

## Chapter Eleven

# DISEASES OF INTERIORSCAPE PLANTS

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# GENERAL METHODS OF DISEASE CONTROL

## Introduction

One of the fastest-growing segments of modern-day commercial horticulture is ornamental plant production. Within this specialized industry, the use of living plants in interior locations such as homes, apartments, offices, public buildings and shopping malls has rapidly expanded in recent years. Many of these plants are of tropical origin, so the interior environments in which they are placed are markedly different than their native habitats. This may place the plants under stress and thereby predispose them to a variety of infectious and non-infectious diseases. Preventing and remedying these problems can be a challenging task because of the difficulty of applying conventional disease control practices in the interior landscape (interiorscape).

## Influence of Production Practices on Diseases

Foliage plants are produced under a wide range of environmental and cultural conditions. In the southern United States, many species are grown outdoors in full sun or under varying degrees of artificial shade. In northern areas of the U.S. and Canada, enclosed structures such as greenhouses are widely used. Many of the same diseases prevail throughout the major production areas. Likewise, common problems are encountered in interiorscapes, regardless of their geographical location. Major changes in production practices have decreased the importance of a number of infectious diseases. For example, the increased use of sterilized growing media and containers has prevented many root diseases from becoming epidemic. The availability of effective, modern pesticides has been of great help to foliage plant producers, as has access to pathogen-free, tissue-cultured plantlets.

The far-ranging and rapid transport of foliage plants throughout the world poses some unique problems in controlling diseases. Pathogens may be introduced into plantings in a variety of ways. Cuttings and other propagative parts are often produced in the tropics and transported to new production locations, complete with diseases and pests. In other cases, propagation units may be derived from infected stock plants produced by a grower for his own use or for sale to other growers. Further spread of diseases may occur during retail distribution. Some tropical plant diseases cannot develop in temperate areas because environmental conditions are not suitable. However, other diseases may flourish over a wide range of conditions, especially if the plants are produced in warm and/or humid environments. Control strategies, therefore, may differ tremendously depending upon the stage at which plants become infected and develop symptoms, and the regime under which they are being grown. Rigorous and routine examination of plant material at all stages of production and utilization should enable prompt and accurate problem diagnoses and the development of effective disease management strategies.

## Cultural Control Measures

Major steps towards effective disease control can be taken with simple changes in existing cultural methods. Some of these are listed below and others are discussed in Chapter 3 under 'General Disease Control Methods for Greenhouse Crops'.

- a) Employ watering systems that do not wet the foliage. Many fungal and bacterial pathogens depend upon free moisture for spore dispersal, germination and/or infection.
- b) Water as infrequently as possible, only when needed, and thoroughly enough to wet the root ball. Extra water may be required to leach out excess soluble salts in some situations.
- c) Water when good drying conditions exist, i.e. not too early or late in the day.
- d) Employ fans, where needed, to move drier air in and around plants to promote foliar drying.
- e) Avoid overcrowding plants. This promotes poor drying and extends wet periods by increasing humidity around plants, thereby causing condensation to occur on plant surfaces. Crowding may also promote tissue senescence, which predisposes it to attack by certain fungi, e.g. *Botrytis*.
- f) Use water free of bacterial and fungal pathogens and low in soluble salts and other impurities.

- g) Pasteurize media containing soil, sand and/or peat moss using heat or chemicals. Holding the temperature at 82°C (180°F) for at least 30 minutes will kill most pathogens.
- h) Clean and disinfest pots, tools, hands and other items coming in contact with pathogen-free media and plants. Benches used for propagation and/or potted plants should be washed and steam or chemically treated prior to receiving media or pots. It is also desirable to raise the benches above the ground to avoid possible contamination from the soil below.
- i) Propagate and install plant stocks which are known to be pathogen-free. Badly infected plants should be rogued and destroyed.
- j) Use growing media with adequate pore space to facilitate good aeration and rapid drainage. Provide sufficient subsurface drainage to allow for leaching out of excess soluble salts.
- k) Provide adequate levels of essential nutrients for plant growth under the particular growing regimes in use. Avoid over-fertilizing as this promotes the accumulation of soluble salts in growing media. Adjustments in nutrient levels so as to promote slower, harder growth will decrease the risk of bacterial diseases that generally thrive on soft, succulent foliage.
- l) Provide optimum air and soil temperatures and light levels for the particular species being grown. Low temperatures and inadequate light result in weak, spindly growth and may predispose plants to attack by pathogens by reducing their natural resistance.
- m) Remove infected leaves and branches, where practical. Gather and destroy prunings and fallen leaves and branches.
- n) Toxic levels of fluorides can occur in superphosphate fertilizer, perlite, water and some peats. Addition of dolomitic or calcitic lime to potting media to increase the pH reduces the solubility of fluoride. Sensitive plants should be grown in a medium of pH 6.0 or greater.

### Chemical Control Measures

The requirement for effective disease control chemicals is greatest in the propagation and growing-on phases of foliage plant production. Here, conditions are more favorable for disease development and spread than in interiorscapes. At present in Canada, there are no fungicides, bactericides or soil fumigants specifically registered for use in interiorscapes. Those products which are licensed on foliage plants are only to be used in greenhouses or, in a few situations, households. Growers should evaluate their individual situations and determine chemical control needs based on potential or actual disease problems. As well, they should guard against overprotection and misuse of pesticides as such practices may be costly, hazardous to human health, and potentially harmful to the plants themselves.

- a) Foliar Fungicides - The number of fungal pathogens that can attack the tops of foliar plants is extensive. Preventative, bi-weekly sprays to both leaf surfaces with broad-spectrum fungicides should provide adequate protection against fungal attack. Foliar sprays may leave some residue on the foliage, especially if spreader-stickers are used. A list of the fungicides registered specifically on foliage plants in Canada is given in Appendix I.
- b) Foliar Bactericides - At present, there are no pesticides registered in Canada specifically for the control of bacterial diseases on foliage plants.

- c) Soil Fungicides - The largest amount of fungicide use associated with foliage plant production occurs in the control of soil-borne plant pathogens. Growers face the prospect of controlling many different soil-borne plant pathogens on a wide variety of hosts. Soil fungicides are generally applied as drenches. The volume of drench used depends largely upon the size of container, depth of bed and type of growing media, especially the amount of organic matter. There are often difficulties encountered when applying soil fungicides that may result in poor control or phytotoxicity. Biodegradable, nonionic surfactants may aid in fungicide distribution and disease control. Generally, drenches should not be used more frequently than once every three months. Also, they should not be applied to the foliage. If a misapplication occurs, lightly rinse the foliage with water to remove the material. Where drenches are used in cutting beds, they should be applied prior to sticking the cuttings. Biofungicides are also now available for use in greenhouse crops to help suppress root rotting organisms such as *Pythium*, *Rhizoctonia* and *Fusarium*.
  
- d) Nematicides - There are no nematicides registered in Canada for nematode control specifically on foliage plants.

### **Resistant Cultivars**

The relative resistance of various species of foliage plants to prevalent infectious and non-infectious diseases has not been well documented. Foliage plant breeders have placed relatively little emphasis on incorporating disease resistance into newly developed cultivars. Likewise, plant pathologists have done only limited evaluations of the relative resistance of foliage plant cultivars currently in commercial use. Until more work is done, the use of resistant cultivars for disease management in foliage plants will not be a readily available alternative for foliage plant producers and interior landscapers.

## CACTUS (Family Cactaceae)

### GRAY MOLD

*Botrytis cinerea*

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG. See Appendix I. Limitations: As per label.

### LEAF SPOT AND STEM ROT

*Fusarium oxysporum, Drechslera cactivora, Pythium aphanidermatum, Phytophthora parasitica*

**Cultural:** Rogue infected plants. Avoid mechanical injury. Do not over water. Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** See Table 1.

Table 1. Relative susceptibility of holiday cacti to four plant pathogens (1)<sup>1</sup>.

Cultivar	<i>Erwinia</i>	<i>Drechslera</i>	<i>Fusarium</i>	<i>Phytophthora</i>
Bridgeport	moderate	moderate	low	moderate
Cambridge	high	moderate	variable	high
Christmas Charm	variable	moderate	moderate	moderate
Christmas Fantasy	low to moderate	moderate	variable	variable
Christmas Flame	variable	moderate	high	moderate
Christmas Magic II	low	moderate	low	low
Gold Charm	high	variable	high	high
Holiday Splendor	variable	moderate	low	high
Kris Kringle	low	high	moderate	variable
Kris Kringle II	low to moderate	high	variable	variable
Lavender Doll	variable	low to moderate	low	variable
Lavender Doll II	low	variable	variable	moderate to high
Peach Parfait	variable	high	low	high
Red Radiance	variable	moderate	moderate	variable
Sanibel	variable	variable	low	moderate
Santa Cruz	high	low to moderate	moderate	moderate
Sleigh Bells	variable	moderate	low	variable
Twilight Tangerine	high	moderate	moderate	moderate
White Christmas	low	low to moderate	moderate	moderate
Windsor	variable	moderate	variable	variable

<sup>1</sup>*Erwinia carotovora* subsp. *carotovora*, *Drechslera cactivora*, *Fusarium oxysporum*, *Phytophthora parasitica*

**Chemical:** ***Pythium* and *Phytophthora* diseases:** metalaxyl (COM) EC – for use on plants in greenhouse or outdoor nurseries, apply to soil mixture according to label instructions. See Appendix I. Limitations: As per label.

**References:**

1. Chase, A.R. 1982. Stem rot and shattering of Easter cactus caused by *Drechslera cactivora*. Plant Dis. 66: 602-603.
2. Chase, A.R. 1993. Susceptibility of holiday cactus cultivars to diseases. Foliage Digest 14(11): 7-8.
3. Knauss, J.F. 1975. Control of basal stem and root rot of Christmas cactus caused by *Pythium aphanidermatum* and *Phytophthora parasitica*. Proc. Fla. State Hort. Soc. 88: 567-571.
4. Mitchell, J.K. 1987. Control of basal stem and root rot of Christmas and Easter cacti caused by *Fusarium oxysporum*. Plant Dis. 71: 1018-1020.

## **CHINESE EVERGREEN (*Aglaonema* spp.)**

### **BACTERIAL LEAF SPOT**

*Erwinia chrysanthemi*, *Pseudomonas cichorii*, *Xanthomonas campestris* pv. *dieffenbachiae*

**Cultural:** Avoid misting or syringing leaves with water. Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** None.

**Biological:** *Bacillus subtilis* (COM, DOM) – apply every 7 days. See Appendix I.

**References:**

1. Arias, R.S. *et al.* 1998. Rapid detection of pectolytic *Erwinia* spp. in *Aglaonema* sp. HortTechnology 8(4): 602-605.
2. Chase, A.R. and Poole, R.T. 1986. Troubleshooting guide to foliage: aglaonema. Greenhouse Grower 4(4): 54-55.
3. McFadden, L.A. 1962. Two bacterial pathogens affecting leaves of *Aglaonema robelinii*. Phytopathology 52: 20. (Abstr.)
4. McFadden, L.A. 1969. *Aglaonema pictum*, a new host for *Erwinia chrysanthemi*. Plant Dis. Rep. 53: 253-254.

### **PYTHIUM AND PHYTOPHTHORA DISEASES**

*Pythium* spp., *Phytophthora* spp.

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Etridiazole (COM) EC, WP; foseyl-Al (COM) WG. Metalaxyl (COM) EC – for use on plants in greenhouse or outdoor nurseries, apply to soil mixture according to label instructions. See Appendix I. Limitations: As per label.

**References:**

1. Chase, A.R. 1987. Diseases Caused by Pythium *and* Diseases Caused by Phytophthora *in* Compendium of Ornamental Foliage Plant Diseases. Am. Phytopath. Soc. pp. 39-44.

## **CROTON (*Codiaeum variegatum*)**

### **ANTHRACNOSE**

*Glomerella cingulata*

**Cultural:** Prune off infected leaves or cut away infected areas of leaves. Disinfect pruning tools after use to avoid spreading the pathogen to healthy tissue. Avoid misting or syringing leaves with water. Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Osborne, L.S. *et al.* 1984. Croton. Foliage Digest 7(4): 5-7.

### **GRAY MOLD**

*Botrytis cinerea*

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG; iprodione (COM) WG, apply to point of run-off, ensuring good coverage of plants. See Appendix I. Limitations: As per label.

**References:**

1. Osborne, L.S. *et al.* 1984. Croton. Foliage Digest 7(4): 5-7.

## **DIEFFENBACHIA (*Dieffenbachia* spp.)**

### **ERWINIA BLIGHT AND STEM ROT**

*Erwinia carotovora* subsp. *carotovora*, *E. chrysanthemi*

**Cultural:** Avoid misting or syringing leaves with water. Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** Camille, Compacta, Hilo, Sparkles, Tropic Marianne.

**Chemical:** None.

**References:**

1. Henny, R.J., A.R. Chase and L.S. Osborne. 1994. Dieffenbachia. Foliage Digest 17(6): 3-6.
2. McFadden, L.A. 1961. Bacterial stem and leaf rot of *Dieffenbachia* in Florida. Phytopathology 51: 663-668.
3. Munnecke, D.E. 1960. Bacterial stem rot of *Dieffenbachia*. Phytopathology 50: 698-700.
4. Nieves-Brun, C. 1985. Infection of roots of *Dieffenbachia maculata* by the foliar blight and soft rot pathogen, *Erwinia chrysanthemi*. Plant Pathol. 34: 139-145.
5. Norman, D.J., R.J. Henny, and J.M.F. Yuen. 1997. Disease resistance in twenty Dieffenbachia cultivars. HortScience 32 (4): 709-710.

## LEAF SCORCH

Physiological - Excess soluble salts, overwatering, poor drainage, excess boron or fluorides.

**Cultural:** Use demineralized water for irrigation and leaching. Repot when accumulations of salt are noticed on the soil surface or when scorch symptoms appear. Avoid overwatering by allowing the soil to dry between applications. In areas of poor drainage, apply sugar solution (20 g sucrose/L water) at a rate of 9 L/m<sup>2</sup> bed area (1). Carefully regulate fertilizer applications. Avoid adding fluoride-containing amendments to growing media.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Henny, R.J., A.R. Chase and L.S. Osborne. 1994. Dieffenbachia. Foliage Digest 17(6): 3-6.
2. Mirza, M. 1999. Personal communication. Crop Diversification Centre North, Edmonton, AB.
3. Poole, R.T. and Chase, A.R. 1987. Dieffenbachia guide. Greenhouse Grower 5(3): 32-34.

## ROOT AND STEM ROT

*Phytophthora* spp., *Pythium* spp., *Fusarium solani*

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Etridiazole (COM) EC, WP; metalaxyl (COM) EC for *Pythium* and *Phytophthora*. *Trichoderma harzianum* (COM) GR, WP for *Pythium*, *Rhizoctonia*, *Fusarium*. *Streptomyces griseoviridis* (COM) WP for *Fusarium* diseases. See Appendix I. Limitations: As per label.

**References:**

1. Chase, A.R. and El-Gholl, N.E. 1982. Stem rot, cutting rot, and leaf spot of *Dieffenbachia maculate* 'Perfection' incited by *Fusarium solani*. Plant Dis. 66: 595-598.
2. Chase, A.R. 1985. You can prevent foliage diseases. Greenhouse Grower 3(12): 38-45.
3. Henny, R.J., A.R. Chase and L.S. Osborne. 1994. Dieffenbachia. Foliage Digest 17(6): 3-6.

**XANTHOMONAS LEAF SPOT**

*Xanthomonas campestris* pv. *dieffenbachiae*

**Cultural:** Avoid misting or syringing leaves with water. Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** Tropic Star.

**Intermediate:** Bausei, Camille, Compacta, Hilo, Memoria-Corsii, Paco, Rebecca, Star White, Starry Nights, Tiki.

**Susceptible:** Triumph, Victory

**Chemical:** None.

**References:**

1. Chase, A.R. 1985. You can prevent foliage diseases. Greenhouse Grower 3(12): 38-45.
2. Chase, A.R. and Henny, R.J. 1990. Susceptibility of 12 *Dieffenbachia* cultivars to *Xanthomonas campestris* pv. *dieffenbachiae*. Foliage Digest 13(2): 1-2.
3. Henny, R.J., A.R. Chase and L.S. Osborne. 1994. Dieffenbachia. Foliage Digest 17(6): 3-6.
4. Norman, D.J., R.J. Henny, and J.M.F. Yuen. 1997. Disease resistance in twenty Dieffenbachia cultivars. HortScience 32 (4): 709-710.

## DRACAENA (*Dracaena* spp.)

### BOTRYTIS BLIGHT

*Botrytis cinerea*

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG; iprodione (COM) WP. See Appendix I. Limitations: As per label.

### FUSARIUM LEAF SPOT AND STEM ROT

*Fusarium moniliforme*

**Cultural:** Keep the foliage as dry as possible to reduce the risk of infecting new leaves. The severity of Fusarium leaf spot on red-edge dracaena (*Dracaena marginata*) can be substantially reduced by using increased rates of fertilizer (1). Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:**

Resistance of selected *Dracaena* species and cultivars to Fusarium leaf spot (2).

<i>Dracaena</i> species and cultivars	Resistant or Susceptible	Symptom type
<i>deremensis</i> ‘Compacta’	resistant	none
<i>deremensis</i> ‘Janet Craig’	very slightly susceptible	clear, yellow speckles on leaf edges
<i>deremensis</i> ‘Warneckii’	very slightly susceptible	clear, yellow speckles on leaf edges
<i>deremensis</i> ‘Lemon Lime’	resistant	none
<i>fragrans</i> ‘Massangeana’	very slightly susceptible	small yellow spots on leaf edges
<i>marginata</i>	very highly susceptible	large yellow and brown spots in whorl that can blend to rot center
<i>marginata</i> ‘Bicolor’	very slightly susceptible	small yellow spots in whorl
<i>marginata</i> ‘Colorama’	moderately susceptible	small yellow spots in whorl
<i>marginata</i> ‘Magenta’	very highly susceptible	large brown spots in whorl that can blend to rot center
<i>marginata</i> ‘Tricolor’	slightly susceptible	small yellow spots in whorl
<i>reflexa</i> ‘Song of Jamaica’	highly susceptible	large tan to reddish brown spots in whorl and on leaf edges
<i>sanderana</i>	resistant	none
<i>sanderana</i> ‘Borinquensis’	resistant	none
<i>sanderana</i> ‘Gold’	resistant	none
<i>surculosa</i>	very slightly susceptible	large tan papery spots form where leaf joins stem
<i>surculosa</i> ‘Florida Beauty’	very slightly susceptible	large tan papery spots form where leaf joins stem
<i>surculosa</i> ‘Juanita’	very slightly susceptible	large tan papery spots form where leaf joins stem

**Chemical:** Chlorothalonil (COM) SU, WG. See Appendix I. Limitations: As per label.

**References:**

1. Chase, A.R. 1987. Effect of fertilizer level on severity of Fusarium leaf spot of *Dracaena marginata*. Proc. Fla. State Hort. Soc. 100: 360-362.
2. Chase, A.R. 1993. Fusarium leaf spot of Dracaenas: resistance of species and cultivars. Foliage Digest 16(8): 1-2.
3. Chase, A.R. 1990. Fertilizer rate affects severity of Fusarium leaf spot of red-edge dracaena. Foliage Digest 13(6): 6-7.
4. Knauss, J.F. 1971. Fusarium stem rot, a previously unreported disease of *Dracaena*. Proc. Am. Soc. Hort. Sci., Trop. Reg. 15: 208-215.
5. Poole, R.T., A.R. Chase and L.S. Osborne. 1993. Dracaena. Foliage Digest 16(11): 1-6.
6. Wehlburg, C. and Martinez, A.P. 1967. Leaf spot of *Dracaena marginata* Lam. caused by *Fusarium moniliforme* Sheld. Proc. Fla. State Hort. Soc. 80: 454-456.

## LEAF SCORCH

Physiological - Excess soluble salts, overwatering, poor drainage, excess boron or fluorides.

**Cultural:** Use demineralized water for irrigation and leaching. Repot when accumulations of salt are noticed on the soil surface or when scorch symptoms appear. Avoid overwatering by allowing the soil to dry between applications. In areas of poor drainage, apply sugar solution (20 g sucrose/L water) at a rate of 9 L/m<sup>2</sup> bed area (2). Carefully regulate fertilizer applications. Avoid adding fluoride-containing amendments to growing media.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Conover, C.A. and Poole, R.T. 1982. Fluoride induced chlorosis and necrosis of *Dracaena fragrans* 'Massangeana'. J. Amer. Soc. Hort. Sci. 107: 136-139.
2. Conover, C.A. and Poole, R.T. 1980. Influence of fertilization, superphosphate and lime on mottling of *Dracaena fragrans*. HortScience 15: 23-24
3. Mirza, M. 1999. Personal communication. Crop Diversification Centre North, Edmonton, AB.

## ENGLISH IVY (*Hedera helix*)

### BACTERIAL LEAF SPOT

*Xanthomonas campestris* pv. *hederae*

**Cultural:** Avoid misting or syringing leaves with water. Use drip irrigation. Remove infected leaves as they are observed to reduce inoculum in the greenhouse. Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** Gold Dust, Perfection, Sweet Heart, Eva, California.

**Intermediate:** Telecurl, Manda Crested, Gold Heart.

**Susceptible:** Ivalace, Green Variegated, Hahn Variegated, Brokamp.

**Chemical:** None.

#### References:

1. Chase, A.R. 1984. *Xanthomonas campestris* pv. *hederae* causes a leaf spot of five species of Araliaceae. Plant Pathol. 33: 439-440.
2. Norman, D.J. 1996. Diseases of English ivy. Foliage Digest 19(5): 1-2.
3. Osborne, L.S. and Chase, A.R. 1985. Susceptibility of cultivars of English ivy to two-spotted spider mite and *Xanthomonas* leaf spot. HortScience 20: 269-271.

### GRAY MOLD

*Botrytis cinerea*

**Cultural:** Reduce humidity in the greenhouse. Remove plants injured by cold, chemical applications or other factors since damaged tissue is readily colonized. Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG; iprodione (COM) WG, apply to point of run-off, ensuring good coverage of plants. See Appendix I. Limitations: As per label.

#### References:

1. Norman, D.J. 1996. Diseases of English ivy. Foliage Digest 19(5): 1-2.

## FERN (Family Polypodiaceae)

### BACTERIAL LEAF BLIGHT

*Pseudomonas cichorii*, *P. gladioli*

**Cultural:** Avoid misting or syringing leaves with water. Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** None.

#### References:

1. Ark, P.A. and Thomkins, C.M. 1946. Bacterial leaf blight of bird's-nest fern. *Phytopathology* 36: 758-761.
2. Chase, A.R. *et al.* 1984. Leaf spot and blight of *Asplenium nidus* caused by *Pseudomonas gladioli*. *Plant Dis.* 68: 344-347.

## FIG (*Ficus* spp.)

### PHOMOPSIS DIEBACK

*Phomopsis cinerescens*

**Cultural:** Plant healthy trees and follow good growing practices to minimize stress. Prune dead or dying branches, disinfecting shears between cuts. Destroy all leaf and twig litter. Maintain light levels at 150 ft-c or more. Follow natural target pruning guidelines in order to favour compartmentalization and inhibit *Phomopsis* infection.

**Resistant Cultivars:** None. See Notes.

**Chemical:** None.

**Notes:** *Ficus benjamina* (weeping fig) is particularly susceptible to phomopsis dieback, whereas other *Ficus* spp. appear less susceptible (3).

#### References:

1. Anderson, R.G. and Hartman, J.R. 1983. Phomopsis twig blight on weeping fig indoors: a case study. *Foliage Digest* 6: 5-7.
2. Benschop, K., Tewari, J.P. and Toop, E.W. 1984. Phomopsis twig dieback of some woody interior ornamentals in Alberta. *Can. Plant Dis. Surv.* 64: 29-31.
3. Chase, A.R. 1993. Common diseases of ficus. *Southern Nursery Digest* (February issue): 20-21.
4. Henley, R.W., A.R. Chase and L.S. Osborne. 1994. Ficus. *Foliage Digest* 17(2): 1-6.
5. Newman, L. 1991. The ultimate *Ficus* prune. *Interiorscape* 10(1): 6-7.
6. Newman, L. 1993. Ficus pruning in the interiorscape. *Foliage Digest* 14(10): 7-8.

## GRAY MOLD

*Botrytis cinerea*

**Cultural:** Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG; iprodione (COM) WG, apply to point of run-off, ensuring good coverage of plants. See Appendix I. Limitations: As per label.

## GRAPE IVY, KANGAROO VINE (*Cissus* spp.)

### POWDERY MILDEW

*Oidium* spp.

**Cultural:** Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** None.

#### References:

1. Henley, R.W., A.R. Chase and L.S. Osborne. 1993. Grape ivy. Foliage Digest 14(10): 1-4.

### ROOT ROT

*Pythium* spp., *Rhizoctonia solani*, *Fusarium oxysporum*, *Cylindrocarpon* spp.

**Cultural:** Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** *Trichoderma harzianum* (COM) GR, WP for *Pythium*, *Rhizoctonia*, and *Fusarium*; *Streptomyces griseoviridis* (COM) WP for *Fusarium* diseases. See Appendix I. Limitations: As per label.

#### References:

1. Bolton, A.T. 1984. Root rot of *Ficus benjamina*. Plant Disease 68: 816-817.

## INDIA RUBBER TREE (*Ficus elastica*)

### ANTHRACNOSE

*Glomerella cingulata*

**Cultural:** Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Agrawal, S.C. and Saksena, S.B. 1972. Experimental studies on leaf anthracnose of *Ficus elastica* Roxb. *Curr Sci.* 41: 246-249.
2. Henley, R.W., A.R. Chase and L.S. Osborne. 1994. *Ficus*. *Foliage Digest* 17(2): 1-6.

### GRAY MOLD

*Botrytis cinerea*

**Cultural:** Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG; iprodione (COM) WG, apply to point of run-off, ensuring good coverage of plants. See Appendix I. Limitations: As per label.

### LEAF SCORCH

Physiological - Excess soluble salts, overwatering, poor drainage, excess boron or fluorides.

**Cultural:** Use demineralized water for irrigation and leaching. Repot when accumulations of salt are noticed on the soil surface or when scorch symptoms appear. Avoid overwatering by allowing the soil to dry between applications. In areas of poor drainage, apply sugar solution (20 g sucrose/L water) at a rate of 9 L/m<sup>2</sup> bed area (1). Carefully regulate fertilizer application. Avoid adding fluoride-containing amendments to growing media.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Henley, R.W., A.R. Chase and L.S. Osborne. 1994. *Ficus*. *Foliage Digest* 17(2): 1-6.
2. Marlatt, R.B. 1978. Boron deficiency and toxicity symptoms in *Ficus elastica* 'Decora' and *Chrysalidocarpus lutescens*. *HortScience* 13: 442-443.
3. Mirza, M. 1999. Personal communication. Crop Diversification Centre North, Edmonton, AB

## NORFOLK ISLAND PINE (*Araucaria heterophylla*)

### COLLETOTRICHUM NEEDLE BLIGHT

*Colletotrichum derridis*

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Ridings, W.H. 1973. Colletotrichum needle necrosis of Norfolk Island Pine. Proc. Fla. State Hort. Soc. 86: 418-421.

### GRAY MOLD

*Botrytis cinerea*

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG. See Appendix I. Limitations: As per label.

## PALM (Family Palmaceae)

### FUSARIUM WILT

*Fusarium oxysporum*

**Cultural:** Disinfect pruning tools between plants. Also refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** *Streptomyces griseovirdis* (COM) WP. See Appendix I. Limitations: As per label.

**References:**

1. Chase, A.R. 1993. Common diseases of palms. Southern Nursery Digest (March issue): 20-21.
2. Domner, J. and Ohr, H. 1989. Palm trees have problems, too. Grounds Maintenance 24(4): 94-102.

## GRAY MOLD

*Botrytis cinerea*

**Cultural:** Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG. See Appendix I. Limitations: As per label.

## LEAF SCORCH

Physiological - Excess soil salts, overwatering, poor drainage, excess fluorides or boron.

**Cultural:** Use demineralized water for irrigation and leaching. Repot when accumulations of salt are noticed on the soil surface or when scorch symptoms appear. Avoid overwatering by allowing the soil to dry between applications. In areas of poor drainage, apply sugar solution (20 g sucrose/L water) at a rate of 9 L/m<sup>2</sup> bed area (1). Carefully regulate fertilizer application. Avoid adding fluoride-containing amendments to growing media.

**Resistant Cultivars:** None.

**Chemical:** None.

### References:

1. Chase, A.R. and Poole, R.T. 1986. Troubleshooting guide to foliage: palms. *Greenhouse Grower* 4(11):24-27.
2. Henley, R.W., A.R. Chase and L.S. Osborne. 1993. Chamaedorea palm. *Foliage Digest* 16(9): 1-4.
3. Marlatt, R.B. 1978. Boron deficiency and toxicity symptoms in *Ficus elastica* 'Decora' and *Chrysalidocarpus lutescens*. *HortScience* 13: 442-443.
4. Mirza, M. 1999. Personal communication. Crop Diversification Centre North, Edmonton, AB.

## PEACE LILY (*Spathiphyllum* spp.)

### CYLINDROCLADIUM ROOT AND PETIOLE ROT

*Cylindrocladium spathiphylli*

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Copper sulphate pentahydrate (COM) SN.

**References:**

1. Chase, A.R. and Poole, R.T. 1988. Cylindrocladium root and petiole rot of *Spathiphyllum* spp. Bull. 860, Agric. Exp. Sta., Univ. Fla., Gainesville, FL. 20 pp.
2. Schoulties, C.L. and El-Gholl, N.E. 1983. Host range and pathogen specificity studies of *Cylindrocladium spathiphylli*. Proc. Fla. State Hort. Soc. 96: 282-284.

## PEPEROMIA (*Peperomia obtusifolia*)

### GRAY MOLD

*Botrytis cinerea*

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG; iprodione (COM) WG, apply to point of run-off, ensuring good coverage of plants. See Appendix I. Limitations: As per label.

### LEAF SCORCH

Physiological - Excess soluble salts, overwatering, poor drainage, excess boron or fluoride.

**Cultural:** Use demineralized water for irrigation and leaching. Repot when accumulations of salt are noticed on the soil surface or when scorch symptoms appear. Avoid overwatering by allowing the soil to dry between applications. In areas of poor drainage, apply sugar solution (20 g sucrose/L water) at a rate of 9 L/m<sup>2</sup> bed area (1). Carefully regulate fertilizer application. Avoid adding fluoride-containing amendments to growing media.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Mirza, M. 1999. Personal communication. Crop Diversification Centre North, Edmonton, AB.
2. Poole, R.T. and Chase, A.R. 1987. Response of foliage plants to fertilizer application rates and associated leachate conductivity. HortScience 22: 317-318.

**STEM AND ROOT ROT**

*Rhizoctonia solani*, *Phytophthora* spp., *Pythium* spp.

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Etridiazole (COM) WP, EC; metalaxyl (COM) EC; *Trichoderma harzianum* (COM) GR, WP. See Appendix I. Limitations: As per label.

**Notes:** Etridiazole and metalaxyl will only control *Pythium* and *Phytophthora*; *Trichoderma harzianum* will control *Pythium*, *Rhizoctonia* and *Fusarium*.

**References:**

1. Ark, P.A. and DeWolfe, T.A. 1951. Phytophthora rot of *Peperomia*. Plant Dis. Rep. 60: 632-633.
2. Chase, A.R. and Munnecke, D.E. 1978. Pythium root rot of *Peperomia obtusifolia* var. *variegata*. Plant Dis. Rep. 62: 314-315.
3. Chase, A.R. and Poole, R.T. 1984. Investigations into the role of fertilizer level and irrigation frequency on growth, quality, and severity of *Pythium* root rot of *Peperomia obtusifolia*. J. Amer. Soc. Hort. Sci. 109: 619-622.

**PHILODENDRON (*Philodendron* spp.)****ERWINIA BLIGHT**

*Erwinia chrysanthemi*

**Cultural:** Avoid misting or syringing leaves with water. Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Chase, A.R. 1985. You can prevent foliage diseases. *Greenhouse Grower* 3(12): 38-45.
2. Chase, A.R. 1993. Common diseases of philodendron. *Southern Nursery Digest* (May issue): 20-21.
3. Henley, R.W., A.R. Chase and L.S. Osborne. 1994. Philodendrons: self-heading types. *Foliage Digest* 17(9): 4-8.
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**GRAY MOLD**

*Botrytis cinerea*

**Cultural:** Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fenhexamid (COM) WG; iprodione (COM) WG, apply to point of run-off, ensuring good coverage of plants. See Appendix I. Limitations: As per label.

**LEAF SCORCH**

Physiological - Excess soluble salts, overwatering, poor drainage, excess fluorides or boron.

**Cultural:** Use demineralized water for irrigation and leaching. Repot when accumulations of salt are noticed on the soil surface or when scorch symptoms appear. Avoid overwatering by allowing the soil to dry between applications. In areas of poor drainage, apply sugar solution (20 g sucrose/L water) at a rate of 9 L/m<sup>2</sup> bed area (1). Carefully regulate fertilizer application. Avoid adding fluoride-containing amendments to growing media.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Mirza, M. 1999. Personal communication. Crop Diversification Centre North, Edmonton, AB.
2. Poole, R.T. and Chase, A.R. 1987. Heartleaf philodendron guide. *Greenhouse Grower* 3(12): 38-45.

**PSEUDOMONAS LEAF SPOT**

*Pseudomonas cichorii*

**Cultural:** Avoid misting or syringing leaves with water. Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Chase, A.R. 1985. You can prevent foliage diseases. *Greenhouse Grower* 3(12): 38-45.
2. Henley, R.W., A.R. Chase and L.S. Osborne. 1994. Philodendrons: self-heading types. *Foliage Digest* 17(9): 4-8.

## STEM AND ROOT ROT

*Fusarium* spp., *Phytophthora* spp., *Pythium* spp., *Rhizoctonia* sp.

**Cultural:** Refer to 'General Methods of Disease Control' at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Etridiazole (COM) WP, EC; metalaxyl (COM) EC; *Trichoderma harzianum* (COM) GR, WP. See Appendix I. Limitations: As per label.

**Notes:** Etridiazole and metalaxyl will only control *Pythium* and *Phytophthora*; *Trichoderma harzianum* will control *Pythium*, *Rhizoctonia* and *Fusarium*.

**References:**

1. Chase, A.R. 1985. You can prevent foliage diseases. *Greenhouse Grower* 3(12): 38-45.

## SCHEFFLERA (*Brassaia actinophylla*)

### LEAF SCORCH

Physiological - Excess soil salts, overwatering, poor drainage, excess fluorides or boron.

**Cultural:** Use demineralized water for irrigation and leaching. Repot when accumulations of salt are noticed on the soil surface or when scorch symptoms appear. Avoid overwatering by allowing the soil to dry between applications. In areas of poor drainage, apply sugar solution (20 g sucrose/L water) at a rate of 9 L/m<sup>2</sup> bed area (1). Carefully regulate fertilizer application. Avoid adding fluoride-containing amendments to growing media.

**Resistant Cultivars:** None.

**Chemical:** None.

**References:**

1. Chase, A.R. and Poole, R.T. 1986. Troubleshooting guide to foliage: schefflera. *Greenhouse Grower* 4(10): 68-69.
2. Mirza, M. 1999. Personal communication. Crop Diversification Centre North, Edmonton, AB.
3. Poole, R.T. and Chase, A.R. 1987. Response of foliage plants to fertilizer application rates and associated leachate conductivity. *HortScience* 22: 317-318.
4. Poole, R.T., A.R. Chase and L.S. Osborne. 1993. Schefflera. *Foliage Digest* 14(12): 4-8.

## ROOT-KNOT NEMATODE

*Meloidogyne* spp.

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** None.

## ROOT AND STEM ROTS

*Phytophthora* spp., *Pythium* spp., *Rhizoctonia* sp.

**Cultural:** Refer to ‘General Methods of Disease Control’ at the beginning of this chapter.

**Resistant Cultivars:** None.

**Chemical:** Fosetyl-AI (COM) WG, metalaxyl (COM) EC; *Trichoderma harzianum* (COM) GR, WP. See Appendix I. Limitations: As per label.

**Notes:** Fosetyl-AI and metalaxyl will only control *Pythium* and *Phytophthora*; *Trichoderma harzianum* will control *Pythium*, *Rhizoctonia* and *Fusarium*.

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3. Carroll, J. and Daughtrey, M. 1986. Diagnosis and management of disease and foliage plants in interiorscapes. Plant Diagnostician's Quarterly, Vol. VII, No. 2, June.
4. Chase, A.R. 1987. Compendium of ornamental foliage plant diseases. APS Press. The American Phytopathological Society. 92 pp.
5. Chase, A.R. 1991. Rhizoctonia diseases of Florida ornamentals. Foliage Digest 14(6): 1-3.
6. Chase, A.R. 1992. Using temperature information to aid in controlling diseases of ornamentals. Foliage Digest 5(2): 5-7.
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8. Chase, A.R. 1997. Foliage plant diseases: diagnosis and control. APS Press. The American Phytopathological Society, St. Paul, Minn. 180 pp.
9. Chase, A.R. and Broschat, T.K. (eds.). 1991. Diseases and disorders of ornamental palms. APS Press, St. Paul, Minn. 56 pp.
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15. Henley, R.W. 1983. A pictorial atlas of foliage plant problems. Central Chapter, Florida Foliage Association, Apopka, FL. 40 pp.
16. Horst, R.K. 2001. Westcott's Plant Disease Handbook. 6<sup>th</sup> Ed. Kluwer Academic Publishers. Boston, Mass. 1008 pp.
17. Howard, R.J. and Dykstra, M.D. 1987. Diseases of interiorscape plants in Alberta. Agriculture and Forestry Bull. 10(1): 22-24.
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21. Newman, L. 1996. What's killing our trees. *Interiorscape* 15(5): 20-29.
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**APPENDIX I. Fungicides registered for use against diseases of foliage plants in Canada**

Plant <sup>1</sup>	Site <sup>2</sup>	Disease	Trade Name	Active Ingredient	Formulation	PCP#
Adiantum	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Aglaonema	GH	damping-off; root & stem rots ( <i>Pythium</i> & <i>Phytophthora</i> )	Aliette	fosetyl-Al	80% WG	24458
			Truban	etrizadiazole	30% WP	11460
			Truban	etrizadiazole	25% EC	12222
			Subdue Maxx	metalaxyl	240 g/L EC	27055
Aglaonema	GH	damping-off; root rots ( <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> )	RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115
			Rhapsody	<i>Bacillus subtilis</i>	1.34% LO	28627
			Serenade Garden	<i>Bacillus subtilis</i>	1.34% LO	28628
Anthurium	GH	damping-off; root & stem rots ( <i>Pythium</i> & <i>Phytophthora</i> )	Truban	etrizadiazole	30% WP	11460
			Truban	etrizadiazole	25% EC	12222
Anthurium	GH	damping-off; root rots ( <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> )	RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115
Aphelandra	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
			Subdue Maxx	metalaxyl	240 g/L EC	27055
Araucaria		gray mold	Decree	fenhexamid	50% WG	26132
Asparagus	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Cactus	GH	gray mold	Decree	fenhexamid	50% WG	26132
	GH	Pythium and Phytophthora	Subdue Maxx	metalaxyl	240 g/L EC	27055
Caladium	GH	gray mold	Decree	fenhexamid	50% WG	26132
		damping-off ( <i>Pythium</i> & <i>Phytophthora</i> )	Subdue Maxx	metalaxyl	240 g/L EC	27055
		damping-off ( <i>Rhizoctonia solani</i> )	Compass	trifloxystrobin	50% WG	27527
Chlorophytum	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Cissus	GH	damping-off; root rots ( <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> )	RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115
			Decree	iprodione	50% WP	26132
GH	root rot ( <i>Fusarium</i> )	Mycostop	<i>Streptomyces griseoviridis</i>	WP	26265	

<sup>1</sup>See Appendix II for a list of Latin and common names of foliage plants.<sup>2</sup>GH = Greenhouse or IS = Interiorscape

**APPENDIX I. Fungicides registered for use against diseases of foliage plants in Canada (continued)**

Plant <sup>1</sup>	Site <sup>2</sup>	Disease	Trade Name	Active Ingredient	Formulation	PCP#
Codiaeum	GH	gray mold	Decree	fenhexamid	50% WG	26132
		gray mold	Rovral	iprodione	50% WG	24709
Dieffenbachia	GH	damping-off; root & stem rots ( <i>Pythium</i> & <i>Phytophthora</i> )	Subdue Maxx	metalaxyl	240 g/L EC	27055
			Truban	etr Diazole	30% WP	11460
			Truban	etr Diazole	25% EC	12222
	GH	damping-off; root rots ( <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> )	RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115
GH	downy mildew ( <i>Peronospora</i> )	Acrobat	dimethomorph	50% WP	27700	
GH	root rot ( <i>Fusarium</i> )	Mycostop	<i>Streptomyces griseoviridis</i>	WP	26265	
Dizygotheca	GH	gray mold	Decree	fenhexamid	50% WG	26132
Dracaena	GH	gray mold ( <i>Botrytis</i> )	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
GH	Fusarium leaf spot	Daconi 1 2787 Daconi 1 2787	chlorothalonil chlorothalonil	40% SU 90% WG	15724 24794	
Echeveria	GH	damping-off; root & stem rots ( <i>Pythium</i> & <i>Phytophthora</i> )	Truban	etr Diazole	30% WP	11460
			RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115
Epipremnum	GH	damping-off; root & stem rots ( <i>Pythium</i> & <i>Phytophthora</i> )	Aliette	fosetyl-Al	80% WG	24458
			Truban	etr Diazole	30% WP	11460
			Truban	etr Diazole	25% EC	12222
GH	damping-off; root rots ( <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> )	RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115	
Episcia	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Euonymous	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Euphorbia	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Ficus	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
GH	downy mildew ( <i>Peronospora</i> )	Acrobat	dimethomorph	50% WP	27700	
Fittonia	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Gynura	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709

<sup>1</sup> See Appendix II for a list of Latin and common names of foliage plants.<sup>2</sup> GH = Greenhouse or IS = Interiorscape

**APPENDIX I. Fungicides registered for use against diseases of foliage plants in Canada (continued)**

Plant <sup>1</sup>	Site <sup>2</sup>	Disease	Trade Name	Active Ingredient	Formulation	PCP#			
Hedera	GH	Colletotrichum leaf spot	Dithane M-45	mancozeb	80% WP	8556			
			Dithane WSP	mancozeb	80% WP	23655			
			Manzate 200	mancozeb	75% DF	21057			
Hedera	GH	damping-off ( <i>Pythium</i> and <i>Phytophthora</i> )	Subdue Maxx	metalaxyl	240 g/L EC	27055			
			Decree	fenhexamid	50% WG	26132			
				iprodione	50% WP	15213			
Hedera	GH	gray mold	Rovral	iprodione	50% WG	24709			
			Compass	trifloxystrobin	50% WG	27527			
				Protect T/O	mancozeb	80% WP	25553		
Hypoestes	GH	Colletotrichum leaf spot	Penncozeb	mancozeb	80% WP	25396			
			Decree	fenhexamid	50% WG	26132			
				iprodione	50% WP	15213			
Hypoestes	GH	gray mold	Rovral	iprodione	50% WG	24709			
			Kalanchoë	GH	gray mold	Decree	fenhexamid	50% WG	26132
						Phyton	copper sulphate	5.5% SN	21699
Kalanchoë	GH	gray mold	Rovral	iprodione	50% WP	15213			
			Rovral	iprodione	50% WG	24709			
			Maranta	GH	Helminthosporium leaf spot	Daconi1 2787	chlorothalonil	40% SU	15724
Daconi1 2787	chlorothalonil	90% WG				24794			
Maranta	GH	gray mold	Decree	fenhexamid	50% WG	26132			
			Rovral	iprodione	50% WP	15213			
			Rovral	iprodione	50% WG	24709			
Monstera	GH	gray mold	Decree	fenhexamid	50% WG	26132			
			Rovral	iprodione	50% WP	15213			
			Rovral	iprodione	50% WG	24709			
Nephrolepis	GH	gray mold	Decree	fenhexamid	50% WG	26132			
			Rovral	iprodione	50% WP	15213			
			Rovral	iprodione	50% WG	24709			
Palms	GH and IS	damping-off ( <i>Rhizoctonia solani</i> )	Compass	trifloxystrobin	50% WG	27527			
			Mycostop	<i>Streptomyces griseoviridis</i>	WP	26265			
				Decree	fenhexamid	50% WG	26132		
			Palms	GH	Helminthosporium leaf spot	Daconi1 2787	chlorothalonil	40% SU	15724
Daconi1 2787	chlorothalonil	90% WG				24794			
Peperomia	GH	damping-off; root & stern rots ( <i>Pythium</i> & <i>Phytophthora</i> )	Subdue Maxx	metalaxyl	240 g/L EC	27055			
			Truban	etridiazole	30% WP	11460			
			Truban	etridiazole	25% EC	12222			
Peperomia	GH	damping-off; root rots ( <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> )	RootShield	<i>Trichoderma harzianum</i>	GR	27116			
			Decree	iprodione	WP	27115			
					Rovral	iprodione	50% WG	26132	
Peperomia	GH	gray mold	Rovral	iprodione	50% WP	15213			
			Rovral	iprodione	50% WG	24709			

<sup>1</sup>See Appendix II for a list of Latin and common names of foliage plants.<sup>2</sup>GH = Greenhouse or IS = Interiorscape

**APPENDIX I. Fungicides registered for use against diseases of foliage plants in Canada (continued)**

Plant <sup>1</sup>	Site <sup>2</sup>	Disease	Trade Name	Active Ingredient	Formulation	PCP#
Philodendron	GH	damping-off; root & stem rots ( <i>Pythium</i> & <i>Phytophthora</i> )	Subdue Maxx	metalaxyl	240 g/L EC	27055
			Truban	etr Diazole	30% WP	11460
			Truban	etr Diazole	25% EC	12222
	GH	damping-off; root rots ( <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> )	RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115
Pilea	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
	GH	Phytophthora blight; Dactylaria leaf spot	Daconil 2787 Daconil 2787	chlorothalonil chlorothalonil	40% SU 90% WG	15724 24794
Polyscias	GH	damping-off; root & stem rots ( <i>Pythium</i> & <i>Phytophthora</i> )	Truban	etr Diazole	30% WP	11460
			Truban	etr Diazole	25% EC	12222
			RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115
Rhoeo	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Rumohra	GH	tan leaf spot	Daconil 2787	chlorothalonil	40% SU	15724
			Daconil 2787	chlorothalonil	90% WG	24794
Rumohra	GH	Ascochyta blight; Rhizoctonia blight; Cercospora leaf spot; Cylindrocladium leaf spot	Daconil 2787	chlorothalonil	40% SU	15724
			Daconil 2787	chlorothalonil	90% WG	24794
Saxifraga	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Schefflera	GH	damping-off; root rots ( <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> )	RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115
			Aliette Subdue Maxx	fosetyl-Al metalaxyl	80% WG 240 g/L EC	24458 27055
Senecio	GH	gray mold	Decree	fenhexamid	50% WG	26132
			Rovral	iprodione	50% WP	15213
			Rovral	iprodione	50% WG	24709
Spathiphyllum	GH	damping-off; root & stem rots ( <i>Pythium</i> & <i>Phytophthora</i> )	Aliette	fosetyl-Al	80% WG	24458
			RootShield	<i>Trichoderma harzianum</i>	GR WP	27116 27115
	GH	Cylindrocladium root and petiole rot ( <i>Cylindrocladium spathiphylli</i> )	Phyton 27	copper sulphate pentahydrate	5.5% SN	21699
			Acrobat	dimethomorph	50% WP	27700
Syngonium	GH	downy mildew ( <i>Peronospora</i> )	Daconil 2787	chlorothalonil	40% SU	15724
			Daconil 2787	chlorothalonil	90% WG	24794

<sup>1</sup>See Appendix II for a list of Latin and common names of foliage plants.<sup>2</sup>GH = Greenhouse or IS = Interiorscape

## APPENDIX II. Latin and common names of foliage plants

LATIN NAME		COMMON NAME
<i>Aglaonema</i> spp.		Chinese evergreen
<i>Aphelandra squarrosa</i>		Zebra plant
<i>Araucaria heterophylla</i>		Norfolk Island pine
<i>Asparagus densiflorus</i>		Sprengeri asparagus
<i>Brassaia actinophylla</i>		Schefflera; Umbrella tree
Cacti	<i>Opuntia ficus-indica</i>	Spineless cactus
	<i>Opuntia vulgaris</i>	Prickly pear cactus
<i>Caladium</i> spp.		Caladium
<i>Chlorophytum comosum</i>		Spider plant
<i>Cissus antartica</i>		Kangaroo vine
<i>Cissus rhombifolia</i>		Grape ivy
<i>Codiaeum variegatum</i>		Croton
<i>Dieffenbachia</i> spp.		Dieffenbachia
<i>Dizygotheca elegantissima</i>		False aralia
<i>Dracaena deremensis</i>		Janet Craig dracaena
<i>Dracaena deremensis</i>		Warneckii dracaena
<i>Dracaena fragrans</i>		Corn plant
<i>Dracaena fragrans</i>		Massangeana cane
<i>Dracaena marginata</i>		Madagascar dragon tree
<i>Dracaena reflexa</i>		Pleomele
<i>Dracaena sanderana</i>		Ribbon plant
<i>Dracaena surculosa</i>		Gold dust dracaena
<i>Echeveria carnicolor</i>		Coral echeveria
<i>Epipremnum aureum</i>		Pothos; Devil's ivy
<i>Episcia</i> spp.		Flame violets
<i>Euonymus</i> spp.		Enonymous
<i>Euphorbia millii</i>		Crown-of-thorns
<i>Fatsia japonica</i>		Japanese aralia
Ferns	<i>Adiantum</i> spp.	Maidenhair fern
	<i>Asplenium nidus</i>	Bird's-nest fern
	<i>Nephrolepis exaltata</i>	Boston fern; Sword fern
	<i>Rumohra adiantiformis</i>	Leatherleaf fern
<i>Ficus benjamina</i>		Weeping fig
<i>Ficus elastica</i>		India rubber tree
<i>Ficus lyrata</i>		Fiddle-leaf fig
<i>Ficus pumila</i>		Creeping fig
<i>Ficus retusa</i>		Cuban laurel fig
<i>Fittonia verschaffletii</i>		Silver-nerve plant

## APPENDIX II. (continued)

LATIN NAME		COMMON NAME
<i>Gynura aurantiaca</i>		Purple passion
<i>Hedera helix</i>		English ivy
<i>Hypoestes spp.</i>		Pink splash
<i>Kalanchoe tomentosa</i>		Pussy ears; Panda plant
<i>Maranta leuconeura</i>		Prayer plant
<i>Monstera deliciosa</i>		Cutleaf philodendron
<i>Nephtytis</i> (see <i>Syngonium</i> )		
Palms	<i>Caryota mitis</i>	Fishtail palm
	<i>Chamaedorea elegans</i>	Parlor palm; Neanthe bella
	<i>Chamaedorea erumpens</i>	Bamboo palm
	<i>Chamaedorea seifrizii</i>	Reed palm
	<i>Chamaedorea humilis</i>	European fan palm
	<i>Chrysalidocarpus lutescens</i>	Areca palm
	<i>Cycas revoluta</i>	Sago palm
	<i>Howea forsterana</i>	Kentia palm; Sentry palm
	<i>Livistona chinensis</i>	Chinese fan palm
	<i>Phoenix roebelini</i>	Pygmy date palm
	<i>Ptychosperma elegans</i>	Solitaire palm; Alexander palm
	<i>Rhapis excelsa</i>	Lady palm
	<i>Rhapis humilis</i>	Slender lady palm
<i>Peperomia spp.</i>		Peperomia
<i>Philodendron scandens oxycardium</i>		Heart-leaf philodendron
<i>Philodendron selloum</i>		Lacy-tree philodendron
<i>Pilea cadierei</i>		Aluminium plant
<i>Pilea microphylla</i>		Artillary plant
<i>Polyscias spp.</i>		Aralia
<i>Rhoeo spatheca</i>		Moses-in-the-cradle
<i>Rumohra adiantiformis</i>		Leatherleaf fern
<i>Sansevieria spp.</i>		Sword plant; Sansevieria
<i>Saxifraga spp.</i>		Rockfoil; Saxifrage
<i>Scheffera actinophylla</i>		(see <i>Brassaia actinophylla</i> )
<i>Scheffera arbuticola</i>		Hawaiian schefflera; Dwarf schefflera
<i>Scindapsus aureus</i>		(see <i>Epipremnum aureum</i> )
<i>Senecio spp.</i>		Cineraria
<i>Spathiphyllum spp.</i>		Peace lily
<i>Syngonium spp.</i>		Nephtytis; Arrowhead vine
<i>Yucca spp.</i>		Yucca