

Disease Control for Home Landscape Ornamentals

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Dear Home Gardener,

This publication was written to help you know what to spray should you encounter a serious disease in your garden or landscape. It is assumed that you have already identified the disease and have determined that a chemical spray is necessary. There are many excellent extension fact sheets and bulletins which describe common disease problems in detail. Many excellent text books also exist. If you have not identified the specific cause of your problem, contact your county extension office where the county agent or a local master gardener can help you.

Help is also available at the Dial U Clinic. This is a phone-in service with specialists in the areas of plant pathology, horticulture, and entomology. It is sponsored by the Minnesota Extension Service and partially supported by a \$2 per call fee. Metro counties can call 1-976-0200; outside the Twin Cities, dial 1-612-624-5353.

The following is an up-to-date listing of available Environmental Protection Agency (EPA) registered chemicals as of November 1987. However, chemical labels are always in a state of flux so be sure to read the entire label before chemical application. In some cases other chemicals may be available to control a given disease but are not listed because they are not packaged for homeowner use or are not available in Minnesota. Since not all garden stores carry all chemicals, especially in small communities, it may be necessary to call around or travel to a larger community to find a chemical. Occasionally some garden stores will ship chemicals. Other possible sources are garden and seed catalogs.

Minnesota Extension Service

Common and Trade Names of Fungicides

Common name	Examples of brand names
benomyl	Benlate, Benomyl, Tersan 1991
bordeaux	Bordeaux, Bordo
calcium polysulfide (lime sulphur)	Lime-sulphur, Orthorix, Dormant Disease Control
captan	Captan, Orthocide
chlorothalonil	Bravo, Daconil 2787, Ortho Multi-purpose Disease Control
coppers	Basic copper sulfate, Tribasic copper sulfate
folpet ¹	Folpet, Phaltan
mancozeb	Dithane M-45, Fore, Manzate 200
maneb	Dithane M-22, Maneb
PCNB	Terraclor
sulphur	Flotox, sulphur
thiophanate-methyl	Topsin M
thiram	Thiram
triadimefon	Bayleton
triforine	Funginex, Triforine
zineb	Zineb

¹Registration canceled. Use up existing supplies.

Disease Control Suggestions

This is a listing of plant disease control methods referred to in the following table. Many of these suggestions can be followed in most disease situations. They should also be followed to prevent the initial occurrence of plant disease.

- A. Avoid crowding plants.
- B. Water early in the day so foliage dries quickly.
- C. Plant resistant varieties, cultivars, species.
- D. Rotate each year.
- E. Remove and destroy infected plants.
- F. Control weeds which serve as alternate hosts to plant pathogens.
- G. Use insecticides to control insects that carry plant diseases.
- H. Remove infected plant parts and dead tissues.
- I. Plant in well-drained soils.
- J. Increase air circulation; avoid crowding.
- K. Avoid wetting the foliage when watering.
- L. Plant disease-free plants, seeds, bulbs, etc.
- M. Use sterilized potting soil.
- N. Avoid injury to tubers, corms, bulbs, etc., when digging and handling.
- O. Remove old leaves in the fall and destroy them.
- P. Avoid planting new plants in infected soil.
- R. Plant only fully hardy plant material.
- S. Remove the alternate host, where practical.
- T. Avoid highly humid conditions.
- U. Avoid planting in dense shady locations.
- V. No chemicals currently labeled for use and/or effective for control.
- W. Chemical control is generally not necessary.
- X. Plant new clean plants in a different area.
- Y. Mulch to minimize moisture loss.
- Z. Do not continuously use benomyl alone; mix or alternate with another appropriate fungicide.

RECOMMENDATIONS FOR DISEASE CONTROL ON ORNAMENTALS (Flowers, Shade Trees, and Shrubs)

Plant	Disease	Symptoms	Control
African violet	Powdery mildew	White powdery fungus on leaf and stem tissue.	(T)
Aster	Botrytis stem rot	Gray spores appear on affected plant parts. The fungus causes a black rot on leaf and stems causing them to wilt.	Benomyl, thiophanate-methyl (A,B)
	Fusarium wilt	Plants begin to wilt. Dark streak may be seen near base of stem, as well as a dark ring beneath stem tissue. Roots are under-developed and stunted.	(C,D)
	Powdery mildew	White powdery patches develop on leaf surface.	Benomyl, sulphur, thiophanate-methyl, or triadimefon
	Rust	Orange to yellow spore pustules on undersurface of leaf.	Sulphur, triadimefon, triforine, (F,S,W)
	Yellows	Plants are stunted and distorted. Oftentimes flower color has a green cast and flowers open unevenly.	(E,F)

RECOMMENDATIONS FOR DISEASE CONTROL ON ORNAMENTALS (Flowers, Shade Trees, and Shrubs)

Plant	Disease	Symptoms	Control
Alpine Currant	Powdery mildew	White powdery like fungus on leaf surface. Browning of leaves, some defoliation. (Do not mistake for mite damage.)	Benomyl (J,U)
Ash, Green Black White	Anthracnose	Brown spots with or without darker margins develop randomly over the leaf following cool, wet weather. Leaf distortion and some defoliation possible.	Benomyl, mancozeb, thiophanate-methyl
	Rust	Orange swollen and distorted areas on leaves, stems, and petioles.	(S,W)
Ash, Mountain	Leafspot Leaf blotch	Small purple spots appear on leaves which later turn brown.	Mancozeb
	Fire blight	Dying leaves and branches which appear burned.	Remove blighted branches 8-10 inches into healthy wood during dry weather: dormant season is preferred.
Azalea	Anthracnose	Both leaf surfaces have numerous small, round, olive-brown to rusty brown spots. Heavy infections cause defoliation.	Benomyl
	Crown rot	Brown discoloration in wood of main roots and basal portions of stems. Infected branches wilt and die.	(E,H)
	Dieback	Terminal buds and leaves turn brown, roll up, and droop. Stem shrivels above canker which encircles stem.	Bordeaux (after bloom and again in 10-14 days) (H,P)
	Powdery mildew	White powdery growth on upper leaf surface.	Benomyl, triadimefon (J,U)
	Wilt and root rot	Foliage becomes a dull yellow and wilts. Roots are decayed and base of stem is brownish.	(E,I)
Begonia	Bacterial leaf spot	Small, circular, blister-like spots on the leaves which gradually enlarge and coalesce to form dead areas. Stems may be invaded and eventually collapse.	(H,J,K)
	Botrytis - leaf blight and stem canker	Dead areas on leaves, stems, and flowers often covered with brownish-gray mold.	Benomyl, mancozeb (H)
	Crown and stem rot	Crown and lower stems become discolored, water-soaked, and soft.	(E,I)
	Powdery mildew	White powdery fungal growth on upper surface of leaves. Severe infections can cause leaf distortion.	Benomyl, triadimefon
Chokecherry/ ornamental cherries	Black knot	Slightly swollen areas to enlarged black growths or knots on woody tissues.	Prune out swollen areas and black knots 3-4 inches below the infection. Use a dormant spray of lime sulphur.
Chrysanthemum	Foliar - nematode	Portions of affected leaves turn brown where nematodes are feeding. As disease progresses, leaves die and fall. The small "worms" responsible for this disease cannot be seen with naked eye.	Rotate away from mums for at least 3 years. (L)

RECOMMENDATIONS FOR DISEASE CONTROL ON ORNAMENTALS
(Flowers, Shade Trees, and Shrubs)

Plant	Disease	Symptoms	Control
Chrysanthemum (continued)	Powdery mildew	A white powdery growth appears on the leaves causing leaf distortion. Fungus can infect blooms. Disease development is usually favored by cool moist environmental conditions.	Benomyl, sulphur
	Rust	Reddish spots about size of pinhead develop on underside of leaf.	Mancozeb, maneb, sulphur, zineb (H)
	Septoria-leaf spot	Dark spots appear on lower foliage and increase in size as disease progresses.	(2 year rotation)
	Verticillium wilt	Lower leaves begin to wilt, turn yellow and then brown. Plants wilt during day and recover at night until disease becomes severe. Plants are stunted and fail to produce flowers. If stem is cut off at base, dark ring can be seen.	(C,E,P)
	Stunt and virus diseases	Plants are stunted and often distorted. Viruses cause premature flowering and abnormal plant color.	(C,G,L)
Clematis	Leafspot	Brown to buff spots appear on leaves.	Sulphur
Columbine	Leafspot	Leaf spotting caused by several fungi.	Benomyl, sulphur
	Powdery mildew	White powder-like fungal growth on leaves.	Benomyl, calcium polysulfide
Crabapple ornamental	Fireblight	Blackening of young shoots and blossoms.	(V)
	Frogeye leaf spot	Red to brown spots with lighter-colored centers.	Chlorothalonil, mancozeb
	Rust	Brown to yellow to orange spots appear on apple leaves. Alternate host is red cedar.	Chlorothalonil, mancozeb, triadimefon, zineb
	Scab	Affected leaves develop velvety or sooty spots. Eventually diseased leaves turn yellow, then brown, and drop prematurely.	Benomyl—(Z), chlorothalonil, mancozeb
Dahlia	Botrytis-gray mold	Fungus can attack leaves, stem, and buds. Gray masses of spores form on infected tissue. Moist, cool weather favors disease development.	Benomyl, mancozeb, maneb (H)
	Mosaic-virus	Virus-infected leaves are mottled. Plant is stunted and bushy. Light green bands of leaf tissue can be seen along the midrib.	(E,G,L)
	Powdery mildew	White powdery fungal growth on upper leaf surface. Leaf distortion and defoliation occur when infection is severe.	Benomyl, sulphur, thiophanate-methyl, triadimefon, triforine
	Ring spot virus	Affected leaves have light green spots. As disease progresses ring spots develop.	(G)
Daisy	Ascochyta rayblight, Septoria leafspot Botrytis	Spotting and blighting of flowers and leaves.	Chlorothalonil, mancozeb
	Powdery mildew	White powdery fungal growth on leaves.	Sulphur, triadimefon

**RECOMMENDATIONS FOR DISEASE CONTROL ON ORNAMENTALS
(Flowers, Shade Trees, and Shrubs)**

Plant	Disease	Symptoms	Control
Delphinium and Larkspur	Black leaf spot	Disease usually begins on lower foliage and spreads upward. Black spots develop on affected foliage. The bacteria can infect leaf, stem, and flower.	Fixed coppers (E)
	Leaf blights and spots	Leaf spotting is caused by several fungi.	Bordeaux mixture, Ferbam
	Powdery mildew	White powder-like fungus growth on leaves. Causes leaf distortion and leaf drop.	Benomyl, calcium polysulfide, sulphur
	Rhizoctonia crown rot	The fungus attacks the crown causing flower stalks to wilt, turn brown, and die. Disease is favored by warm, moist weather conditions.	Terraclor (prior to planting) (E,P)
Dogwood	Leafspot	Leaf spotting is caused by several fungi.	Bordeaux mixture, copper sulfate (Basic), mancozeb (W)
Elm	Elm black leaf spot	Black spots irregular in shape on leaves. Heavy spotting may result in leaf chlorosis and leaf drop.	
Foxglove	Leafspot	Leaf spotting is caused by several fungi.	Copper, sulphur (E,J,K,L)
Geranium	Bacterial blight	Small, round water-soaked spots, on leaves. Large, angular areas on leaves may wilt and turn necrotic due to stem rot. Upper roots and stems blacken and shrivel.	
	Botrytis blight	Fungus can cause a blossom blight, leaf spot, and stem rot. Gray mold can develop on infected parts.	Benomyl, Bordeaux, chlorothalonil, mancozeb (H)
	Oedema (Physiological)	Small water-soaked spots (blisters) develop on the undersides of leaves. Occurs in cloudy, cool weather.	(T,U)
	Pythium blackleg (<i>Pythium</i> spp.)	Common on cuttings and young plants. Black, water-soaked lesions develop on stem near the soil line. Affected plants wilt and die rapidly.	(L,M,P)
	Rhizoctonia root rot (<i>Rhizoctonia</i> spp.)	Symptoms may be similar to Pythium blackleg. Laboratory confirmation may be needed to distinguish between the diseases.	(L,M)
	Root rot	Leaves and flowers fade in color and wilt. Roots are decayed and nonfunctional.	(D,I,M)
	Rust	Small, yellow flecks appear on upper surface of leaves. On the lower surface, brick-red pustules form in a circular pattern opposite the flecks.	Chlorothalonil, mancozeb, maneb, triadimefon
Gladiolus	Botrytis dry rot	Black fruiting bodies of fungus, as well as masses of gray spores, may occur on corm. Fungus can attack stem, leaves, and flower. Cool, moist weather conditions favor development.	Benomyl (H)
	Fusarium basal rot	Evidence of fungus on corm causes brown depressed areas.	Benomyl (after digging) (L,N)

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Plant	Disease	Symptoms	Control
Gladiolus (continued)	Fusarium dry rot	Note fungal lesions on corm. Stems may rot off below soil line and stems topple over.	Benomyl } Thiophanate- } } prior to corm methyl } } storage Captan } } Thiram } } bulb treatment prior (E,G) } } to planting
	Gladiolus break	Leaves are mottled with whitish streaks. Virus-infected plants show color break in flowers.	(E,G)
	Leafspot	Oval tan to brown spots on leaves and stems.	Bordeaux mixture, copper sulphate (Basic), mancozeb
	Penicillium rot	Fungus causes sunken lesions on corm. Entire corm becomes soft and punky. Oftentimes a green mold can be seen on infected corms.	Benomyl (after digging), folpet
	Scab	Infected leaves develop small reddish-brown spots on leaf blade. Symptoms on corms include shallow circular brown lesions with raised tissue surrounding lesions.	Thiram dust to corms (D,H,I,L)
Hawthorn	Rust	Small white tube-like structures are produced on leaves and fruits which release orange fungal spores.	Chlorothalonil, mancozeb, sulphur
Hollyhock	Rust	Small lesions develop on underside of leaf. Yellow spots with reddish centers appear on upper leaf surface.	Chlorothalonil, coppers, mancozeb, sulphur, zineb (H)
Honeysuckle	Leaf blight	The disease first appears on newly developing leaves in spring. Affected leaves turn tan, then become dry and brittle. The leaves often twist or curl and drop prematurely. A white powdery mass of the fungus forms on the <i>lower</i> surface of the leaf (compared to upper surface for powdery mildew).	Mancozeb (H,O)
	Powdery mildew	Powdery mildew normally occurs later in the growing season. The disease may be confused with leaf blight; here the white powdery appearance occurs on <i>both</i> the upper and lower leaf surface.	Benomyl, sulphur (W)
Horse Chestnut, Buckeye	Leaf blight Leaf blotch	Large or small light reddish-brown spots with bright yellow borders occur on the leaf.	Chlorothalonil, lime sulphur, mancozeb (O)
Hydrangea	Powdery mildew	White powder-like fungal growth on surface of leaves.	Benomyl, thiophanate-methyl (J)
Iris	Bacterial soft rot	Affected plants develop a water-soaked appearance to the leaves. Rhizomes develop a foul-smelling soft rot; the disease often follows injury caused by the iris borer.	(E,G,H)
	Iris leaf spot	Circular to oval straw-colored spots develop on leaves; spots surrounded by a brown to purple margin.	Benomyl, chlorothalonil, mancozeb, maneb, thiophanate-methyl or ethyl, triadimefon (J,O)

**RECOMMENDATIONS FOR DISEASE CONTROL ON ORNAMENTALS
(Flowers, Shade Trees, and Shrubs)**

Plant	Disease	Symptoms	Control
Iris (continued)	Scorch (cause unknown)	Central leaves wither and die back from tips. Affected leaves may turn reddish-brown. Rhizome remains firm but center of roots rot, leaving outer layer. Roots collapse and can easily be pulled from the rhizome.	(I,V)
Juniper	Phomopsis blight	Initially twig tips turn brown followed by progressive dieback of the branch.	Bordeaux, mancozeb (C)
Lilac	Bacterial blight	This disease occurs in the spring. Affected leaves and shoots first appear water-soaked but soon darken and shrivel as if scorched by fire. Succulent growth is more susceptible.	Bordeaux, copper sulfate (Basic) (H)
	Powdery mildew	White powdery patches develop on the surface of leaves, mostly in the fall.	Benomyl, sulphur, thiophanate-methyl, triadimefon, triforine
Lily	Botrytis blight	Orange to reddish-brown circular spots on leaves, stems, buds, and flowers. Grayish fungal growth appears in spots during wet weather.	Benomyl, chlorothalonil, mancozeb, maneb, thiophanate-methyl (H)
Maples	Anthracnose	Light brown irregular spots occur on the leaf. Distortion and defoliation can occur.	Basic copper, benomyl, bordeaux, thiophanate-methyl (W)
	Tar spot	Shiny black irregularly shaped, raised spots on surface of leaf.	(W)
Marigold	Aster-yellows	Affected leaves first develop yellowing along veins. Growing points turn light yellow-green and give rise to abnormal growth.	(E)
	Botrytis blight	Browning and decay of flowers. Grayish fungal growth appears on infected petals during wet weather.	Benomyl, mancozeb, thiophanate-methyl (E)
Oak	Anthracnose	Common on white and bur oak. Small to large spots on leaves may run together giving a blotchy appearance.	Benomyl, thiophanate-methyl
	Leaf blister	Circular to irregular raised areas on leaf are bluish white. Common on red oaks.	Chlorothalonil, mancozeb
	Oak wilt	Rapid wilting and death of leaves and branches. Most severe on red oak. See AG-FO-0612, Oak Wilt.	(V)
Pachysandra	Leaf and stem blight	Leaves first develop brown blotches; eventually the entire plant is blighted and dies.	Chlorothalonil Coppers Mancozeb (E,I,J) } Apply as drenching spray
Pansy	Anthracnose and leaf spot	Small spots develop on the leaves. Margins are marked with characteristic dark borders. Petals are also attacked.	Mancozeb, maneb (H)
	Botrytis blight	Disease is favored by cool moist weather conditions. Affected plant parts are covered with masses of gray spores.	Benomyl, sulphur, thiophanate-methyl (J,T)

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Plant	Disease	Symptoms	Control
Peony	Botrytis blight	Early in spring, young stalks suddenly wilt and fall over. Flower buds turn brown and dry up. When weather conditions are favorable, masses of gray spores cover affected tissue.	Benomyl, fixed copper, mancozeb, maneb (C,H)
	Leaf blotch	Spots on infected leaves take on a glossy purple color. Corresponding spots on underside of leaf are dull brown. Disease development is favored by cool moist weather conditions.	(O)
	Leaf and Stem spots	Fungi can affect stem, leaves, and flowers. Infection occurs on young succulent tissue. Spots appear as small elongated reddish areas which enlarge with red centers and gray borders. Similar symptoms are found on buds and leaf tissue.	(H)
	Phytophthora blight	Fungus attacks leaves, stems, and buds. Infected plant parts turn black and somewhat leathery. Entire shoot may turn black and die. Fungus can infect crown, causing a root rot.	Fixed copper, mancozeb, maneb (D,H,P)
	Sclerotinia stem rot	This pathogen is occasionally found on garden peony. Infected shoots wilt and die, and stems rot. When an infected stem is split, large black fruiting bodies of fungus can be seen.	(E,H,X)
	Verticillium wilt	Oftentimes plant wilts during blooming stage. When basal shoots are removed and cross sectioned, a dark ring can be seen. Fungus plugs the vascular tissue causing plant to wilt.	(E,L,X)
Periwinkle	Stem canker and leaf spot	Leaf spotting and blighting of foliage and stems.	Copper (H,I,J)
Petunia	Botrytis blight	Large areas of petals and leaves turn brown. Gray fungal growth may develop on infected plant parts.	Benomyl, chlorothalonil, thiophanate-methyl (H)
	Crown and root rot (damping off)	Black discoloration and dry rot of stem at the soil line. Plants eventually wilt and die.	(I,T)
	Powdery mildew	White powder-like growth on leaves.	Benomyl, coppers, sulphur, thiophanate-methyl, triadimefon (J)
	Root rot	Dark discoloration of roots and lower stem.	Benomyl } at thiophanate-methyl } planting
	White mold	Early death of plant. White mold growth may be present on exterior of lower stems.	
Phlox	Leaf blight (physiological)	Phenomenon is usually associated with older plants on shoots which give rise to new shoots in spring. Initial symptoms include leaf drop of lower foliage, which soon progresses upward until all leaves have fallen off.	(Y)

RECOMMENDATIONS FOR DISEASE CONTROL ON ORNAMENTALS
(Flowers, Shade Trees, and Shrubs)

Plant	Disease	Symptoms	Control
Phlox (continued)	Leaf spot (several fungi)	Most spots appear as small, dark circular lesions on lower leaves. Some spots may have light centers. Spotting may cause drying and premature death of leaves.	Benomyl, Bordeaux, sulphur, triforine (H,O)
	Powdery mildew	White powdery growth on leaves.	Benomyl, thiophanate-methyl, triadimefon (O)
Pine, Austrian	Diplodia blight	New growth is stunted. Needles turn brown and branch tip dies. An excessive amount of resin may be present.	Benomyl, Bordeaux
	Dothistroma blight	Dark spots or bands on 1-year-old needles. Tip of needle dies.	Bordeaux, chlorothalonil
Pine, red	Pine needle rust	White pustules form on needles which break open to release orange spores.	(S)
Pine, Scots	Brown spot	Reddish-brown spots with yellow margins develop on needles in late summer. Infected needles turn brown in the fall.	Bordeaux, chlorothalonil, mancozeb, maneb
	Lophodermium	Needles develop brown spots with yellow margins, then turn brown in the spring. Premature defoliation occurs.	Bordeaux, chlorothalonil, mancozeb, maneb
Poplar	Rust	Yellow-to-orange pustules form on lower leaf surface.	Triadimefon, triforine
	Septoria leaf spot	White to dark brown leaf spots, 1-15 mm in diameter and often coalescing.	Benomyl
Rose	Black spot	Circular black spots appear on upper side of leaf. Spots are frequently surrounded by a halo. Infected leaves turn yellow and fall prematurely. Cane infection produces reddish-purple spots.	Benomyl, captan, chlorothalonil, coppers, mancozeb, maneb, sulphur, thiophanate-methyl, triforine, zineb (H,O,Z)
	Botrytis blight	A smooth, slightly sunken grayish-black lesion may develop just below flower head destroying the bud. The bud frequently hangs over at or near the lesion. Fungus may also infect stub ends of stems from which flowers have been cut. Masses of gray spores may be present on infected tissue.	Benomyl, chlorothalonil (H)
	Cane cankers	Small spots or lesions form on canes, often at a pruning cut. These lesions may expand rapidly and kill the cane.	Prune out all cankered canes several inches below the margin of the discolored area. Maintaining a good control program for black spot will help reduce the incidence of rose canker.
	Crown gall	Formation of large irregular galls on the roots and root collar. Large galls can result in decreased vigor, stunting, and death.	(E,L,X,P)
	Powdery mildew	Fungus produces white growth on leaves. Infected leaves are distorted and stunted.	Benomyl, sulphur, triforine

**RECOMMENDATIONS FOR DISEASE CONTROL ON ORNAMENTALS
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Plant	Disease	Symptoms	Control
Rose (continued)	Rose mosaic	Leaves show a yellowing, mottling variegation, or ring-like patterns. Symptoms may not be visible in late summer or early fall. The virus is spread by propagation practices.	(L)
	Rust	Bright red-to-orange spots appear on leaves and stems.	Mancozeb, maneb, sulphur, triforine (H)
Salvia	Powdery mildew	White powdery growth on leaves.	Benomyl, thiophanate-methyl
Sedum	Powdery mildew	White powder-like growth on leaves.	Triadimefon
Snapdragon	Leaf blight and leaf spots	Look for spotting on foliage and flowers. Oftentimes small black fungal fruiting bodies can be seen on infected leaves. Growth masses of gray spores indicate Botrytis.	(V)
	Powdery mildew	White fungal growth appears on leaves. Leaf distortion and stunting may occur.	Benomyl, triadimefon, triforine (J)
	Stem rot	Water-soaked areas appear on the stem near soil line. Stems soon topple over and are sometimes covered with a white cottony fungal growth. Flower buds wilt. When stem is broken open, black fungal structures are found within.	Terraclor - soil treatment
	Rust	Symptoms include reddish spots on the underside of leaf. Severely infected plants wilt and die.	Mancozeb, maneb, sulphur, zineb (C,J)
Spirea	Leaf spot	Small tan, circular spots develop on leaves.	(W)
Spruce	Cytospora canker	Browning and death of lower branches. Copious amounts of bluish-white pitch or resin is common on dead and dying branches.	Fertilize and water to stimulate new growth. Prune infected branches close to trunk. (H,R)
	Rhizosphaera needlecast	Extensive needle defoliation, resulting in bare branches near the base and others with only green tips.	Bordeaux, chlorothalonil (R)
Sunflower	Powdery mildew	White powder-like fungal growth on leaves.	Sulphur, triadimefon
Sweet Pea	Anthracnose	White-to-tan area can be seen on leaves. Leaves often fall off at blooming time. The growing tips may shrivel and die. Entire flower stalk may be killed.	(L)
	Black root rot	Roots are rotten and lower stem is black. Top portion of plant is yellow and wilted.	Captan (soil treatment prior to planting)
	Pea mosaic	Young plants are stunted and leaves curled. Leaves yellow and become mottled. Infected plants produce few flowers. Blooms have discolored streaks.	(E,G)
	Powdery mildew	White powdery growth appears on the leaves. Leaves may be distorted and stunted.	Benomyl, sulphur

**RECOMMENDATIONS FOR DISEASE CONTROL ON ORNAMENTALS
(Flowers, Shade Trees, and Shrubs)**

Plant	Disease	Symptoms	Control
Tulip	Basal rot	Infected bulbs are dull white and base of bulbs is sunken. Disease occurs only in certain areas in the U.S.	(L)
	Botrytis blight	On the bulbs, black fungal structures can be seen in addition to brown lesions. Symptoms on leaf include water-soaked spots and yellowing. These enlarge, turn gray, and are covered with masses of gray spores. Blossoms can also be attacked; flecks appear on flowers.	Benomyl, mancozeb, thiophanate-methyl
	Crown rot and basal rot	Fungus is soil-borne; it enters roots and moves up to the bulb and leaf base. The flowers topple over. Often the bulbs become covered with brownish fungus which forms small black structures on rotting bulbs.	Terraclor (D,E,L)
	Stem rot	Infected stems turn brown to black near the soil line. Affected tissue is water soaked. Flowers topple over as stalks shrivel.	(I,J)
Viburnum	Powdery mildew	White powdery growth on the surface of leaves.	Chlorothalonil
Virginia Creeper (Woodbine)	Leaf spot	Affected plants develop large brown to gray leaf spots, often surrounded by a purple border.	(H,W)
Walnut	Anthracnose	Irregular dark brown to black spots on leaves. Some defoliation possible.	Benomyl, mancozeb, thiophanate-methyl
Yew (Taxus)	Dieback and decline (physiological)	Affected plants develop yellow foliage and branch dieback. Plants may eventually die.	(I, R)
Yucca	Leaf spot	Irregular brown spots on leaves.	Bordeaux, mancozeb (H)
Zinnia	Alternaria blight	Symptoms include small reddish-brown spots with gray centers. Dark-brown cankers occur on the stem. The fungus attacks the flowers, causing a stunting or complete blight.	Mancozeb, maneb
	Powdery mildew	White fungus growth appears on the leaves. Leaf stunting and distortion may occur.	Benomyl, chlorothalonil, sulphur, thiophanate-methyl, triadimefon, triforine (J)
	Root and stem rots	This disease is caused by several soil-borne fungi. Infected plants are stunted and pale yellow. Plants wilt because of rotted roots.	(I,J)
	Viruses	Several viruses can attack zinnia. Symptoms include stunting of plant, leaf mottling, and leaf distortion.	(E,G,L)
	White mold	Early death of plants. A white mold-like growth may be evident on the exterior of the main stem.	(E,F,I,L,V)

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