

HOMEOWNER FUNGICIDE GUIDE

Elizabeth Little, Extension Homeowner IPM Specialist

The following is a supplemental guide to fungicides which are readily available to homeowners. This guide is not intended to take the place of the individual product labels which are the best resource concerning the use of any pesticide. Most but likely not all of the current brand names are listed here. Follow label recommendations for application rates, methods and safety precautions when using all pesticides.

COMMON NAME (i.e. Active Ingredient)	BRAND NAME(S)	DISEASES CONTROLLED	COMMENTS
Aluminum tris	Monterey Aliette	Downy mildew on roses, Pythium and Phytophthora in ornamentals, bedding plants, conifers and turf, Fire blight on pear, pyracantha, and hawthorne.	Apply as spray or drench.
Bordeaux mixture (copper sulfate + hydrated lime)	Hi-Yield Bordeaux Mix Fungicide and others	Various diseases of fruits, vegetables and ornamentals including leaf curl on peaches and bitter rot, black rot and scab on apples. Labeled for many plants including apples, boxwoods, chrysanthemums, dahlias, iris, lilies, and tulips.	Protectant fungicide. This is a contact fungicide. Some sensitive plants require diluting the product to one half strength (depending on the product used – see label) to avoid phytotoxicity. These include geraniums, ivy, pansy, celery, strawberry, azaleas, dogwood, juniper, and rhododendron. Can cause phytotoxicity when applied to young, tender leaves of peach, plum, rose and apple. Should not be used during cool, wet weather as it can cause spotting or burning of leaves.
Captan	Ortho Home Orchard Spray, Dragon Fruit Tree Spray, Ferti-lome Fruit Tree Spray, Bonide Captan 50W, Bonide Rose Insect & Disease Control, and Hi-Yield Captan 50% WP	Good general fruit fungicide used for bitter rot, black rot, <i>Botryosphaeria</i> rot, flyspeck, sooty blotch, frog-eye leaf spot and scab control on apples, brown rot and scab on peaches and plums, Botrytis rot on strawberries, downy mildew, and black rot of grape. Also used for black spot of rose, powdery mildew on tuberous begonias, rust and leaf spot on carnations, Botrytis flower blight on chrysanthemums, petal blight of camellias, rot and/or damping off of cuttings (azaleas, carnations, chrysanthemums) and bulbs (gladiolus, tuberous begonias). General soil drench treatment for grass seedlings, cuttings and flower beds for damping off and root rot (<i>Rhizoctonia</i> spp.). Some products include grass (non- pasture/ grazing) label for brown patch, leaf spot, seedling blights and melting out (<i>Helminthosporium</i>) on St. Augustinegrass..	Broad spectrum protectant fungicide. This is a contact fungicide. Label indicates control of difficult to control diseases (i.e. root rots, petal blight of camellias) product actually gives suppression only. Does not control cedar apple rust. Combination fruit spray home orchard products also contain insecticides (usually malathion and methoxychlor) for control of home orchard insect pests. Do not combine with lime, lime-sulfur or Bordeaux mixture as fungicidal activity will be reduced. Do not apply Captan in combination with oil or near the time of oil sprays.
Chitin (organic)	Hi-Yield Nem-A-Cide	Nematodes	This is a soil amendment that increases growth of beneficial microorganisms that feed on chitin (nematode eggs and nematodes contain chitin). This is considered an ORGANIC product. A single application/year is usually sufficient.

HOMEOWNER FUNGICIDE GUIDE (continued)

COMMON NAME (i.e. Active Ingredient)	BRAND NAME(S)	DISEASES CONTROLLED	COMMENTS
Chlorothalonil	Ortho Garden Disease Control (Daconil 2787), Hi- Yield Daconil Lawn Vegetable Flower Fungicide, Fertilome Lawn & Garden fungicide, Fertilome Broad Spectrum Liquid Fungicide, and Bonide Fung-onil	<p>Many common fungal diseases including anthracnose, downy mildew, gray mold (<i>Botrytis</i>), powdery mildew, early blight and late blight on many vegetables including tomatoes.</p> <p>Downy mildew, anthracnose, fungal leaf spots, shot-hole, rusts, scab and powdery mildew on ornamentals.</p> <p>Some fruit diseases, including brown rot and scab on stone fruits.</p> <p>Listed vegetables, fruit trees, roses, flowers, shrubs and shade trees</p>	<p>The most widely used broad spectrum protectant fungicide. This is a contact fungicide.</p> <p>Not recommended for pittosporum or schefflera as phytotoxicity may result.</p> <p>Discoloration of blooms may occur, especially with roses.</p> <p>NO LONGER LABELED FOR HOMEOWNER TURF USE.</p>
Copper compounds	Bonide Copper Spray or Dust, Bonide Liquid Copper, Dragon Copper Fungicide, Hi- Yield Copper Fungicide, Fertilome Black Spot & Powdery Mildew control, and others	<p>Many fungal and bacterial diseases, including powdery and downy mildew, fungal leaf spots, anthracnose, bacterial leaf spot and/or blight, fire blight and rust on a wide variety of fruits, vegetables and ornamentals.</p>	<p>Broad spectrum protectant fungicide.</p> <p>Although considered "safe" by many organic growers, copper is toxic to humans so label directions and harvest intervals should as always be followed carefully.</p> <p>Discoloration of blooms can occur on certain varieties of ornamentals. To avoid this problem, do not spray prior to or during the flowering period. Foliage discoloration may occur with some plants as well. Refer to individual product label for plants which may be treated.</p>
Liquid lime-sulfur (calcium polysulfides)	Ortho Dormant Disease Control Lime-Sulfur Spray, Hi-Yield Improved Lime Sulfur Spray, Lilly Miller PolySul Summer and Dormant Spray Concentrate, Bonide Lime- Sulfur Spray, Bonide Oil Lime & Sulfur spray, and others	<p>Used in the dormant season to kill overwintering fungal spores of black spot, powdery mildew and rust of rose, leaf curl and shot-hole of peach, cane blight and leaf spot of brambles.</p> <p>Some brands labeled for delayed dormant and/or growing season applications for scab and powdery mildew of apple, anthracnose, rust and powdery mildew of blackberry and powdery mildew and scab on pear.</p> <p>During the growing season used for powdery mildew on many ornamentals and black spot of rose.</p>	<p>Broad spectrum protectant fungicide. This is a contact fungicide.</p> <p>Labeled for roses, peaches, pears, brambles, fruit trees, deciduous hedge plants, delphinium, lilacs, euonymous, columbine, crepe myrtle, sweet peas, zinnias, fruits, ornamentals, and tuberous begonias.</p> <p>Do not spray when temperature is expected to exceed 80F within 24 hours. Spray early in the morning or late in the evening to avoid burning of foliage.</p> <p>Also controls mites and scale.</p>
Mancozeb	Bonide Mancozeb Flowable with Zinc	<p>Many vegetable diseases including anthracnose, fungal leaf spots, downy mildew, early blight, gummy stem blight, late blight, scab, rust and smut.</p> <p>Many ornamental diseases including anthracnose, black spot, Botrytis, cedar-apple rust, downy mildew, fungal leaf spots, and other rusts.</p> <p>A few brands are labeled for common fungal lawn diseases.</p>	<p>Broad spectrum protectant fungicide. This is a contact fungicide.</p> <p>When applied to plants not on the label the product should be tested on a small area of the plant or small area of the planting first.</p> <p>Most small container products are not labeled for use on home fruit trees. Treated ornamentals should not be used for food purposes.</p> <p>Be sure to observe harvest intervals on label when applied to vegetables.</p>
Maneb	Hi-Yield Maneb Lawn and Garden Fungicide	<p>Diseases of shrubs, flowers, and turfgrass in the home landscape; various diseases of the following vegetables: beans, cucumbers, peppers, tomatoes, and watermelons.</p>	<p>General protectant fungicide. This is a contact fungicide.</p>

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COMMON NAME (i.e. Active Ingredient)	BRAND NAME(S)	DISEASES CONTROLLED	COMMENTS
Myclobutanil	Spectracide Immunox (several), Ferti-lome F-Stop Granular Fungicide, Green Light Fung-Away Systemic Granules	<p>Good for powdery mildew, black spot of rose, fungal leaf spots, rusts, anthracnose and other diseases of flowers and ornamental shrubs and trees.</p> <p>Controls brown patch, dollar spot, melting out, rust, large patch, fusarium blight, and anthracnose on lawns.</p> <p>Also controls powdery mildew, scab and rust on apples, brown rot and other diseases on stone fruits and anthracnose, black rot and powdery mildew on grapes.</p>	<p>Systemic fungicide.</p> <p>Provides better powdery mildew control than most other fungicides.</p> <p>Overdosage to ornamentals can result in foliar greening, shortened internodes and/or thickened leaves.</p> <p>For use on turf, proper identification of the causal disease organism is key. Contact local county agents for more information.</p> <p>Not labeled for vegetable crops.</p> <p>Avoid exclusive use of this product for resistance management.</p>
PCNB	Terraclor 75WP, Ferti-lome Azalea, Camellia, Crape Myrtle Insecticide and Fungicide, Hi-Yield Turf and Ornamental Fungicide (containing 10% PCNB), Hi-Yield Terraclor Granular Fungicide	<p>Turf, ornamental and vegetable diseases caused by basidiomycetes, including brown patch, dollar spot, southern blight (white mold), <i>Helminthosporium</i> leaf spot and melting out, damping off (<i>Rhizoctonia</i> spp. only), <i>Sclerotinia</i>, azalea (Ovulinia) and camellia flower blight, <i>Rhizoctonia</i> root and crown diseases.</p> <p>Specific vegetable diseases on label include <i>Rhizoctonia</i> root and stem rot of beans, Southern blight of peanuts, tomatoes and peppers, club root (<i>Plasmodiophora</i>) of broccoli, brussel sprouts, cabbage and cauliflower and scab and <i>Rhizoctonia</i> of potatoes.</p>	<p>Protectant preventative fungicide, specific for basidiomycetous fungi. Usually formulated as wettable powder or granules.</p> <p>Should be lightly watered in after applying to turf.</p> <p>For ornamentals drench or incorporate the product thoroughly into the soil for best results.</p> <p>Do not apply to <i>Philodendron</i> or <i>Pilea</i>.</p> <p>For vegetables application must be at planting or transplanting either by soil drench, incorporation, or in furrow.</p>
Propiconazole	Ortho Lawn Disease Control and Ferti-lome Liquid Systemic Fungicide	Turf, ornamental, flower, shrub care against powdery mildew, dollar spot, anthracnose, rust, scab, tip blight, brown spot, etc.	<p>A water-based systemic fungicide that prevents major diseases on roses, flowers, lawns, trees, and shrubs.</p> <p>Do not apply this product to African violets, Begonia, Boston ferns, or Geraniums.</p>
Streptomycin sulfate	Ferti-lome Fire Blight spray, Bonide Fire Blight spray, Agri-mycin 17	<p>Controls fire blight of apple and pear.</p> <p>Some brands also labeled for fire blight of pyracantha, bacterial wilt of chrysanthemum, bacterial stem rot of Dieffenbachia cuttings, bacterial leaf spot on philodendron, crown gall on roses, and bacterial spot on tomatoes and peppers.</p>	<p>Actually a bactericide/antibiotic compound. Has no fungicidal activity.</p> <p>When used for fire blight control of apples and pears it must be applied du ring bloom prior to symptoms appearing to be effective. Sprays should begin at 20-30% bloom and continue every 3-4 days until petal fall.</p> <p>Do not apply when fruit is visible.</p> <p>Do not apply within 30 days of harvest for pears.</p> <p>Do not apply within 50 days of harvest for apples. within 50 days of harvest for apples.</p>

HOMEOWNER FUNGICIDE GUIDE (continued)

COMMON NAME (i.e. Active Ingredient)	BRAND NAME(S)	DISEASES CONTROLLED	COMMENTS
Sulfur	Ferti-lome Dusting Sulfur, Bonide Liquid Sulfur, Bonide Sulfur Plant Fungicide, Safer Garden Fungicide, others	<p>Controls diseases of fruit including powdery mildew, cedar apple rust and scab of apples, brown rot and scab of peach, plum and nectarine, powdery mildew on brambles and strawberry.</p> <p>Also labeled for powdery mildew, leaf spots, rust and Botrytis on many vegetables and ornamentals (includes black spot of rose).</p>	<p>Broad spectrum protectant fungicide. This is a contact fungicide.</p> <p>Formulated as a wettable powder or dust.</p> <p>Should not be used when the temperature is above 90 degrees or within four weeks of an oil spray as injury to the foliage may occur. Refer to individual product label for plants which may be treated. Do not use on apricots, cucumbers, d'Anjou pears, melons, spinach, squash or viburnum as sulfur causes injury and defoliation to these plants.</p> <p>Also controls mites.</p> <p>Residue may be a problem.</p>
Tebuconazole	Bayer Advanced All-in-One Rose & Flower Care; Bayer Advanced 3-in-1 Insect, Disease, & Mite control, Bayer Advanced Disease Control for Flowers, Roses, and Shrubs	Controls black spot, powdery mildew, rust, and southern blight on roses, flowers, azaleas, rhododendrons, camellias and other landscape ornamental shrubs.	<p>Systemic fungicide, insecticide, fertilizer- all-in-one.</p> <p>Protects against insects and disease for up to 6 weeks.</p> <p>No spraying, just mix & pour.</p>
Thiophanate methyl	Cleary's 3336, Ferti-lome Halt Systemic Rose and Flower Fungicide, Scott's Lawn Fungus Control, Green Light Systemic Fungicide	<p>Anthracnose, dollar spot, Rhizoctonia (Brown patch), Helminthosporium leaf spot (melting out), Fusarium patch on lawns.</p> <p>Foliar diseases of ornamentals including anthracnose, black spot of rose, Botrytis, fungal leaf spots, powdery mildew, Ovulinia blight and Phomopsis blight on juniper.</p> <p>Soil/ root diseases of flowering & bedding plants and woody ornamentals caused by Fusarium, Rhizoctonia, Sclerotinia, and Thielaviopsis spp.</p> <p>Bulb diseases caused by Botrytis, Fusarium, Rhizoctonia, Sclerotinia, Fusarium and Penicillium spp.</p>	<p>Broad spectrum systemic fungicide. Usually available as wettable powder.</p> <p>Does not control Pythium or Phytophthora spp.</p> <p>A preliminary trial is suggested on a small scale when applying to a plant not listed on the label but for a listed disease problem. Wait 5-7 days before evaluating any potential injury.</p> <p>Not recommended for <i>Nephrolepis exalta</i>, <i>Plectranthus australis</i>, and <i>Hatiora gaertneri</i>.</p> <p>Repeated, exclusive use of thiophanate methyl may lead to buildup of resistant fungi and loss of control.</p>
Triadimefon	Green Light Fung-Away Systemic Fungicide (several products), Bonide Bayleton Systemic Fungicide, Bayer Advanced Fungus Control for Lawns, Hi-Yield Lawn Fungicide Granules containing Bayleton	<p>Turf diseases including brown patch, dollar spot, rusts, anthracnose, southern blight, and Fusarium patch.</p> <p>Ornamental diseases including flower blights (<i>Ovulinia</i> and <i>Sclerotinia</i> spp.), fungal leaf spots, powdery mildew and rusts.</p>	<p>Systemic fungicide.</p> <p>Provides better powdery mildew control than most other fungicides.</p> <p>Can cause some foliar discoloration and distortion on roses.</p> <p>Bayleton 50%DF is labeled for use on bearing apple trees for cedar apple rust and powdery mildew and grapes and pears for powdery mildew. However, most homeowner brands/ repackages of triadimefon are not labeled for use on bearing fruit and nut trees or any part of plants used for consumption. Check the individual product label.</p>
Triforine	Ortho Rose Pride Orthenex Insect & Disease Control, Ortho RosePride Funginex	Black spot, powdery mildew, and rust of roses, powdery mildew on azaleas, begonias, delphinium, kalanchoe, plane tree, calendula, crepe myrtle, dahlia, euonymous, jerusalem thorn, lilac, phlox, snapdragons, Photinia, and zinnias, rust on aster, carnation and oxalis, petal blight on azaleas and rhododendron and Entomosporium leaf spot on Photinia.	<p>Locally systemic fungicide.</p> <p>Triforine voluntarily cancelled by manufacturer, may become increasingly difficult to find as existing product supply is used.</p>

ORGANIC STRATEGIES FOR THE GARDEN AND HOME LANDSCAPE

Paul Guillebeau, Extension Entomologist and Elizabeth Little, Homeowner IPM/Sustainable Agriculture Extension Specialist

What is Organic Gardening? Generally accepted organic practices comprise soil management, fertilization, and pest management.

The USDA National Organic Program established rules for commercial organic production. These rules do not apply to home gardeners, but they are a useful guide to choosing organic pest management alternatives. The chemicals listed in this section are recognized as organic insecticide, fungicide and bactericide alternatives by the National Organic Program.

Organic pest management is not simply replacing a conventional pesticide with another chemical that is labeled 'organic'. Knowledge and planning are the keys to successful organic gardening. Consider a Master Gardener Class offered through your local Extension Service. Additionally, your local library offers books on organic gardening.

Principles for Organic Gardening

- Healthy plants are less susceptible to pests and disease. Stressed plants attract some pests.
 - Choose plants that are adapted for your local climate.
 - When you buy plants, inspect them carefully for signs of pest infestation.
 - Test the soil to make sure the plants are receiving the nutrients they need to stay healthy.
 - Plant at the right date and under the proper light/water conditions.
 - Consult your local Cooperative Extension agent for advice about choosing plants and creating healthy growing conditions.
- Anticipate problems.
 - Find out what pests and pathogens are common in your area.
 - Look for plant varieties resistant to regular pests and pathogens.
 - Learn the life cycles of the pests and pathogens you expect.
 - When/how do they arrive?
 - Are any stages of the life cycle vulnerable (or protected)?
 - Cooperative Extension is your best source.
- Scout for pest and disease problems regularly.
 - It is much easier to manage young insects, early infections, and small populations.
 - Scout at least three times per week in warm weather.
 - Look at the whole plant, under leaves, and along stems.
- Practice good sanitation.
 - Dispose of diseased or spent plant materials promptly.
 - Many pests and pathogens will persist over the winter in crop debris.
- Use crop rotation.
 - Do not plant the same type of plants in the same place each year.
- Encourage natural controls.
 - An assortment of flowers and herbs will attract beneficial insects.
- Use mechanical controls.
 - Row covers and hand-picking are practical on a small scale.
 - Water spray is effective against many insects if the plants are hardy enough to withstand a vigorous spray.
- Utilize cultural controls.
 - An appropriate planting date may avoid peak pest populations.
 - Mulch helps keep plants healthy and controls some pests and pathogens.
 - Avoid plants or particular varieties that have a lot of pest problems.

- Use chemical controls sparingly. An “organic” listing does not eliminate all risks.
 - Spot treat instead of spraying a large area.
 - Use pesticides only when other options are not practical.

ORGANIC INSECTICIDE/MITICIDE OPTIONS

Except for spinosad products, nearly all organic insecticides have little or no residual activity. Repeated applications may be necessary before you see results.

Nearly all organic pesticides have a very broad range of use sites, which means you can use them nearly anywhere in the garden or landscape. Check the label to be sure it is labeled for the site you need to treat.

USE ALL PESTICIDES ACCORDING TO THE LABEL INSTRUCTIONS! **If used improperly, even natural products may injure your family or pets.**

To use this guide, locate your pest problem and identify the chemical options. Review the chemical options for additional information and potential risks. If you need help choosing among several options, consult your local Extension agent.

Caterpillars	– pyrethrins, <i>Bacillus thuringiensis</i> kerstaki, spinosad, neem
Fire ants	spinosad (fire ant bait formulation)
Thrips	spinosad
Aphids, whiteflies, other soft bodied pests	pyrethrins, oils, insecticidal soap, neem
Stink bugs	neem, pyrethrins, spinosad
Beetles	spinosad, pyrethrins, neem
Scale insects	oils
Mites	oils, sulfur, insecticidal soap
Mosquito larvae	<i>Bacillus thuringiensis</i> israelensis
Yellow jackets	traps, pyrethrins
Slugs/snails	iron phosphate

Pyrethrins (pyrethrum) are produced by some varieties of chrysanthemum. Pyrethrins are often combined with piperonyl butoxide (PBO), which significantly increases the effectiveness of pyrethrins. The PBO is a synthetic chemical; some people do not consider PBO combinations an organic alternative.

Pyrethrins are also available in product combinations with oil or sulfur to give the products greater activity against mites and diseases.

Risks: May kill bees and other beneficials. Extremely toxic to aquatic species. Pyrethrins can be toxic to cats.

NOTE: Very short (hours) residual activity. Insects may recover from pyrethrin exposure unless PBO is added to the product.

Pyrethrin products – Garden Safe, Ortho Ecosense, Bonide, others.

Horticultural oils and dormant oils are highly refined petroleum products. Oils must be applied to the insects/mites to kill them. No residual activity.

Risks: May kill nontarget arthropods if they are covered with oil. May cause plant injury, particularly if the weather is hot or the plant is water stressed.

NOTE: Be sure you are using the right oil and the right concentrations to minimize the risk of plant injury.

ORGANIC STRATEGIES FOR THE GARDEN AND HOME LANDSCAPE (continued)

Petroleum oil products – Bonide All Seasons and many others

Other oils include sesame oil, soybean oil, and canola oil. We have limited information about their efficacy, but their activity will be similar to the petroleum oils. They can also cause phytotoxicity.

Neem (azadirachtin) is derived from the Neem tree. Leaf extracts and oils pressed from nuts are available. Neem is an insecticide, an insect growth regulator, and a repellent. An insect growth regulator prevents juvenile insects from maturing properly.

Risks: High concentrations can harm fish. Low risk to bees and other beneficial insects.

Neem products: Green Light, others

Spinosad comes in two forms. The organic form is derived a soil bacterium, *Saccharopolyspora spinosa*. The other form is a synthesized version of the same chemical; it is not considered to be organic.

Risks: May harm bees. Low risks for other nontarget species.

Spinosad products: Fertilome, Bulls Eye

Iron phosphate is the only organic slug bait in U.S. Used for many years in Europe.

Risks: Low risks to nontarget species.

Iron Phosphate products: Ortho Ecosense, Worryfree

Insecticidal soap may also be called Potassium Salts of Fatty Acids. They must be applied directly to the insects. They have no residual activity.

Risks: May cause plant injury, particularly when weather is hot or plant is water stressed.

Insecticidal Soap products: Ortho Ecosense, Safer, others.

Sulfur is commonly found in combination with other organic products to provide control of fungal diseases.

Risks: Low risks to nontargets. May cause irritation of skin, eyes, and throat tissue.

Sulfur products: many.

Bacillus thuringiensis kerstaki is a strain of *Bacillus* bacteria that only infects caterpillars. The caterpillars must consume the bacteria. Birds, fish, pets, people, etc. catch this strain of bacteria.

Risks: Very low risks to nontarget species (except other caterpillars).

Bacillus thuringiensis kerstaki products: Dipel, Thuricide, others.

Bacillus thuringiensis israelensis is a similar strain of bacteria that controls mosquito larvae. Use it water containers or ponds where mosquitoes are a problem.

Bacillus popillae is a bacterial strain that infects Japanese beetle larvae. It will not affect adult insects. There is no clear evidence that using *Bacillus popillae* will reduce Japanese beetle damage in your yard.

Japanese beetle traps catch large numbers of Japanese beetle adults attracted from a large area. There is no clear evidence that using Japanese beetle traps will reduce Japanese beetle damage in your yard. On a large property, it may be possible to attract Japanese beetles away from desirable plants; however this strategy is unproven.

ORGANIC STRATEGIES FOR THE GARDEN AND HOME LANDSCAPE (continued)

Yellow jacket traps can help to reduce the number of yellow jackets in a local area. May seem ineffective if other foods are nearby that are also attractive to yellow jackets.

Diatomaceous earth is not recommended. It loses most of its effectiveness in damp/humid conditions, and it is difficult to avoid inhaling the dust.

Home brews are commonly used and widely touted on the internet. Common brews include garlic, hot pepper, ground insects, etc. Because there is no consistency among brews, there are no reliable data to gauge their effectiveness. Garlic and hot pepper are known to repel some insects.

<http://www.omri.org/> Organic Materials Review Institute and the National Organic Standard. Includes a list of all of the pest management chemicals accepted as organic.

<http://attra.ncat.org/organic.html> National Sustainable Ag Information Service. This site has a great deal of information about organic production, including pest management.

<http://www.ams.usda.gov/AMSV1.0/NOP> - USDA National Organic Program.

ORGANIC FUNGICIDE/BACTERIACIDE OPTIONS

The products listed in this section are registered by the EPA and are “approved” for use in organic production. However, most of these products are non-specific and are toxic to humans, plants, and many non-target invertebrates and aquatic life. In addition, the effectiveness of most of these products is generally limited when compared to “conventional” pesticides. With this in mind, organic pesticides should not be considered as substitutes for or used as conventional fungicides in a pest control program, and should only be used judiciously and as a last resort in an integrated pest management program. Most plant diseases in the home garden do not cause sufficient harm to the plant to justify the use of pesticides.

Type of diseases controlled	Compound	Notes
Coppers:		
<p>Many fungal and bacterial diseases, including powdery and downy mildew, fungal leaf spots, anthracnose, bacterial leaf spot and/or blight, fire blight and rust on a wide variety of fruits, vegetables and ornamentals. Effectiveness against most pathogens is often limited.</p> <p>Labeled for many plants.</p>	<p>Copper sulfate and fixed coppers (copper hydroxide, copper oxide, copper oxychloride)</p>	<p>Copper is toxic to fish, aquatic invertebrates, and humans. Label directions and harvest intervals should be followed carefully. Copper is a heavy metal and must be used in a manner that minimizes accumulation in the soil</p> <p>Coppers have the potential to burn the foliage and flowers of many plants. To avoid this problem, do not spray prior to or during the flowering period, or during prolonged cold, wet weather. Refer to individual product label for plants which may be treated.</p>
<p>Various diseases of fruits, vegetables and ornamentals including leaf curl on peaches and bitter rot, black rot and scab on apples.</p> <p>Labeled for many plants.</p>	<p>Bordeaux Mixture (hydrated lime/copper sulfate)</p>	<p>Lime added to copper sulfate increases the effectiveness of the copper. Phytotoxicity (burning of foliage and flowers) can occur on many plants including the young, tender leaves of peach, plum, rose and apple. Some sensitive plants require diluting the product to one half strength (depending on the product used – see label) to avoid phytotoxicity. Should not be used during cool, wet weather since this can increase damage to plant foliage.</p>
Sulfurs:		
<p>Used in the dormant season to kill overwintering fungal spores of black spot, powdery mildew and rust of rose, leaf curl and shot-hole of peach, cane blight and leaf spot of brambles.</p> <p>Some brands labeled for delayed dormant and/or growing season applications for scab and powdery mildew of apple, anthracnose, rust and powdery mildew of blackberry and powdery mildew and scab on pear.</p>	<p>Liquid lime-sulfur (calcium polysulfides)</p>	<p>Labeled for roses, peaches, pears, brambles, fruit trees, deciduous hedge plants, delphinium, lilacs, euonymous, columbine, crepe myrtle, sweet peas, zinnias, fruits, ornamentals, and tuberous begonias.</p> <p>Do not spray when temperature is expected to exceed 80°F within 24 hours. Spray early in the morning or late in the evening to avoid burning of foliage.</p> <p>Also controls mites and scale.</p>

ORGANIC STRATEGIES FOR THE GARDEN AND HOME LANDSCAPE (continued)

Type of diseases controlled	Compound	Notes
Sulfurs: (cont.)		
<p>Controls fungal diseases including powdery mildew, scab, and cedar apple rust of apples, brown rot and scab of peach, plum and nectarine, powdery mildew on brambles and strawberry. Also labeled for powdery mildew, leaf spots, rust and botrytis on many vegetables and ornamentals (includes black spot of rose).</p>	<p>Elemental sulfur (Dry wettable sulfurs of flowable sulfurs)</p>	<p>Should not be used when the temperature is above 90 degrees or within four weeks of an oil spray as injury to the foliage may occur. Refer to individual product label for plants which may be treated. Do not use on apricots, cucumbers, d'Anjou pears, melons, spinach, squash or viburnum as sulfur causes injury and defoliation to these plants.</p> <p>Sulfur is lethal to beneficial insects, spiders and mites leading to increased problems with certain pests including mites. Residue may be a problem.</p>
Other compounds:		
<p>Some control of insect vectors of viruses and a few fungal diseases such as powdery mildews and black spot.</p>	<p>Oils, horticultural, narrow range oils as dormant, suffocating, and summer oils</p>	<p>Do not apply when sulfur compounds have or will be used. This combination is toxic to the plant. Repeated use can cause build-up in the soil.</p>
<p>Controls various foliar fungal diseases, in particular powdery mildew on various hosts.</p>	<p>Potassium bicarbonate</p>	<p>Diluted in water and often mixed with insecticidal soap (surfactant) and horticultural oil to increase effectiveness.</p>
<p>Fire blight control in apples and pears only</p>	<p>Streptomycin</p>	<p>Bactericide/antibiotic compound. Has no fungicidal activity. Fire blight bacteria can develop resistance with prolonged use.</p> <p>When used for fire blight control of apples and pears it must be applied during bloom prior to the appearance of symptoms to be effective. Sprays should begin at 20-30% bloom and continue every 3-4 days until petal fall.</p> <p>Do not apply when fruit is visible.</p> <p>Do not apply within 30 days of harvest for pears.</p> <p>Do not apply within 50 days of harvest for apples.</p>