



Retail Garden Center Series: Homeowner Fungicide Products for Diseases of Ornamentals¹

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Introduction

Advising homeowner clientele as to proper fungicide selection and use is much more than making a product sale, satisfying a consumer need, and hopefully achieving a loyal customer. Garden center personnel must remember they are bound by the same Federal Insecticide Fungicide and Rodenticide Act (FIFRA) as are commercial producers.

This act and its many amendments allow the following:

1. use of a fungicide on a crop where the crop name exists on the label or falls within a generic category like "shrubs" or "flowers".
2. recommend product use for a disease not listed on the label as long as the crop exists on the label.
3. use of the product at or below label listed rate.
4. use of the product for an interval no shorter than the stipulated label interval.
5. use on plants in a site listed on the label: field/landscape, greenhouse, interior/interior landscape.
6. use of the product in an application mode specified on the label (e.g., spray or drench).
7. use of the product in tank-mix combinations with other pesticides or fertilizers where these uses **are not** prohibited by the label.

Fungicides do not always need to be recommended for disease management. Many times these products are recommended for "diseases" that are mistaken identities in Florida or cosmetic plant diseases that cause no appreciable harm to the plant. Where fungicides are needed, their strength can be enhanced by combination with such other management options as sanitation, improved variety selection, environmental manipulation (e.g. watering, fertilizing, etc). Recommend these pesticides to customers who have the tools to apply them properly and the commitment to apply them repeatably to achieve a desired level of disease management.

The following text defines the diverse active ingredients in common fungicides sold for urban disease management on ornamental plants. Categories of disease are described with specific trade name products, followed with plant clearances. Products with broad legal categorical use across ornamental plants are

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printed with bold type. A trade name/manufacturer address list follows at the end of the publication.

Captan--(cis-N-Trichloromethylthio-4-cyclohexene-1,2-dicarboximide)

Toxicity Class = IV

This is a protectant fungicide and seed treatment material that has broad use to control fungal root, stem, leaf, fruit and flower diseases on a variety of ornamental plants. Seed treatment use protects for only a few days during germination. Product can be used as a furrow or seed-flat drench for damping-off control. Check the label for specific plant clearances as these products are not broadly labelled.

Chlorothalonil--(Tetrachloroisophthalonitrile)

Toxicity Class = IV

This broad spectrum protectant fungicide has broad usage to control leaf and flower disease on ornamentals. Product labels are plant-specific in labelling, so read the label for legal use. This product is excellent as an alternative to systemic fungicide use.

Copper Bordeaux--($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ +hydrated lime)

Toxicity Class = III

This old fashioned mixture of copper sulfate and lime is a protectant fungicide with wide application for foliar bacterial and fungal disease control. This product leaves a considerable residue and may be phytotoxic in cool, damp weather compared to other copper-based fungicide formulations. Active against such diseases as fire blight, bacterial spots, algal leaf spots, downy mildews, powdery mildews and other fungal leafspot and blight diseases. This is the least desirable copper-based product for safe use on ornamentals.

Copper oleate-- $[\text{C}_8\text{H}_{17}\text{CH}:\text{CH}(\text{CH}_2)_7\text{COO}]_2\text{Cu}$

Toxicity Class = IV

One of several copper-based bactericides/fungicides that are protectant action only. These products are poorly soluble in water compared to newer fungicides and are toxic to fish. This product controls a similar range of diseases as Copper Bordeaux but offers greater plant

safety in cool, damp weather. Products may have plant-specific or categorical-use labels.

Copper resinate--(Copper salts of fatty and rosin acids)

Toxicity Class = IV

Another of several copper-based formulations active against bacterial and fungal diseases as a protectant. This active ingredient is similarly less soluble in water than newer fungicides, redistributes on leaves less effectively and can be toxic to fish if it enters bodies of water. Disease control is similar to Copper Bordeaux and is a safer formulation in cool, moist weather. Products may have plant-specific or categorical-use labels.

Copper sulfate, basic--($\text{Cu}_5\text{O}_4 \cdot 3\text{Cu}(\text{OH})_2\text{H}_2\text{O}$)

Toxicity Class = III

This protectant bactericide and fungicide shares the characteristics listed for copper oleate and copper resinate. Due to its higher percentage of copper, application during bright, hot afternoon may cause leaf spotting. Product labels may be either plant specific or categorical.

Mancozeb--(Coordination product of Zn^{++} and manganese ethylene bisdithiocarbamate)

Toxicity Class = IV

This product is more effective than its precursor maneb as a broad-spectrum control of foliar and flower diseases caused by fungi including the rust and downy mildew fungi. Product labels are generally plant specific. This is an excellent fungicide to alternate with such systemics as thiophanate methyl or triadimefon.

Maneb--(manganese ethylene bisdithiocarbamate)

Toxicity Class = IV

This product is less effective than the newer mancozeb-based products although sharing the ability to control the same broad range of foliar and flower fungi. It is also used in tank-mix combinations with copper-based products to improve bacterial disease control. Product labels are plant specific.

Metam sodium--(sodium N-methyldithiocarbamate)**Toxicity Class = II**

This broad spectrum liquid soil fumigant is effective against soil fungi, nematodes, soil insects and germinating weed seeds. This product is used by soil injection or sprinkler application and is more effective under a water seal or polyethylene tarp. This product requires a "Restricted Use" pesticide license to purchase and apply. Product broadly labeled for pre-plant use.

Methyl bromide--(bromomethane)**Toxicity Class = II**

A broad spectrum soil fumigant sold as a liquified gas under pressure. The active ingredient is colorless and odorless under ambient conditions and thus is packaged with at least a 2% chloropicrin (tear gas) component for safety purposes. Used as a preplant, injected soil fumigant to control fungi, nematodes, insects and weed seeds under a polyethylene tarp seal. This is a "Restricted Use" pesticide requiring a license to buy and apply. Product broadly labelled for preplant use.

N-alkyl ammonium chlorides -- (same)**Toxicity Class = IV**

This is a contact disinfectant product that is useful to clean working surfaces, pots, flats etc. prior to planting or seeding. It is inactivated by prolonged contact with organic matter and offers little persistence as a foliar fungicide. Do not recommend its use beyond damping-off or cutting rot control.

PCNB--(pentachloronitrobenzene=quintozene)**Toxicity Class = III**

This soil active protectant fungicide is used as a seed treatment, in furrow treatment or post-planting drench to control damping-off and root/stem rotting fungi like *Rhizoctonia solani* and *Sclerotium rolfsii*. Product labels are plant specific.

Streptomycin--(streptomycin sulfate or nitrate)**Toxicity Class = IV**

This is an antibiotic used in human medicine and plant disease management and is a by-product of a soil microbe. Although active against some fungi, the primary use of this product is for management of bacterial diseases. This is a locally systemic product that needs slow drying for best activity. Products have plant-specific labelling for use on chrysanthemum, dieffenbachia and philodendron only. **This product is not recommended for these uses in Florida by home owners.**

Sulfur--(sulfur)**Toxicity Class = IV**

This is both a fungicide and miticide across a broad range of plants. Formulations may include dusts, wettable powders and flowables. This fungicide is primarily useful for managing powdery mildew and rust diseases. Application under warm-to-hot temperatures may cause plant injury. Product labels may be either plant specific or categorical in use.

Thiophanate methyl -- (Dimethyl ((1,2-phenylene)bis-(iminocarbonothioyl)) biscarbamate or 4,4-o-phenylenebis(3-thioallophanate)**Toxicity Class = IV**

This product is a full systemic fungicide (upwardly mobile) that is closely related to benomyl. It has a broad use in the control of soilborne and foliar fungi-incited diseases. Product can be used as a drench for damping-off, seed decays, and root/stem rots caused by such fungi as *Cylindrocladium*, *Fusarium* and *Rhizoctonia* spp. As a foliar fungicide, benomyl controls a wide range of leaf spot, blights, and powdery mildews. Products containing benomyl often have broad, categorical use labels so that legal use is allowed for most ornamental plants if they can be considered either "Flowers, Ornamentals or Shade Trees." Repeated use of this product without alternation or tank-mixing with an unrelated active ingredient may lead to fungal tolerance developing - especially with powdery mildew fungi and *Botrytis* sp.

Thiram--(Bis(dimethylthio-carbamoyl) disulfide or tetramethylthiuram disulfide)**Toxicity Class = III**

This is a broad-spectrum seed treatment that is protectant in action. Product has a plant-specific label for bulb and corm treatment.

Triadimefon --(1-(4-chlorophenoxy)-3,3-dimethyl-1-(1H-1,2,4-triazol-1-yl)-2-butanone)**Toxicity Class = III**

This is one of the newer, full systemic fungicides (upwardly mobile) with curative action. This chemistry has growth regulation effect by activity, excessive use should be avoided. Strength of this fungicide includes powdery mildew, rust, and certain other foliar and flower-infecting fungi. Labels are plant specific and quite extensive. This product should not be used repeatedly nor alternated with such other products as Banner™ or Rubigan™ because of the risk of fungal tolerance developing.

Triforine--(N,N'-1,4-piperazinediylbis(2,2,2-trichloro-ethylidene)-bis-(formamide))**Toxicity Class = IV**

This is a popular local systemic fungicide that moves upward within the plant and has some curative ability. The active ingredient is effective against powdery mildews, rusts, and other fungal diseases of ornamentals. Product labels are plant-specific.

HOMEOWNER TRADE NAME FUNGICIDES FOR DISEASE CONTROL ON ORNAMENTALS Seed Decay & Damping-off Diseases

These diseases are caused by seedborne or soilborne fungal pathogens. Fumigants can be used to eradicate soilborne pathogens before planting. Seed treatment fungicides will often confer several days protection for germinating seeds - especially in cool, wet weather. Other fungicides can be mixed in the furrow or drenched over the top during active periods of seedling death.

Bonide Bulb Dust (thiram + insecticide) -- gladiolus, lily, narcissus, tulip, iris, hyacinth.

Bonide Captan - (captan) -- azalea, carnation, chrysanthemum, gladiolus, tuberose begonia.

Dragon Captan Wettable (captan) -- azalea cuttings.

Dragon Systemic Fungicide 3336WP (thiophanate methyl) -- herbaceous annuals, perennials and bedding plants, bulb rots of daffodil, easter lily, gladiolus, iris, tulip.

Dutch Bulb & Gladiolus Dust (thiram + insecticide) -- gladiolus, hyacinth, iris, lily, narcissus, tulip.

Fertilome Halt Systemic (thiophanate methyl) -- seed

and cutting rots on flowers and ornamentals caused by *Fusarium*, *Cylindrocladium*, *Rhizoctonia*, *Sclerotinia* and *Thielaviopsis* spp.

Green Light Systemic Fungicide (thiophanate methyl)

-- herbaceous annuals, perennials and bedding plants to control *Fusarium*, *Cylindrocladium*, *Rhizoctonia*, *Sclerotinia* and *Thielaviopsis* sp. and to control bulb rots of daffodil, easter lily, gladiolus, iris and tulip.

Hi-Yield Consan 20 (n-alkyl ammonium chlorides) -

seeds, seedlings.

Maril Physan 20 (n-alkyl ammonium chlorides) --

seeds, seedlings.

Rigo Captan Garden Fungicide (captan) -- azalea, carnation, chrysanthemum cuttings and gladiolus and tuberous begonia decay.

SA Captan Fungicide (captan) -- cutting rot of azalea, carnation & chrysanthemum; bulb/corm rot of gladiolus and tuberous begonia.

SA Thiomyl Systemic Fungicide (thiophante methyl)

-- seed and cutting rots on flowers and ornamentals caused by *Fusarium*, *Cylindrocladium*, *Rhizoctonia*, *Sclerotinia* and *Thielaviopsis* spp.

SA Terraclor Fungicide (PCNB) -- soil incorporated spray for dry rot fungi control for calendula, larkspur, snapdragon and sweet pea.

Security Captan Garden Spray (captan) -- azalea, carnation & chrysanthemum cutting rots; gladiolus and tuberous begonia decays.

***Great Lakes Meth-o-Gas, Terr-o-Gas (methyl bromide/chloropicrin)** -- generic plant bed, row treatment fumigant.

***Green Light Vapam Soil Conditioner (metam sodium)** -- generic plant bed or row treatment fumigant.

***Zeneca Vapam (metam sodium)** -- generic plant bed or row treatment fumigant.

***Please note that these products are RESTRICTED USE PESTICIDES**

Root and Stem Rot Diseases

Soil fungi cause two major types of root/stem diseases; the wet rot diseases caused by the water fungi *Phytophthora* and *Pythium* spp. and the dry rot diseases caused by *Rhizoctonia*, *Fusarium*, etc. These fungi can be managed by pre-plant soil fumigation. There are no homeowner-sized products for control of the wet root rot diseases at this time.

Bonide Captan (captan) -- azalea, carnation, chrysanthemum cutting use.

Dragon Systemic Fungicide 3336WP (thiophanate methyl) -- herbaceous annuals, perennials, bedding plants, azaleas, conifers, poinsettias, and rhododendrons.

Ferti-Lome Halt Systemic (thiophanate methyl) -- herbaceous annuals, perennials, bedding plants, azaleas, conifers, poinsettias, and rhododendrons.

Green Light Systemic Fungicide (thiophanate methyl)

-- to control stem, crown and root rots of herbaceous annuals, perennials, and bedding plants caused by *Fusarium*, *Cylindrocladium*, *Rhizoctonia*, *Sclerotinia*, and *Thielaviopsis* as a drench.

SA Thiomyl Systemic Fungicide (thiophanate methyl)

-- to control stem, crown and root rots of herbaceous annuals, perennials, and bedding plants caused by *Fusarium*, *Cylindrocladium*, *Rhizoctonia*, *Sclerotinia*, and *Thielaviopsis* as a drench.

SA Terraclor Fungicide (PCNB) -- *Rhizoctonia* dry root/stem rot control on African violet, begonia, carnation, chrysanthemum, poinsettia, snapdragon bedding plants as a drench. Bulb and/or corm rot control for iris, hyacinth, narcissus, tulip and gladiolus as a dip or soil incorporated treatment.

***Great Lakes Meth-o-Gas, Terr-o-Gas (methyl bromide/chloropicrin)** -- generic plant bed, row treatment fumigant.

***Green Light Vapam Soil Conditioner (metam**

sodium) -- generic plant bed or row treatment fumigant.

***Zeneca Vapam (metam sodium)** -- generic plant bed or row treatment fumigant.

***Please note that these products are RESTRICTED USE PESTICIDES**

Bacterial Foliar Diseases

Many ornamental plant species are plagued with leaf or twig diseases caused by bacterial pathogens. Incidence is often correlated to cool-to-warm, wet season periods that favor bacterial diseases. Use of overhead irrigation - especially late in the day, will serve to increase disease severity.

Acme Bordeaux Mixture (copper sulfate) -- geranium, ivy, lilac

American Copper Fungicide (copper oleate) -- azalea, begonia, chrysanthemum, dahlia, delphinium, rose, snapdragon, stock, sweet peas.

Bonide Copper (copper sulfate) -- azalea, begonia, chrysanthemum, **flowering shrubs**, gardenias, hawthorn, maple, marigold, phlox, pine, philodendron, rose, stock.

Bonide Copper (copper sulfate + lime) -- aster, azalea, begonia, chrysanthemum, **flowering shrubs**, gardenia, marigold, phlox, philodendron, rose, stock.

Bonide Fire Blight Spray (streptomycin sulfate) -- chrysanthemum, dieffenbachia, philodendron, pyracantha, rose.

Bonide Garden Dust (copper sulfate, basic + sulfur + insecticides) -- rose.

Bonide Rotenone - Copper Dust (copper sulfate, basic + insecticide) -- aster, azalea, begonia, chrysanthemum, **flowering shrubs**, gardenia, marigold, phlox, rhododendron, rose, stock.

Dragon Bordeaux Mix (copper sulfate, basic + lime) -- chrysanthemum, geranium, ivy, lilac, phlox, rhododendron.

Dragon Copper Dragon Tomato & Vegetable Dust (copper sulfate, basic + insecticide) -- azalea, rose and **ornamentals**.

Dragon Copper Fungicide (copper resinate) -- azalea, begonia, chrysanthemum, **foliage plants**, hydrangea, ivy, ixora, magnolia, philodendron, pyracantha, rose.

Ferti-lome Black Spot & Powdery Mildew Control (copper oleate) -- azalea, begonia, chrysanthemum, dahlia, delphinium, rose, snapdragon, stock, sweet peas.

Ferti-lome Fire Blight Spray (streptomycin sulfate) -- chrysanthemum, dieffenbachia, philodendron, rose.

Ferti-lome Triple-Action (copper oleate + insecticides) -- flowers, roses, shrubs, shade trees.

Hi-Yield Bordeaux Mix (copper sulfate + lime) -- azalea, chrysanthemum, dahlia, geranium, ivy, phlox, rhododendron.

Hi-Yield Consan 20 (n-alkyl ammonium chlorides) -- orchids.

Maril Physan 20 (n-alkyl ammonium chlorides) -- orchids.

Natural Guard Bordeaux Mix (copper sulfate + lime) -- azalea, chrysanthemum, dahlia, geranium, ivy, phlox, rhododendron.

Natural Guard Liquid Copper Fungicide (copper oleate) -- roses, flowers, shrubs.

SA Liquid Copper Fungicide (copper resinate) -- azalea, begonia, chrysanthemum, **foliage plants**, gardenia, hydrangea, ivy, ixora, philodendron, pyracantha, rose.

SA Streptomycin Sulfate 17 (streptomycin sulfate) -- chrysanthemum, dieffenbachia, philodendron.

Sunniland Copper-cide Liquid Fungicide -- (copper resinate) -- rose, sycamore.

FUNGAL FOLIAR & FLOWER DISEASES

Powdery Mildews

These diseases are the most obvious plant diseases to recognize in the home yard. The common symptom is the obvious powdery white fungal growth on the upper leaf surface most often, although lower leaf surface, flowers, and stems can be invaded. This disease is prevalent only in the late fall through mid-spring seasons.

Acme Bordeaux Mixture (copper sulfate) -- geranium, ivy, lilac.

Bonide Bayleton Systemic Fungicide (triadimefon) -- some 40 flowering and foliage species outside or in the greenhouse plus 49 shade and ornamental tree and shrub species.

Bonide Copper (copper sulfate) -- **flowering shrubs**, rose.

Bonide Earth Friendly Rose & Flower Dust (copper + sulfur + insecticides) -- **ornamentals**, rose.

Bonide Garden Dust (copper + sulfur + insecticide) -- rose.

Bonide Liquid Copper (copper resinate) -- rose.

Bonide Liquid Fungicide (chlorothalonil) -- rose, viburnum, zinnia.

Bonide Rotenone - Copper Dust (copper sulfate + insecticide) -- rose.

Bonide Sulfur Plant Fungicide (sulfur) -- **ornamental shrubs, perennials**, roses.

Dexol Fungicide Containing Daconil (chlorothalonil) -- rose, zinnia.

Dragon Copper (copper resinate) -- rose.

Dragon Daconil 2787 (chlorothalonil) -- ash, azalea, buckeye, cherry laurel, chrysanthemum, daisy, dogwood, euonymus, flowering crabapple, hawthorn, hollyhock, horse chestnut, hydrangea, mahonia, oak (red), photinia, poplar, pyracantha, rose, sycamore, viburnum, zinnia.

Dragon Systemic Fungicide 3336WP (thiophanate methyl) -- roses, flowers, ornamentals and shade trees.

Dragon Wettable or Dusting Garden Sulphur (sulfur) -- aster, azalea, calendula, carnation, chrysanthemum, clematis, crape myrtle, dogwood, dahlia, delphinium, hydrangea, ligustrum, lilac, maple, phlox, rhododendron, rose, snapdragon, sweet peas, zinnia.

Dragon Rose and Flower Dust (chlorothalonil + sulfur + insecticide) -- aster, hydrangea, rose, sweet peas, zinnias.

Ferti-lome Black Spot & Powdery Mildew Control (copper oleate) -- azalea, begonia, camellia, chrysanthemum, crape myrtle, dahlia, delphinium, fuchsia, lilac, rose, snapdragon, stock, sweet pea.

Ferti-lome Dusting Sulfur (sulfur) -- aster, azalea, buttonbush, calendula, carnation, cedar, cherry laurel, chrysanthemum, clematis, columbine, cosmos, crape myrtle, dahlias, daisy, delphinium, dogwood, English ivy, euonymus, foxglove, gladiolus, golden fleece, hibiscus, holly, hollyhock, hydrangea, juniper, lady's mantle, ligustrum, lilac, petunia, poplar, sage, silver vine, smilax, snapdragon, spiraea, sunflower, sweet pea, verbena, violet, willow. **Generally clear for use on flowers, ornamentals, roses and shrubs.**

Ferti-lome Fire Blight Spray (streptomycin sulfate) -- chrysanthemum, dieffenbachia, philodendron, rose.

Ferti-lome Halt Systemic (thiophanate methyl) -- broad use on flowers, ornamentals, roses and shade trees.

Ferti-lome Liquid Fungicide (chlorothalonil) -- chrysanthemum, rose, zinnia.

Green Charm Multi-Purpose Fungicide (chlorothalonil) -- ash, azalea, buckeye, carnation, chamaedorea palm, cherry laurel, chrysanthemum, daisy, dogwood, dracaena, euonymus, flowering crabapple, geranium, gladiolus, hawthorn, holly, hollyhock, horse chestnut, hydrangea, iris, leatherleaf fern, ligustrum, lily, mahonia, maranta, oak (red), oyster plant, petunia, philodendron, photinia, pine, poplar, pyracantha, rose, statice, sycamore, syngonium, viburnum, zinnia.

Green Light Fung-Away Fungicide (triadimefon) -- some 40 flowering and foliage species outside or in the greenhouse plus 49 shade and ornamental tree and shrub species.

Green Light Systemic Fungicide (thiophanate methyl) -- broad use on flowers, ornamentals, roses and shade trees.

Green Thumb Lawn & Garden Fungicide (chlorothalonil) -- rose, zinnia.

Hi-Yield Rose, Flower and Vegetable Dust (sulfur + insecticide) -- flowers, roses, shrubs, trees.

Natural Guard Rose, Floral & Vegetable Dust (sulfur + insecticide) -- roses and flowers.

Natural Guard Wettable Sulphur (sulfur) -- aster, azalea, buttonbush, calendula, carnation, cedar, cherry laurel, chrysanthemum, clematis, columbine, cosmos, crape myrtle, dahlias, daisy, delphinium, dogwoods, English ivy, euonymus, foxglove, gladiolus, golden fleece, hibiscus, holly, hollyhock, hydrangea, juniper, lady's mantle, ligustrum, lilac, petunia, poplar, sage, silver vine, smilax, snapdragon, spiraea, sunflower, sweet pea, verbena, violet, willow. **Generally clear for use on flowers, ornamentals, roses and shrubs.**

Ortho Rose Pride Funginex Rose & Shrub Disease Control (triforine) -- asters, azalea, begonia, calendula, carnation, crape myrtle, dahlia, delphinium, euonymus, Jerusalem thorn, kalanchoe, oxalis, phlox, photinia, poplar, rose, snapdragon, sycamore, zinnia.

Ortho Multi-Purpose Fungicide Daconil 2787 (chlorothalonil) -- ash, azalea, buckeye, carnation, chamaedorea palm, cherry laurel, chrysanthemum, daisy, dogwood, dracaena, euonymus, flowering crabapple, geranium, gladiolus, hawthorn, holly,

hollyhock, horse chestnut, hydrangea, iris, leatherleaf fern, ligustrum, lily, mahonia, maranta, oak (red), oyster plant, petunia, philodendron, photinia, pine, poplar, pyracantha, rose, statice, sycamore, syngonium, viburnum, zinnia.

Ortho Rose Pride Orthenex Insect & Disease Control (triforine + insecticide) -- aster, calendula, carnation, crape myrtle, dahlia, euonymus, Jerusalem thorn, phlox, photinia, rose, snapdragon, zinnia.

Pennington's Pride Multi-Purpose Fungicide (chlorothalonil) -- ash, azalea, buckeye, carnation, chamaedorea palm, cherry laurel, chrysanthemum, daisy, dogwood, dracaena, euonymus, flowering crabapple, geranium, gladiolus, hawthorn, holly, hollyhock, horse chestnut, hydrangea, iris, leatherleaf fern, ligustrum, lily, mahonia, maranta, oak (red), oyster plant, petunia, philodendron, photinia, pine, poplar, pyracantha, rose, statice, sycamore, syngonium, viburnum, zinnia.

Pro Care Multi-Purpose Fungicide (chlorothalonil) -- ash, azalea, buckeye, carnation, chamaedorea palm, cherry laurel, chrysanthemum, daisy, dogwood, dracaena, euonymus, flowering crabapple, geranium, gladiolus, hawthorn, holly, hollyhock, horse chestnut, hydrangea, iris, leatherleaf fern, ligustrum, lily, mahonia, maranta, oak (red), oyster plant, petunia, philodendron, photinia, pine, poplar, pyracantha, rose, statice, sycamore, syngonium, viburnum, zinnia.

Rigo's Best Lawn & Garden Fungicide (chlorothalonil) -- chrysanthemum, rose, zinnia.

SA Lawn Ornamental & Vegetable Fungicide (chlorothalonil) -- chrysanthemum, geranium, rose, zinnia.

SA Systemic Fungicide for Turf & Ornamentals (triadimefon) -- some 40 flowering and foliage species outside or in the greenhouse plus 49 shade and ornamental tree and shrub species.

SA Thiomyl Systemic Fungicide (thiophanate methyl) -- broad use on flowers, ornamentals, roses and shade trees.

SA Wettable or Dusting Sulfur (sulfur) -- aster, azalea, calendula, chrysanthemum, crape myrtle, dahlia, delphinium, dogwood, ligustrum, maple, phlox, rhododendron, rose, snapdragon, zinnia.

Security Fungi-Gard (chlorothalonil) -- dogwood, mahonia, rose, viburnum, zinnia.

Security Nutonex (sulfur) -- aster, chrysanthemum, cosmos, dahlia, delphinium, dogwood, euonymus,

Golden Fleece, hibiscus, honeysuckle, hydrangea, Lady's Mantle, ligustrum, lilac, phlox, poplar, silver vine, rose, spirea, sunflower, verbena, willow, zinnia.

Other Fungal Diseases of Foliage and Flowers

Many ornamental plants are subject to a wide array of leaf and flower diseases caused by fungi. These diseases include the following: anthracnose, blights, leaf spots, rusts, scabs, etc. Severity depends on the specific host:fungus combination involved. Disease severity can be slowed through careful sanitation of diseased plant parts, water management, and use of appropriate fungicides when needed.

Please Note: Products that contain a copper-based active ingredient listed under "Bacterial Foliar Diseases" will also assist in management of some of these diseases.

Acme Bordeaux Mixture (copper sulfate + lime) -- arborvitae, boxwood, camellia, cedar, cypress, dahlia, dogwood, delphinium, elm, geranium, gladiolus, iris, ivy, juniper, laurel, lilac, lily, linden, maple, oak, palms, peony, pine, rhododendron, sycamore, tulip, tulip tree, yew.

Black Leaf Lawn & Garden Fungicide (chlorothalonil) -
- chrysanthemum, geranium, iris, philodendron, rose, zinnia.

Black Leaf Liquid Copper Fungicide (copper resinate) -
sycamore.

Bonide A Complete Fruit Tree Spray (captan + insecticides) -- evergreens, flowers, roses, ornamentals.

Bonide Bayleton Systemic Fungicide (triadimefon) -- some 40 flowering and foliage species outside or in the greenhouse plus 49 shade and ornamental tree and shrub species.

Bonide Captan 50% WP (captan) - carnation, chrysanthemum, rose.

Bonide Copper (copper sulfate) -- azalea, begonia, chrysanthemum, **flowering shrubs**, gardenia, hawthorn, maple, marigold, phlox, pine, rhododendron, rose, stock.

Bonide Earth Friendly Rose & Flower Dust (copper + sulfur + insecticides) -- ornamentals, pine, rose.

Bonide Fruit Tree Spray (captan + insecticides) -- flowers, evergreen, ornamentals, roses.

Bonide Garden Dust (copper + sulfur + insecticide) -- rose.

Bonide I.M.F. (captan + insecticides) -- arborvitae, azalea, carnation, chrysanthemum, gladiolus, hydrangea, juniper, rose, zinnia.

Bonide Liquid Copper (copper resinate) -- cedar rust on cedar.

Bonide Liquid Fungicide (chlorothalonil) -- azalea, carnation, cherry laurel, chrysanthemum, daisy, crabapple, dogwood, geranium, gladiolus, hawthorn, hollyhock, iris, lily, mahonia, privet, rose, viburnum, zinnia.

Bonide Mancozeb Flowable with Zn (mancozeb) -- azalea, begonia, chrysanthemum, geranium, lily, peony, rhododendron, rose, zinnia.

Bonide Mancozeb Plant Fungicide (mancozeb) -- african violet, arborvitae, ash, aster, begonia, carnation, cedar, chrysanthemum, conifers, crabapple, dieffenbachia, dracaena, elm, euonymus, fern, Ficus, fuchsia, geranium, gladiolus, hawthorn, holly, honeysuckle, hydrangea, iris, juniper, lily, magnolia, marigold, narcissus, oak, orchids (dendrobium), pansy, philodendron, pyracantha, rose, tulip, zinnia.

Bonide Rose Spray II (captan + insecticide) -- evergreens, flowers, ornamentals, rose.

Bonide Rose & Flower Spray/Dust (captan + insecticide) -- evergreens, flowers, ornamentals, rose.

Bonide Rotenone - Copper Dust (copper sulfate + insecticide) -- arborvitae, aster, azalea, begonia, chrysanthemum, flowering shrubs, gardenia, hawthorn, maple, marigold, oak, phlox, rose, stock.

Bonide Sulfur Plant Fungicide (sulfur) -- ornamental shrubs, perennials, roses.

Dexol Fungicide Containing Daconil (chlorothalonil) -- chrysanthemum, geranium, iris, philodendron, rose, zinnia.

Dragon Bordeaux Mix (copper sulfate + lime) -- arborvitae, azalea, barberry, boxwood, chrysanthemum, cypress, dahlia, dogwood, elm, geranium, gladiolus, hollyhock, iris, ivy, juniper, laurel, lilac, lily, linden, maple, oak, pansy, peony, phlox, pine, rhododendron, sycamore, tulip, yew, willow.

Dragon Captan Wettable (captan) -- azalea, camellias, chrysanthemum, rose.

Dragon Copper (copper resinate) -- azalea, begonia, camellia, chrysanthemum, gardenia, cotoneaster,

- foliage plants**, hydrangea, iris, ivy, magnolias, palms, philodendron, pacysandra, pyracantha, rose.
- Dragon Daconil 2787 (chlorothalonil) -- ash, azalea, buckeye, carnation, chamaedorea palm, cherry-laurel, chrysanthemum, conifers, daisy, dogwood, dracaena, euonymus, flowering crabapple, geranium, gladiolus, hawthorn, holly, hollyhock, horse chestnut, hydrangea, iris, leatherleaf fern, ligustrum, lily, Mt. laurel, mahonia, parlor palm, petunia, philodendron, photinia, poplar, maranta, oyster plant, red oaks, rose, statice, sycamore, syngonium, zinnia.
- Dragon Ferbam (ferbam) -- carnation, chrysanthemum, peony, tulip, rose, snapdragon.
- Dragon Mancozeb Disease Control (mancozeb) -- cleared on 68 ornamental plants plus conifers.
- Dragon Rose and Flower Dust (chlorothalonil + sulfur + insecticide) -- aster, hydrangea, rose, sweet peas, zinnia.
- Dragon Systemic Fungicide 3336WP (thiophanate methyl)** -- roses, flower, ornamentals, shade trees.
- Dragon Wettable or Dusting Garden Sulfur (sulfur) -- carnation, chrysanthemum, hollyhock, rose, snapdragon.
- Ferti-lome Liquid Fungicide (chlorothalonil) -- chrysanthemum, geranium, iris, rose, zinnia.
- Ferti-lome Halt Systemic (thiophanate methyl)** -- flowering and woody ornamentals.
- Green Charm Multi-Purpose Fungicide (chlorothalonil) -- ash, azalea, buckeye, carnation, chamaedorea palm, cherry laurel, chrysanthemum, daisy, dogwood, dracaena, euonymus, flowering crabapple, geranium, gladiolus, hawthorn, holly, hollyhock, horse chestnut, hydrangea, iris, leatherleaf fern, ligustrum, lily, mahonia, maranta, oak (red), oyster plant, petunia, philodendron, photinia, pine, poplar, pyracantha, rose, statice, sycamore, syngonium, viburnum, zinnia.
- Green Light Broad Spectrum Mancozeb Fungicide (mancozeb) -- azaleas, camellia, carnation, hollyhock, iris, rhododendron, rose.
- Green Light Fung-Away Fungicide (triadimefon) -- some 40 flowering and foliage species outside or in the greenhouse plus 49 shade and ornamental tree and shrub species.
- Green Light Systemic Fungicide (thiophanate methyl)** -- broad use on flowers, ornamentals, and shade trees.
- Green Light Wettable Dusting Sulfur (sulfur) -- carnation, chrysanthemum, hollyhock, rose, snapdragon.
- Green Thumb Tri-Basic Bordeaux Powder (copper sulfate + lime) -- elm, linden, maple, oak.
- Green Thumb Lawn & Garden Fungicide (chlorothalonil) -- chrysanthemum, geranium, iris, rose, zinnia, philodendron.
- Hi-Yield Bordeaux Mix (copper sulfate + lime) -- for use on 30 ornamental plants.
- Hi-Yield Maneb Lawn & Garden Fungicide (maneb) -- azalea, camellia, carnation, dogwood, geranium, hydrangea, lily, pansy, rose.
- Natural Guard Bordeaux Mix (copper sulfate + lime) -- for use on 30 ornamental plants.
- Natural Guard Liquid Copper Fungicide (copper oleate)** -- roses, flowers, shrubs.
- Ortho Rose Pride Funginex Rose and Shrub Disease Control (triforine) -- asters, azalea, begonia, calendula, carnation, crape myrtle, dahlia, delphinium, euonymus, Jerusalem thorn, kalanchoe, lilac, oxalis, phlox, photinia, poplar, rose, snapdragon, sycamore, zinnia.
- Ortho Multi-Purpose Fungicide Daconil 2787 (chlorothalonil) -- ash, azalea, buckeye, carnation, chamaedorea palm, cherry laurel, chrysanthemum, dogwood, dracaena, euonymus, flowering crabapple, geranium, gladiolus, hawthorn, holly, hollyhock, horse chestnut, hydrangea, iris, leatherleaf fern, ligustrum, lily, mahonia, maranta, oak (red), oyster plant, petunia, philodendron, photinia, pine, poplar, pyracantha, rose, statice, sycamore, syngonium, viburnum, zinnia.
- Ortho Rose Pride Orthenex Insect & Disease Control (triforine + insecticide) -- aster, calendula, carnation, crape myrtle, dahlia, euonymus, Jerusalem thorn, phlox, photinia, rose, snapdragon, zinnia.
- Pennington's Pride Multi-Purpose Fungicide (chlorothalonil) -- ash, azalea, buckeye, carnation, chamaedorea palm, cherry laurel, chrysanthemum, daisy, dogwood, dracaena, euonymus, flowering crabapple, geranium, gladiolus, hawthorn, holly, hollyhock, horse chestnut, hydrangea, iris, leatherleaf fern, ligustrum, lily, mahonia, maranta, oak (red), oyster plant, petunia, philodendron, photinia, pine, poplar, pyracantha, rose, statice, sycamore, syngonium, viburnum, zinnia.
- Pro-Care Multi-Purpose Fungicide (chlorothalonil) -- ash, azalea, buckeye, carnation, chamaedorea palm,

cherry laurel, chrysanthemum, daisy, dogwood, dracaena, euonymus, flowering crabapple, geranium, gladiolus, hawthorn, holly, hollyhock, horse chestnut, hydrangea, iris, leatherleaf fern, ligustrum, lily, mahonia, maranta, oak (red), oyster plant, petunia, philodendron, photinia, pine, poplar, pyracantha, rose, statice, sycamore, syngonium, viburnum, zinnia.

Rigo's Best Captan Garden fungicide (captan) -- carnation, chrysanthemum, rose.

Rigo's Best Lawn & Garden Fungicide (chlorothalonil) -- chrysanthemum, geranium, iris, philodendron, rose, zinnia.

SA Captan Fungicide (captan) -- carnation, chrysanthemum, rose.

SA Dithane M-45 (mancozeb) -- azalea, camellia, carnation, dahlia, holly, hollyhock, honeysuckle, iris, lily, ornamental crabapple, pansy, rhododendron, rose, snapdragon, tulip, zinnia.

SA Lawn Ornamental & Vegetable Fungicide (chlorothalonil) -- chrysanthemum, geranium, rose, zinnia.

SA Liquid Copper (copper resinate) -- azalea, begonia, camellia, cedar, chrysanthemum, coloneaster, foliage plants, gardenia, hydrangea, iris, ixora, ivy, juniper, magnolia, maple, oak, palm, pachysandra, philodendron, pyracantha, rose, sycamore.

SA Systemic Fungicide for Turf & Ornamentals (triadimefon) -- some 40 flowering and foliage species outside or in the greenhouse plus 49 shade and ornamental tree and shrub species.

SA Terraclor Fungicide (PCNB) -- azalea, camellia.

SA Terraclor 2E Lawn Fungicide (PCNB) -- azalea, camellia.

SA Thiomyl Systemic Fungicide (thiophanate methyl) -- flowering and woody ornamentals.

SA Tomato-Vegetable Dust (maneb + insecticide) -- gladiolus, rose, zinnia.

Security Captan Garden Spray (captan) -- chrysanthemum.

Security Fungi-Gard (chlorothalonil) -- ash, azalea, carnation, cherry laurel, chrysanthemum, crabapple, daisy, dogwood, firethorn, geranium, gladiolus, hawthorn, hollyhock, iris, leatherleaf fern, lily, mahonia, Mt. Laurel, oyster plant, petunia, philodendron, photinia, privet, quince, rose, viburnum, zinnia.

Security Nutronex (sulfur) -- calendula, cherry laurel, clematis, columbine, Eng. ivy, foxglove, hydrangea, petunia, phlox, sage, similax, snapdragon, and rose.

Sunniland Copper-Cide Fungicide (copper resinate) -- rose, sycamore.

Homeowner Pesticide Manufacturers

Acme -- PBI/Gordon Corp. PO Box 4090, Kansas City MO 64101

American Brand - Voluntary Purchasing Group
Bonham, TX 75418

Black Leaf -- Black Leaf Products Co. P.O. Box 189,
Buckner KY 40010

Black Leaf Lawn & Garden -- Wilbur-Ellis Co., 191 W.
Shaw Ave., Suite 107. Fresno, CA 93704-2876.

Bonide -- Bonide Products, Inc. 2 Wurz Avenue,
Yorkville, NY 13495

Dexol -- Dexol Industries, inc. 1450 W. 228th St.,
Torrance CA 90501

Dragon -- Dragon Corporation Box 7311 Roanoke, VA
24019

Ferti-lome -- Voluntary Purchasing Group Bonham, TX
75418

Great Lakes -- Great Lakes Chemical Corp. P.O. Box
2200 Hwy. 52NW, West Lafayette, IN 47906

Green Charm -- Gro-Tec, Inc. PO Box 1508, Covington
GA 30209

Green Light -- Green Light Company P.O. Box 17985,
San Antonio, TX 78217

Green Thumb -- Cotter & Co. c/o Black Leaf Products
PO Box 189, Buckner KY 40010

Hi-Yield -- Voluntary Purchasing Group Bonham, TX
75418

Maril Products, Inc. 620 South B St., Suite A. Tustin,
CA 92680

Natural Guard -- Voluntary Purchasing Group Bonham,
TX 75418

Ortho -- The Solaris Group Div. of Ag. Group
Monsanto Co. P.O. Box 5006, San Ramon CA 94583

Pennington's Pride -- Gro Tec, Inc. P.O. Box 1508,
Covington, GA 30209

Pro-Care -- Gro-Tec, Inc. PO Box 1508, Covington GA
30209

Rigo -- Rigo Company Div. of Wilbur-Ellis Co.
Buckner, KY 40010

SA -- Southern Agricultural Insecticides, Inc. P.O. Box
218, Palmetto, FL 34220

Security -- Farnam Companies, Inc. 301 W. Osborn Rd.
Phoenix, AZ 85013-3928

Sunniland -- Sunniland Corporation, P.O. Box 8001,
Sanford, FL 32772

Zeneca -- Zeneca Inc. Agricultural Products, 1200
South 47th St., Richmond, CA 94804