POINSETTIA DISEASES AND THEIR MANAGEMENT

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Diseases and their management must be an integral part of a poinsettia production program. Diseases are a threat to a poinsettia crop from the establishment of stock to sale of finished plants. The management of the many diseases that occur on poinsettia (Table 1) require a totally integrated program that includes sanitation, cultural practices, environmental control and as a last resort, the proper use of pesticides.

Description of Major Poinsettia Diseases. The importance and control of each of the following diseases will be discussed for each phase of production: stock plants, propagation and finishing.

Table 1. Diseases of Poinsettia.

Common Name of Disease	Pathogen	Importance in N.C.*	Occurrence**
Stem and Crown Rot	*Rhizoctonia solani*	++++	S,P,F
Root Rot	*Pythium spp.*	++++	S,P,F
	Phytophthora parasitica	+	S,F
	Thielaviopsis basicola	+	F
Leaf Spot	*Alternaria euphorbiicola*	-	S
Bacterial Leaf Spot	*Xanthomonas poinsettiicola*	-	F
Bacterial Soft Rot	*Erwinia carotovora*	+++	P
Botrytis Blight (Gray Mold)	*Botrytis cinerea*	++++	S,P,F
Bacterial Canker	*Corynebacterium poinsettiae*	+	F
Crown Gall	*Agrobacterium tumefaciens*	-	S
Rust	*Uromyces euphorbiae f. poinsettiae*	-	F
Root Knot Nematode	*Meloidogyne spp.*	-	F
Scab	*Sphaceloma poinsettiae*	-	S,F
Crown Rot	*Sclerotinia sclerotiorum*	-	S,F
Watery Rot	*Rhizopus spp.*	++	S,P
Virus	Poinsettia mosaic virus	+	S,P,F
Wet Rot	*Choanephora cucurbitarum*	++	S,P
Greasy Canker	*Pseudomonas viridaflava*	-	S,F

*Relative importance in N.C.: (++++) most important; (-) very rare or does not occur.
**Stage of production: S = Stock plants; P = Propagation; and F = Finish.

Diseases Caused by Fungi

Rhizoctonia Stem Rot. This is one of the most important diseases on poinsettia as it kills plants in all stages of production (see Table 1). *Rhizoctonia solani* causes a light to dark brown water soaked lesion on the stem extending just above and just below the soil line. The lesion gradually expands until it encircles the stem. The lesion becomes slightly sunken and remains as a dry rot. Infection often begins during rooting and may kill plants before or after transplanting. If the disease progresses slowly, plants may not die until mid- to late-November.

Plants with stem rot may be stunted, lower may leaves abscise, upper leaves may be chlorotic and the leaf edge may curl upward along the midrib. If the disease progresses rapidly, the foliage wilts suddenly and plants fall over and die. In later stages of the disease, roots may also be discolored.

Development of Rhizoctonia stem rot is not affected by pH. Disease development increases as soil temperature is increased from 17 to 26°C (62–80°F). Soil moisture levels below 40% moisture holding capacity (MHC) are not favorable for Rhizoctonia stem rot and a MHC above 80% retards disease development.

Pythium and Phytophthora Root Rot. Root rot of poinsettia can be caused by *Pythium aphanidermatum, P. debaryanum, P. irregular, P. megalacanthum, P. oligandum, P. perniciorum, P. polymastum,* and *P. ultimum.* Poinsettia root rot is also caused by the closely related fungus *Phytophthora parasitica.* Disease severity may vary between the above species but the conditions for disease development and symptoms are quite similar. Root rot caused by these fungi may be the most common disease on poinsettia in North Carolina. It can occur at any stage of production but often shows up in November or early December.

The primary symptoms of root rot are badly rotted dark wet roots. The rot may affect stems to varying degrees depending upon the age of plant and upon cultural conditions. If

roots of very young succulent plants become infected, the pathogen may proceed up the stem several inches and cause the entire stem to become water-soaked, then turn dark brown to black. Stems may collapse at the soil line and fall over.

Infected plants can be stunted, have chlorotic leaves, and lower leaves abscise. Plants infected with Pythium or Phytophthora that survive the disease in early growth stages may bloom early or wilt, collapse, and die.

Pythium and Phytophthora root rot is favored by high soil moisture. Disease development may be reduced by lowering the media pH to 5.5 or below. Moderate to cool media temperatures are best for disease development for Pythium where as Phytophthora root rot is usually more severe under warm conditions. Pythium and Phytophthora root rot is also favored by high soluble salts.

Thielaviopsis Root Rot (Black Root Rot). This root rot disease is less common now than it was 30 to 40 years ago. This is probably due to the elimination of soil from media and to warmer growing temperatures. This disease has become more important over the past 4 to 5 years on pansy and vinca plugs. This raises concern about re-introduction of this fungus into greenhouses.

The above ground symptoms of Thielaviopsis root rot and Pythium root rot are very similar. Affected plants are stunted with badly rotted roots. Initial root symptoms are speckled light brown lesions. As the disease progresses, the root system may turn brown and later black. Longitudinal black cracks develop on lower portions of stems. These black cracks on the lower portion of rotting poinsettia stems infected with Thielaviopsis distinguish it from Pythium, Phytophthora and Rhizoctonia root rots.

Thielaviopsis root rot is favored by cool soil temperatures of 13 to 16°C (55–60°F). This root rot is most likely to develop late in the production cycle when plants are grown cool to retard flower development and intensify bract color. Disease development is favored by soil moisture holding capacity by 70% or higher. Thielaviopsis root rot is also favored by media pH of 5.5 or above.

Botrytis Blight or Gray Mold. Botrytis blight, commonly called gray mold, is caused by the fungus *Botrytis cinerea*. This is the most important disease on floral crops and it is also the most important above ground disease on poinsettias grown in North Carolina greenhouses. Botrytis blight can occur on poinsettia during all stages of production.

This fungus causes brown lesions on leaf stem or bract tissue. Infection and initial disease development almost always occur on wounded, weakened or dead tissue of leaves, stems or bracts. Healthy tissues that come in contact with diseased tissues almost always become infected. Lesions on bracts are initially located near margins and are minute in size. First they are light tan in color but become darker brown as the lesion expands. Latex may be exuded on the underside of leaf lesions. Under high humidity, Botrytis produces grayish brown spore masses over the surface of the rotting tissue. Millions of spores may be produced on each rotting lesion and each spore is capable of causing a new infection. Spores are easily dislodged and carried by air currents or splashing water to healthy plants.

Botrytis cinerea attacks over 200 hosts and is not host specific. Epidemics of Botrytis blight are favored by high relative humidity (85% or above) and free moisture on the plant surfaces. The fungus is active over a wide temperature range. Growing plants with very tight spacing, plants with dense foliar canopies, plants with excessive shade, and plants with very succulent growth are also favorable for disease development.

Scab. Scab or spot anthracnose is caused by the fungus *Sphaceloma poinsettiae*. Raised circular to elongated lesions from a few mm to one cm appear on stems and midribs of leaves. Lesions are usually light tan and often are

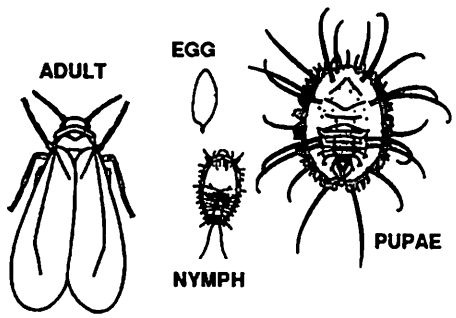

Figure 7. Greenhouse whitefly life stages.

Greenhouse whiteflies survive outdoors on bedding plants and in vegetable gardens throughout the summer growing season. Amateur gardeners sometimes have an extraordinarily difficult time controlling whiteflies in the home garden. Whiteflies are amazingly difficult to eradicate with some organophosphate and carbamate insecticides.

A biological control agent, *Encarsia formosa*, is available for greenhouse whitefly suppression. The parasite has been used successfully on greenhouse vegetables especially in Europe. However, the parasite is reproductively inhibited at temperatures below 75°F. These wasps sometimes stabilize greenhouse whitefly populations but the wasps are much more sensitive to insecticides than whiteflies so that spraying certain pesticides may actually aggravate the whitefly problem. (In our experimental work, when we need to increase the number of whiteflies to get enough to work with, we spray with a pyrethroid to eliminate parasitic wasps.)

Pesticides for the Control of Poinsettia Pests

Whiteflies

aldicarb (**Temik** 10G): don't use within 28 days of sale: some growers report it's not too effective This product is no longer being manufactured. Once existing stocks are used up the supply will be gone.

bendiocarb (**Dycarb, also Ficam, Turcam**): runoff onto the potting mix may cause phytotoxicity.

biphenthrin (**Talstar**): Use before the bracts color up Used as a tank mix with Orthene 75S by some growers for sweetpotato whitefly control.

dithio (**Plantfume 103**): regular, close applications necessary for control; does not seem to be phytotoxic to bracts. This product will probably be discontinued by the manufacturer within the next few years.

fenpropathrin (**Tame**) new pyrethroid for whiteflies. Labeled as a tank mix with Orthene 75S for the sweetpotato whitefly.

kinoprene (**Enstar**) use the 20 oz rate for erradication. Toxic to all stages of whiteflies at the 20 ounce per 100 gallon rate. Will damage 'Pink Peppermint' and perhaps other varieties of poinsettia.

methiocarb (**PT 1700**): new active ingredient labeled for whiteflies.

oils (**Ultra Fine Spray, Sun Spray**): Labeled for use on bracts showing color, but has been reported to cause the bracts to fade.

oxamyl (**Vydate**): moderately effective; relatively gentle to plants; don't use on the bracts.

Oxamyl 10G (**Vydate L** is not recommended for use on poinsettias): some growers report it's not too effective

oxythioquinox (**Morestan**): not too soon before or after a plant growth regulator. Morestan is toxic to the eggs and older nymphs as well as young crawlers. Morestan is not labeled for greenhouses.

pyrethrum (**Pyrenone, X-Clude**) liquid spray or aerosol.

soap (**Insecticidal**): somewhat phytotoxic, do not apply to bracts; in our demonstrations, soap lowered the whitefly population faster than any other chemical.

Leaftiers & Caterpillars
acephate (**Orthene, PT 1300**)
bendiocarb (**Dycarb also Ficam, Turcam**): runoff into the potting mix may cause phytotoxicity.
biphenthrin (**Talstar**): before bracts color up.
fenpropathrin (**Tame**) new pyrethroid for beet armyworm.
fluvalinate (**Mavrik**)
Bacillus thuringiensis (**Dipel**)
methomyl (**Lannate**): Lannate is not labeled for greenhouse use.

Fungus Gnats
Bacillus thuringiensis israelensis (**Gnatrol**)
diazinon (**Knox-Out**): aerosoal and flowable.
malathion
Oxamyl 10G (**Vydate L** is not recommended for use on poinsettias.)
pyrethrum (**X-Clude**)
resmethrin (**SPB 1382**): aerosol and emulsifiable concentrate. Do not use the latter on bracts showing color.
sumithrin: aerosol.

Spider Mites
abamectin (**Avid**): extremely effective miticide.
aldicarb (**Temik 10G**): don't use within 28 days of sale: some growers report it's not too effective. This product is no longer being manufactured. Once existing stocks are used up the supply will be gone.
biphenthrin (**Talstar**): Use before the bracts color up.
fenpropathrin (**Tame**): new pyrethroid for twospotted spider mite.
fluvalinate (**Mavrik**)
oxythioquinox (**Morestan**): not too soon before or after a plant growth regulator. Morestan is not labeled for greenhouses.

Thrips
acephate (**Orthene, PT 1300**)
aldicarb (**Temik 10G**): don't use within 28 days of sale: some growers report it's not too effective. This product is no longer being manufactured. Once existing stocks are used up the supply will be gone.
bendiocarb (**Dycarb also Ficam, Turcam**): runoff into potting mix may cause phytotoxicity.
Oxamyl 10G (**Vydate L** is not recommended for use on poinsettias.)

Mealybugs
aldicarb (**Temik 10G**): don't use within 28 days of sale some growers report it's not too effective. This product is no longer being manufactured. Once existing stocks are used up the supply will be gone.
bendiocarb (**Dycarb also Ficam, Turcam**): runoff into potting mix may cause phytotoxicity.
biphenthrin (Talstar): before the bracts color up.
fenpropathrin (**Tame**): new pyrethroid.
oils (**Ultra Fine Spray, Sun Spray**): Even labeled for use on bracts showing color, but bract fading has been reported.
Oxamyl 10G (**Vydate L** is not recommended for use on poinsettias.)

Earwigs
soap (**Insecticidal**): somewhat phytotoxic, do not apply to bracts.

Table 2. Some fungicides that can contribute to a total poinsettia disease control program based upon sanitation, sterilization, and cultural practices.

Common and trade name	Chemical	Comments
benomyl **Benlate**	methyl 1-(butylcarbamoyl)-2-benzimidazole-carbamate	Use as a drench against *Rhizoctonia solani* and *Thielaviopsis basicola* and as a foliar spray against *Botrytis cinerea.*
chlorothalonil **Daconil 2787** **Exotherm Termil**	tetrachloroisophthalonitrile	Use Daconil as a spray against *Botrytis* diseases. Exotherm Termil is heated to generate dust for greenhouse space treatment. Do not apply under slow-drying conditions.
metalaxyl **Subdue**	N-(2,6-Dimethylphenyl)-N-(methoxyacetyl)-alanine methyl ester	Specific for water mold. *Pythium spp.* and *Phytophthora spp.*
etridiazole **Truban**	5-Ethoxy-3-trichloromethyl-1,2,4-thiadiazole	Specific for *Pythium* and *Phytophthora* species.
etridiazole + thiophanate methyl **Banrot**	5-Ethoxy-3-trichloromethyl-1,2,4-thiadiazole + dimethyl 4,4-o-phenylenebis (3-thioallophanate)	Use as a drench against major root rot organisms.
PCNB **Terraclor**	pentachloronitrobenzene	Specific for *Rhizoctonia solani.* NOT effective against water molds. Good residual action.
Vinclozolin **Ornalin**	3-(3,5-dichorophenyl)-5-vinyl- 5-methyl-1,3-oxazolidine-2,4-dione	Specific for the control of *Botrytis* blight.

Fungicide recommendations often change from year to year. For the most current recommendations, consult the latest edition of the *North Carolina Agricultural Chemicals Manual.*