply when disease first appears and repeat at 7- to 14-day intervals. Apply when disease first appears and repeat at 10- to 14-day intervals.
thiophanate-methyl + mancozeb (Zyban) 79W	4 bags/100 gal (24 oz/100 gal)	Repeat at weekly intervals.
triadimefon (Strike) 25WDG	2 to 4 oz/100 gal	Apply as needed at first sign of disease. Repeat at 14- to 21-day intervals. Not effective for powdery mildew control on verbena.
trifloxystrobin (Compass O) 50WDG	2 to 4 oz/100 gal	Good eradicant. Repeat at 7- to 14-day intervals. Rotate to another fungicide of nonstrobilurin chemistry after each Compass application. Use caution when applying to petunia, violets, and New Guinea impatiens due to possible phytotoxicity.
triflumizole (Terraguard) 50W	4 to 16 oz/100 gal	Use 16 oz/100 gal for initial applications of existing infections. Use 4 to 8 oz/100 gal for subsequent applications and preventative sprays. Do not exceed 2 oz/100 gal for impatiens transplants. Repeat at 7- to 14-day intervals.
triticonazole (Trinity) 19SC	6 to 12 fl oz/100 gal	Use preventively. Begin applications when conditions favor fungal infection and before disease symptom development. Use of an adjuvant/spreader sticker can aid in control.
<b>Rhizoctonia Aerial Blight</b>		
azoxystrobin (Heritage)	1 to 4 oz/100 gal	Repeat at 7- to 28-day intervals. Do not make more than three sequential applications before switching to a nonstrobilurin fungicide.
chlorothalonil (Chlorostar VI, Daconil Weather Stik, Echo 720, Manicure 6 Flowable) (Chlorothalonil DF, Chlorothalonil 720 SFT) (Chlorothalonil 500 ZN) (Daconil Ultrex) 82.5WDG (Echo Ultimate)	1 3/8 pt/100 gal  See label  1.9 pt/100 gal 1.4 lb/100 gal 1.25 lb/100 gal	Apply when foliage and flowers are dry. Repeat at 7- to 14-day intervals. Apply to hydrangea foliage only. Avoid application during bloom period on plants where flower injury is unacceptable.
chlorothalonil + thiophanate-methyl (Spectro) 90WDG	1 to 2 lb/100 gal	Re-treat at a minimum of 7-day intervals.
cyprodinil + fludioxonil (Palladium)	2 to 6 oz/100 gal	Spray on a 7 to 14 day interval while conditions are conducive to disease development. After two applications, alternate with another fungicide with a different MOA for two applications. Cautionary statement on label for applications to Geraniums, Impatiens and New Guinea Impatiens.
fludioxonil (Medallion)	1 to 2 oz/100 gal	Spray to runoff. Repeat at 7- to 14-day intervals until conditions no longer favor disease.
flutolanil (Contrast, Prostar) 70WSP	3 to 12 oz/100 gal	Apply at 14- to 21-day intervals.
iprodione (Chipco 26019 N/G) (18 Plus, Iprodione Pro 2SE)	1 to 2 lb/100 gal 1 to 2.5 qt/100 gal	Spray plants to ensure thorough coverage Repeat at 7- to 14-day intervals. Do not make more than four applications per crop per year. Do not use as a soil drench on impatiens or pothos. Do not use on Spathiphyllum.
iprodione + thiophanate-methyl (26/36)	33 to 84 fl oz/100 gal	Spray plants to ensure thorough coverage. Repeat at 7- to 14-day intervals. Do not make more than four applications per year. Do not use as a soil drench on impatiens or pothos. Do not use on Spathiphyllum.
pyraclostrobin (Empress Intrinsic)	1 to 3 fl oz/100 gal in propagation and 2 to 6 fl oz/100 gal for all other plants in production	Apply as a preventative drench – prior to onset of disease. Can be reapplied 7 to 28 days following the initial application.

**Table 10-11. Disease Control of Annual, Perennial, Bedding, and Flowering Potted Plants in Greenhouses**

Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Rhizoctonia Aerial Blight (continued)</b>		
pyraclostrobin + boscalid (Pageant Intrinsic)	12 to 18 oz/100 gal	Apply prior to disease development. Repeat at 7- to 14 day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.
polyoxin D zinc salt (Endorse 2.5WP)	1.1 to 2.2 lb/100 gal	Apply as a foliar spray every 7 to 10 days. Apply prior to disease development and when conditions are conducive for disease.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F	10 to 14.5 fl oz/100 gal 12 to 16 fl oz/100 gal	Apply when disease symptoms first appear. Repeat at 7- to 14-day intervals.
thiophanate-methyl + flutolanil (SysStar WDG)	4 to 8 oz/100 gal	For best results apply before disease development.
triflumizole (Terraguard) 50W	4 to 8 oz/100 gal	Make initial application prior to or at first sign of disease. Use the higher rate under heavy disease pressure. Repeat at 7- to 14-day intervals.
<b>Rhizoctonia Stem and Root Rot</b>		
azoxystrobin (Heritage)	1 to 4 oz/100 gal (spray) 0.9 oz/100 gal (drench)	Apply as a preventative spray or drench treatment. Repeat at 7 to 21 days. Do not exceed 2 oz/100 gal on impatiens.
chlorothalonil + thiophanate-methyl (Spectro) 90WDG	1 to 2 lb/100 gal	Spray uniformly over area to be treated. Re-treat at 7-day intervals.
etridiazole + thiophanate-methyl (Banrot) 40W	4 to 8 oz/100 gal	Apply in sufficient volume to saturate the soil mixture. Irrigate immediately. Repeat at 4- to 12-week intervals if necessary.
fludioxonil (Medallion)	1 to 2 oz/100 gal	Apply as a drench at seeding or transplanting. Apply sufficient mix to wet the upper one-half of the growing medium. Make only one application to seedling crop. If needed, re-treat transplants 21 to 28 days after initial application. Do not apply as a seed or soil drench to impatiens or New Guinea impatiens. May cause stunting or chlorosis on some geranium cultivars.
fludioxonil + mefenoxam (Hurricane) 48 WP	See label	Apply as a pre-potting or growing media drench per label directions. Labeled for Rhizoctonia and Phytophthora/Pythium root rots and is best used when both diseases are present or suspected.
flutolanil (Contrast, Prostar) 70WSP	3 to 6 oz/100 gal	Apply drench at 2 oz per 4-in. pot. Repeat 21 to 28 days after initial application. Make no more than four applications per year.
iprodione (Chipco 26019 N/G) (18 Plus, Iprodione Pro 2SE)	6.5 oz/100 gal 13 fl oz/100 gal	Apply 1 to 2 pints per sq ft at seeding or transplanting. Do not apply as a drench on impatiens or pothos. Repeat every 14 days. Do not make more than six applications per year. Do not use on Spathiphyllum.
iprodione + thiophanate-methyl (26/36)	13.5 fl oz/100 gal	Apply 1 to 2 pints per sq ft at seeding or transplanting. Do not apply as a drench on impatiens or pothos. Do not use on Spathiphyllum. Repeat every 14 days. Do not make more than 6 applications per year.
PCNB (Terraclor) 75WP	4 to 8 oz/100 gal	See label for amount to apply. One repeat application can be made 4 to 6 weeks later, if necessary.
polyoxin D zinc salt (Endorse 2.5WP)	1.1 to 2.2 lb/100 gal	Apply as a drench every 14 to 28 days.
pyraclostrobin (Empress Intrinsic)	1 to 3 fl oz/100 gal in propagation and 2 to 6 fl oz/100 gal for all other plants in production	Apply as a preventative drench – prior to onset of disease. Can be reapplied 7 to 28 days following the initial application.
pyraclostrobin + boscalid (Pageant Intrinsic)	12 to 18 oz/100 gal	Apply prior to disease development. Repeat at 7- to 21-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F  (OHP 6672) 50WP, (T-Storm) 50WSB (OHP 6672) 4.5L, (T-Storm Flowable)	7.5 to 20 fl oz/100 gal 8 to 16 fl oz/100 gal  12 to 16 oz/100 gal 20 fl oz/100 gal	Apply as a heavy spray or drench at a rate of 0.5 to 2 pints per sq ft. Repeat at 4- to 8-week intervals. Apply 8 oz as a drench or directed spray after seeding or 12 to 16 oz after transplanting. Repeat at 21- to 28-day intervals. Apply as a drench at a rate of 1 to 3 pints per sq ft after transplanting. Repeat at 21- to 28-day intervals. Apply as a drench or heavy spray at a rate of 1 to 2 pints per sq ft after transplanting. Repeat at 2- to 4-week intervals.
thiophanate-methyl + flutolanil (SysStar WDG)	2 to 4 oz/100 gal	Apply according to label directions.
trifloxystrobin (Compass O) 50WDG	0.5 oz/100 gal	Apply as a drench to wet upper half of the growing media. Apply at seeding, again at transplanting, and at 21- to 28-day intervals thereafter. May injure petunia, violet, and New Guinea impatiens.
triflumizole (Terraguard) 50W	4 to 8 oz/100 gal	Apply as soil drench at 2- to 4-week intervals. Use higher rate under heavy disease pressure.
triticonazole (Trinity) 19SC	8 to 12 fl oz/100 gal	Use preventively. Begin applications when conditions favor fungal infection and before disease symptom development. The crown and base of the plant and the soil or potting medium surrounding the crown must be thoroughly covered.
<b>Rusts</b>		
azoxystrobin (Heritage)	1 to 4 oz/100 gal	Apply at 7- to 28-day intervals. Do not make more than three sequential applications of Heritage before alternating with a nonstrobilurin fungicide. Not effective for rust control on Hypericum. Rotate with mancozeb or triflumizole.
chlorothalonil (Chlorostar VI, Daconil Weather Stik, Echo 720, Manicure 6 Flowable) (Chlorothalonil DF, Chlorothalonil 720 SFT) (Chlorothalonil 500 ZN) (Daconil Ultrex) 82.5WDG (Echo) 90DF, (Echo Ultimate)	1 3/8 pt/100 gal  See label  1.9 pt/100 gal 1.4 lb/100 gal 1.25 lb/100 gal	Apply when foliage and flowers are dry. Repeat at 7- to 14-day intervals. Apply to hydrangea foliage only. Avoid application during bloom period on plants where flower injury is unacceptable.

**Table 10-11. Disease Control of Annual, Perennial, Bedding, and Flowering Potted Plants in Greenhouses**

Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Rusts (continued)</b>		
chlorothalonil + thiophanate-methyl (Spectro) 90WDG	1 to 2 lb/100 gal	Apply when foliage and flowers are dry, or nearly dry. Re-treat at a minimum of 7-day intervals.
mancozeb (Dithane) 75DF, (Fore) 80WSP, (Mancozeb DG) (Pentathlon DF) (Pentathlon LF) (Protect DF)	1.5 lb/100 gal 1 to 2 lb/100 gal 0.8 to 1.6 qt/100 gal 1 to 2 lb/100 gal	Begin at first sign of disease. Repeat at 7- to 10-day intervals. Begin application at first sign of disease. Repeat at 7- to 10-day intervals. Begin application at first sign of disease. Repeat at 7- to 10-day intervals. Apply at 7- to 21-day intervals.
mancozeb + myclobutanil (Clevis, MANhandle)	1 to 2 lb/100 gal	Apply at first sign of disease, and repeat at 7- to 10-day intervals. The addition of Latron B-1956 will improve performance. In a limited number of trials, gave very good to excellent control of rust on geranium (18 oz/100 gal) and snapdragon (1 lb/100 gal).
myclobutanil (Eagle) 20EW (Eagle) 40WP (Systhane) 40WSP	6 to 12 fl oz/100 gal 3 to 6 oz/100 gal 4 oz/100 gal	Apply on a protectant application schedule at 10- to 14-day intervals. See label for rates to control white rust on chrysanthemum.
neem oil (Triact 70)	1 gal/100 to 200 gal	Apply at 7- to 14-day spray intervals. Trial first on open blooms. To control existing disease, apply on a 7-day schedule until disease pressure is eliminated. Not for impatiens, carnation, or hibiscus.
oxycarboxin (Plantvax) 75W	16 to 24 oz/100 gal	Apply at first sign of disease. Repeat at 2-week intervals for a maximum of two to four applications per season.
pyraclostrobin + boscalid (Pageant Intrinsic)	6 to 12 oz/100 gal	Apply prior to disease development. Repeat at 7- to 10-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F	10.75 to 20 fl oz/100 gal 12 to 16 fl oz/100 gal	Begin applications at first sign of disease. Repeat at 7- to 14-day intervals.
triadimephon (Strike) 25WDG	2 to 4 oz/100 gal	Spray to the point of drip as needed.
triflumizole (Terraguard) 50WP	2 to 8 oz/100 gal	Apply prior to, or at first sign of disease. Repeat at 7- to 14-day intervals.
<b>Scab, Poinsettia (<i>Sphaceloma</i>)</b>		
azoxystrobin (Heritage)	1 to 4 oz/100 gal	Apply at 7- to 21-day intervals. Test for phytotoxicity prior to treating entire crop. Do not make more than three sequential applications of Heritage before alternating with a nonstrobilurin fungicide.
chlorothalonil + thiophanate-methyl (Spectro) 90WDG	1 to 2 lb/100 gal	Repeat at 7-day intervals.
copper sulfate pentahydrate (Phyton 27)	2.0 to 3.5 oz/100 gal	Apply at 7-day intervals.
mancozeb (Dithane) 75DF, (Fore) 80WSP, (Mancozeb DG) (Protect DF)	1.5 lb/100 gal 1 to 2 lb/100 gal	Spray at first sign of disease. Apply at 7- to 21-day intervals. May leave a residue.
mancozeb + myclobutanil (Clevis, MANhandle)	2 lb/100 gal	Apply at first sign of disease. The addition of Latron B-1956 will improve performance.
myclobutanil (Eagle) 20EW (Eagle) 40WP (Systhane) 40WSP	6 to 12 fl oz/100 gal 3 to 6 oz/100 gal 4 oz/100 gal	Retreat at 10- to 14-day intervals.
thiophanate-methyl (AllBan Flo) (Cleary 3336) F	10 to 14.5 fl oz 12 to 16 fl oz/100 gal	Apply at 7- to 14-day intervals.
triflumizol (Terraguard) 50W	4 to 8 oz/100 gal	Repeat at 7- to 14-day intervals.
triticonazole (Trinity) 19SC	6 to 12 fl oz/100 gal	Use preventively. Begin applications when conditions favor fungal infection and before disease symptom development.
<b>Sclerotinia Blight (<i>Sclerotinia sclerotiorum</i>)</b>		
azoxystrobin (Heritage)	1 to 4 oz/100 gal	Apply as a directed spray at 7- to 21-day intervals. Test for phytotoxicity prior to treating entire crop. Do not exceed 2 oz/100 gal on impatiens, pansy, and violas.
chlorothalonil (Chlorothalonil DF) (Chlorothalonil 500 ZN) (Chlorothalonil 720 SFT) (Chlorostar VI, Daconil Weather Stik, Echo 720, Manicure 6 Flowable) (Daconil Ultrex) 82.5WDG (Echo) 90DF, (Echo Ultimate)	See label 1.9 pt/100 gal 1.37 pt/100 gal 1 3/8 pt/100 gal 1.4 lb/100 gal 1.25 lb/100 gal	Apply at 7- to 14-day intervals. Apply when foliage and flowers are dry, or nearly dry. Applications made during bloom may damage flowers.
chlorothalonil + thiophanate-methyl (Spectro) 90WDG	1 to 2 lb/100 gal	Apply when both foliage and flowers are dry, or nearly dry. Repeat at 7-day intervals. Do not use on Swedish ivy, Boston fern, or Easter cactus.
cyprodinil + fludioxonil (Palladium)	2 to 6 oz/100 gal	Spray on a 7-14 day interval while conditions are conducive to disease development. After two applications, alternate with another fungicide with a different MOA for two applications.
fenhexamid (Decree) 50WDG	0.75 to 1.5 lb/100 gal	Apply at 7- to 14-day intervals. Maintain agitation during application. May cause phytotoxicity on poinsettia bracts.
PCNB (Terraclor) 75WP	See label	Apply as a drench or bulb soak according to label directions.
pyraclostrobin + boscalid (Pageant Intrinsic)	12 to 18 oz/100 gal	Apply prior to disease development. Repeat at 7- to 14-day intervals. Make no more than two sequential applications. Do not expose petunia or impatiens in flower or wintercreeper or nine bark to spray or drift as injury may occur.

**Table 10-11. Disease Control of Annual, Perennial, Bedding, and Flowering Potted Plants in Greenhouses**

Disease Pesticide and Formulation	Rate of Formulation	Schedule and Remarks
<b>Sclerotinia Blight (continued)</b>		
thiophanate-methyl (AllBan Flo) (Cleary 3336) F (OHP 6672) 50WP, (T-Storm) 50WSB (OHP 6672) 4.5L, (T-Storm Flowable) (SysTec 1998) FL	7.5 to 20 fl oz/100 gal 8 to 16 fl oz/100 gal 12 to 16 oz/100 gal 20 fl oz/100 gal 10 to 20 fl oz/100 gal	Repeat at 4- to 8-week intervals. Repeat at 21- to 28-day intervals. Repeat at 21- to 28-day intervals. Repeat at 2- to 4-week intervals. Repeat at 2- to 4-week intervals.
trifloxystrobin (Compass O) 50WDG	1 to 4 oz/100 gal	Apply as a foliar spray. Repeat at 7- to 14-day intervals.
triticonazole (Trinity) 19SC	8 to 12 fl oz/100 gal	Use preventively. Begin applications when conditions favor fungal infection and before disease symptom development. The stem areas of the plant must be thoroughly covered using spray to runoff.
<b>Thielaviopsis Root Rot: See Black root rot.</b>		

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**Further Information**

All Plant Pathology Disease Notes can be accessed at: [www.ces.ncsu.edu/depts/pp/notes/Ornamentals/Ornamental\\_contents.html](http://www.ces.ncsu.edu/depts/pp/notes/Ornamentals/Ornamental_contents.html). Printed copies are also available at each county Cooperative Extension Center.