

HOMEOWNER FUNGICIDE GUIDE

Holly Thornton, 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. For a listing of fungicides labeled for use on specific plants see "**Ornamentals and Shade Tree Disease Control, Part B**".

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 <u>TURF</u> USE.</p>
Copper compounds	Bonide Copper Spray or Dust, Bonide Liquid Copper, Dragon Copper Fungicide Fungicide, Hi-Yield Copper Fungicide, Ferti-lome 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. The 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>

HOMEOWNER FUNGICIDE GUIDE (continued)

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 during 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. Do not apply within 30 days of harvest for pears. Do not apply 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>Anthrachnose, 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.</p> <p>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 PESTICIDE GUIDE FOR INSECT AND DISEASE CONTROL

Holly Thornton, Homeowner IPM Specialist, Extension Plant Pathology

This guide was developed as a quick reference to materials which are acceptable for use in organic vegetable gardens and landscapes.

GENERAL INFORMATION ABOUT PESTICIDES ACCEPTABLE FOR USE IN ORGANIC GARDENS

- All products in this guide are registered by the EPA. They are “approved” for use in organic gardens by promoters of organic techniques such as Rodale Press. The catalogues that sell these products advertise as being all organic. No efficacy guarantees are given. It is assumed that the grower who chooses to use organic techniques realizes that organic pesticides are just one small component of a program that emphasizes plant health as the best pest control. Materials such as baking soda (sodium bicarbonate), liquid dish soaps, sugar, and so forth, are not registered pesticides and so cannot be recommended by the University of Georgia Cooperative Extension Service.
- Products called “Garden Spray” or other generic terms generally include pyrethrins, copper, and sulfur. They are labeled for control of insects and diseases. “Garden Dusts” are similar and generally include copper, sulfur, and/or some sort of insecticide such as rotenone. These control insects & disease as well.
- **Azadirachtin** is a compound extracted from the **neem** tree (*Azadirachta indica*). It is a broad-spectrum pesticide, acting as a repellent, growth regulator, and a poison. Neem oil also has insecticidal properties. These materials control aphids, leafminers, looper caterpillars, mealybugs, thrips, whiteflies, foliar-feeding beetles, and mites. At 70% concentration, neem oil kills powdery mildew spores.
- **Bacillus thuringiensis** (commonly called “B.t.”) is bacterial pesticide. Different strains of the bacteria control different pests. B.t. var kurstaki (also known as: B.t. var berliner) infect lepidopterous (caterpillars) pests and beetle larvae; B.t. var san diego infects beetle larvae; B.t. var israelensis infects fly larvae, including mosquitos; B.t. var tenebrionis infects Colorado potato beetle and elm leaf beetle larvae. *B. popillae* and *B. lentimorbus* infect Japanese beetle grubs in the soil. Bacterial pesticides are most effective against early instar larvae. Older caterpillars, beetle larvae, etc., are more tolerant of the bacteria. B.t. must be ingested by the insect in order to infect, therefore apply only when pests are feeding actively. Once applied, B.t. products do not last long in the environment; reapplication may be necessary.
- **Bicarbonates (baking soda)** has been used since 1933 as a fungicide. When used with oil, the sodium can become toxic to plants. Ammonium bicarbonate or potassium bicarbonate are more effective and they provide nitrogen and potassium nutrients to plants.
- **Bordeaux mix** is a combination of copper sulfate and hydrated lime. It can be applied as a dust or mixed with water as a wettable powder to control foliar diseases. It also has insecticidal properties. The material is best applied just before leaves flush out in spring. Burning can occur at temperatures below 50° F and when humidity is high.
- **Chitin** is an organic amendment made from chitin extracted from shellfish waste, soybean meal, and urea. It works by increasing the soil composition of microorganisms that feed on chitin. Chitin is one of the primary components of the body wall of nematodes. To be effective, a large amount of product is necessary. Available as Hi-Yield Nem-A-Cide Nematode Control and Clandosan at your local retail locations. This product is NOT recommended for use on FRUIT TREES. USE ON LAWNS, TREES, and VEGETABLES. A single annual application is sufficient for control.
- **Copper** is an inorganic material used to control a variety of fungal and bacterial diseases on foliage. Apply when weather conditions will allow plants to dry quickly. Copper is toxic to fish and aquatic invertebrates. Apply as a preventive spray only. Repeated applications can cause stunting; copper is a heavy metal which doesn’t break down in soil over time.
- **Cryolite** is an inorganic formulation of sodium fluoaluminate. (Note: Inorganic simply means that the material does not contain carbon.) It can help suppress caterpillars and beetles. The material is toxic to fish.
- **Diatomaceous earth** is another inorganic material. It is composed of the crushed exoskeletons of microscopic marine organisms--diatoms. The microscopic particles are abrasive and scratch the surfaces of insects, slugs, and mites, causing the pest organism to desiccate. It is recommended that a mask be worn when applying this material; inhaling the material can be hazardous to your health.
- **Growth regulators** disrupt the maturation process of insects. Commercially available products usually are synthetic versions of insect hormones. Methoprene is one familiar, and effective, growth regulator used to control fleas. Kinoprene (Enstar) is used for whitefly control.
- **Horticultural oils** are hydrocarbons (petroleum-based compounds). At a 1% rate, phytotoxicity is rare. The material can be used to help control mites, aphids, scale insects, and other soft-bodied pests. Horticultural oils are contact pesticides. They work by coating the pest, suffocating it by blocking the openings through which the insect or mite takes in air. Thorough coverage of the affected plant or plant part is necessary to assure that pests are in contact with the oil. Depending on population levels and weather conditions, oils may need to be reapplied regularly. Application of horticultural oils when temperatures are high (above 85-90° F) and/or humidity is low may cause leaf scorch and interfere with plant respiration. Apply these products at cooler times of day when the sun isn’t shining directly on the foliage; water plants a few hours prior to oil application--this means soaking the soil deeply, not wetting the foliage. Dormant oils are applied only when plants are not actively growing--usually in late winter. Do not combine oils with sulfur. Check label before combining oils with other pesticides. Plants susceptible to injury from horticultural oils include: sugar and Japanese maples, beech, hickory, walnut, blue spruce and certain other conifers, ferns, palms, African violets, some cacti and succulents.
- **Insecticidal soaps** are contact insecticides specially formulated not to strip plant surfaces of their protective wax coating. Insecticidal soaps can control mites and soft-bodied insects like aphids and other sap-feeders. Like horticultural oils, thorough coverage of the plant is necessary to ensure contact with the pest(s) and reapplication may be necessary depending on weather conditions.
- **Sulfur** is an inorganic element that can help control mites, and is frequently used to prevent foliar diseases. Do not apply to plants that have been treated with oil within the last 4 weeks. Don’t apply at temperatures above 80° F. Corrosive to metal: use sprayer with plastic parts.
- **Lime and lime-sulfur** are inorganic compounds that help control mites, psyllas, and some sap-feeding insects. These materials also are used for

foliar disease control. To avoid phytotoxicity, do not apply within 2-4 weeks after using horticultural oil. Don't apply at temperatures over 85° F.
Caustic material.

ORGANIC PESTICIDE GUIDE (continued)

- **d-Limonene** (commonly sold as Orange guard) is the major component of the oil extracted from citrus rind. It destroys the wax coating of the insect's respiratory system. When applied directly, the insect suffocates. Orange Guard is a water-based insecticide. Orange Guard is 100% biodegradable and water-soluble. The EPA calls d-Limonene a broad-based insecticide. It can be used for aphids, ants, mealybugs, gnats, ants, silverfish, roaches, fleas. Do not spray when plants are under stress. Avoid spraying in direct sunlight or the heat of the day. Avoid spraying flowers or flower parts.
- **Pheromones** are compounds that act as chemical signals between like organisms. Some have been synthesized by man and are used mostly as attractants to monitor insect emergence. Saturation in a small area can confuse the target organism and disrupt mating.
- **Pyrethrum** is the dried flower heads of pyrethrum daisies. The material has broad-spectrum use, controlling flying pests, aphids, beetles, caterpillars, thrips, and mealybugs.
- **Pyrethins** are extracted compounds from **pyrethrum** daisies. **Pyrethroids** are synthetic pyrethrins that are more toxic to insects than either pyrethrum or pyrethrins. Pyrethroids may not be used for organic production.
- **Rotenone** also is a plant derivative (a botanical pesticide). It acts as a contact insecticide, as well as a stomach poison. Rotenone is a slow-acting control for beetles, weevils, slugs, looper caterpillars, mosquitoes, thrips, flies, and mites. It is most effective against pests with chewing mouthparts, like beetles, although early instar caterpillars, which also are foliar feeders, are less affected than older caterpillars. Rotenone is short-lived in the environment and frequently available in formulations containing pyrethrins (synthetic versions of pyrethrum). Rotenone is not toxic to honeybees. Rotenone is no longer sold as an insecticide, but on-hand supplies may be used.
- **Ryania** is a plant derivative frequently found in combination with pyrethrin and rotenone. It can help control codling moth, thrips, and European corn borer. It is toxic to fish and other aquatic life, as well as mammals. Protective clothing should be worn when applying this material since exposure can be hazardous to your health.
- **Sabadilla**, a plant derivative, is available as a dust or wettable powder. It acts as a contact insecticide, as well as a stomach poison. Sabadilla can be used to control sap-feeding insects, caterpillars, and thrips. It is toxic to honeybees.
- **Streptomycin** and **terramycin** are fungally-derived antibiotics. They are used to control bacterial diseases of plants.

You can find more information at www.ams.usda.gov/nop

APPLE & PEAR Organic Pesticide Guide for Disease and Insect Control

Note: Various products simply called "garden spray" are labeled for organic control of insects & diseases on apples & pears. These are not included in the table below. See General Notes for information regarding specific materials.

Insect or Disease	Pesticide	Remarks & Precautions
Insect & mite eggs	ultra-fine horticultural oil	Dormant or delayed dormant to ½" green
Aphids	insecticidal soap pyrethrin sprays	24 hr. pre-harvest interval
Beetles	sabadilla WP or dust pyrethrin sprays	Dust: apply to wet plants 24 hr. pre-harvest interval
Bitter rot, Black rot, Powdery mildew	copper (Cu) spray or dust	Dust - cover with a thin film on both sides of foliage spray - mix 1 tsp/1 qt of water
Bugs (Hemiptera: stink bugs, etc.) adults and immatures (nymphs)	sabadilla WP or dust pyrethrin or ryania (packaged separately or combined)	WP: re-apply every 5-7 days & after rain; Dust: apply to wet plants 24 hr. pre-harvest interval
Immatures (nymphs):	insecticidal soap ultra-fine horticultural oil	See General Notes caution
Caterpillars	B.t. var. berliner or kurstaki pyrethrin or ryania	Apply only when insects are feeding.
Codling moth	ryania B.t. var. kurstaki	Apply at 10-14 day intervals; 1st application at petal fall. 24 hr. pre-harvest interval. Effective only when insects are actively feeding
Fire blight	streptomycin sulfate Bordeaux mix	Apply at bloom; every 3-4 days during bloom; every 5-7 days after bloom until fruit is visible Can burn foliage at temperatures below 50° F & when humidity is high; apply before bud break

ORGANIC PESTICIDE GUIDE (continued)

Insect or Disease	Pesticide	Remarks & Precautions
Exposed thrips	pyrethrins spray	24 hr. pre-harvest interval
Fruit tree leaf roller	ultra-fine horticultural oil B.t. var. kurstaki	See General Notes caution Apply when insects are actively feeding
Leafhoppers	pyrethrin/ryania (packaged separately or combined)	
Mites	ultra-fine horticultural oil pyrethrins spray insecticidal soap	Summer or post-harvest 24 hr. pre-harvest interval 2 applications @ 7 day intervals
Pear psylla	ultra-fine horticultural oil	Do not apply after waxy bloom forms on fruit.
Scale insects	ultra-fine horticultural oil	Target crawler stage.

**PEACH & NECTARINE
Organic Pesticide Guide for Disease and Insect Control**

Note: Various products simply called “garden spray” are labeled for organic control of insects & diseases on apples & pears. These are not included in the table below. See General Notes for information regarding specific materials.

Insect or Disease	Pesticide	Remarks & Precautions
Insect & mite eggs	ultra-fine horticultural oil	Dormant or delayed-dormant spray.
Aphids	insecticidal soap pyrethrin spray	24 hr. pre-harvest interval
Beetles	pyrethrin sprays	24 hr. pre-harvest interval
True bugs (Hemiptera)	sabadilla (to control adults) ultra-fine horticultural oil insecticidal soap	See General Notes caution.
Caterpillars	B.t. var. kurstaki	Apply when insects are feeding.
Peach leaf curl	Bordeaux mix	Can burn plants when temperatures are below 50° F and humidity is high.
Leaf curl, shot hole, blossom brown rot	liquid copper	7-10 tsp/gal water; DO NOT apply after pink bud
Peach twig borer	ultra-fine horticultural oil	See General Notes caution
Scale insects (adult) (immatures)	ultra-fine horticultural oil insecticidal soap	Summer or post-harvest application Target crawler stage.

**SMALL FRUITS (Blueberry, Grape, Strawberry)
Organic Pesticide Guide for Disease and Insect Control**

Note: Various products simply called “garden spray” are labeled for organic control of insects & diseases on apples & pears. These are not included in the table below. See General Notes for information regarding specific materials.

Insect or Disease	Pesticide	Remarks & Precautions
Aphids	ultra-fine horticultural oil insecticidal soap pyrethrins spray	See General Notes caution. 24 hr. pre-harvest interval
Caterpillars	B.t. var kurstaki	Apply when insects are feeding

ORGANIC PESTICIDE GUIDE (continued)

Insect or Disease	Pesticide	Remarks & Precautions
Downy mildew & black rot-grapes strawberry	Copper (liquid, spray, or dust)	Some vinifera & French hybrid varieties may be sensitive to copper-make a test application to a few leaves
Fruit worms	B.t. var kurstaki pyrethrins spray	Apply when insects are feeding 24 hr. pre-harvest interval
Mealybugs	ultra-fine horticultural oil	Dormant spray. See General Notes caution
Mites	ultra-fine horticultural oil	Foliar spray- see General Notes caution
Scale insects	ultra-fine horticultural oil	Dormant spray- see General Notes caution
Strawberry leafroller	B.t. var kurstaki pyrethrins spray	Apply when insects are feeding 24 hr. pre-harvest interval
Thrips	ultra-fine horticultural oil	Foliar spray. See General Notes caution.

VEGETABLES

Organic Pesticide Guide for Diseases and Insect Control

Note: Various products simply called “garden spray” are labeled for organic control of insects & diseases on apples & pears. These are not included in the table below. See General Notes for information regarding specific materials.

Insect or Disease	Pesticide	Remarks & Precautions
Aphids	ultra-fine horticultural oil insecticidal soap pyrethrins spray sabadilla dust or WP	See General Notes cautions 24 hr. pre-harvest interval Dust: apply to wet plants
Bacterial blight (bean, tomato, pepper)	Copper (liquid, dust, or spray)	Preventive spray- apply 2 weeks before disease usually appears. Repeat every 7-10 days.
Bacterial wilt: Control insects like cucumber beetles which transmit the bacteria	see beetle controls below	
Beetles: larvae adults (bean, Japanese, tortoise, etc.) Japanese beetles Cucumber & flea beetles weevils Colorado potato beetle larvae	ultra-fine horticultural oil pyrethrins spray sabadilla dust or WP B.t. var kurstaki B. popillae or lentimorbus pyrethrins spray B.t. var san diego or kurstaki	See General Notes caution 24 hr. pre-harvest interval Dust: apply to wet plants Apply when insects are feeding Causes milky spore disease in Japanese beetles 24 hr. pre-harvest interval repeat applications every 5-7 days to treat later-hatching larvae.
Black leg (potato)	streptomycin sulfate 21.2 WP	Soak cut seed pieces for 30 min & plant
True bugs (Hemiptera- incl. stink bugs, lygus bugs, etc.)	pyrethrins spray sabadilla dust or WP insecticidal soap	24 hr. pre-harvest interval Dust: apply to wet plants
Caterpillars	ultra-fine horticultural oil pyrethrins spray B.t. var kurstaki sabadilla dust or WP	See General Notes caution 24 hr. pre-harvest interval Apply when insects are feeding Dust: apply to wet plants
Cercospora leafspot- peanuts, vegetables	copper fungicide (liquid, dust, or spray)	Preventive- apply 2 weeks before disease usually appears. Repeat every 14 days.
Downy mildew: beans, beets, collards, cucumbers, lettuce, onions, peas, spinach, turnips	copper sprays or dusts	1st application when disease appears. Repeat @ 7-10 d intervals. 24 hr. pre-harvest interval.

ORGANIC PESTICIDE GUIDE (continued)

Insect or Disease	Pesticide	Remarks & Precautions
Early blight (<i>Alternaria</i> sp.) & Late blight (<i>Phytophthora infestans</i>): tomato, potato	Copper (liquid)	Preventive- apply 2 weeks before disease usually appears. Reapply every 7-10 days
Leafhoppers	ultra-fine horticultural oil sabadilla dust or WP	See General Notes caution Dust: apply to wet plants
Leafminers	ultra-fine horticultural oil sabadilla dust or WP	See General Notes caution Dust: apply to wet plants
Leafspots (incl. anthracnose)	sulfur Top Cop w/ Sulfur	1st application when disease appears. Repeat @ 7-14 d intervals.
Mites	ultra-fine horticultural oil	See General Notes caution
Powdery mildew	liquid copper sulfur- spray or dust	1st application when disease appears & repeat @ 7-10 d intervals until signs disappear.
Rust: beans, peas, spinach	sulfur- spray or dust	1st application during early bloom
Stem anthracnose (bean)	Copper	1st application @ early bloom or when disease is evident. 1st application when plants are 5" tall. Repeat at 5-7 d intervals.
Thrips	ultra-fine horticultural oil pyrethrins spray	See General Notes caution 24 hr. pre-harvest interval
Whitefly	ultra-fine horticultural oil	See General Notes caution

WOODY ORNAMENTALS

Organic Pesticide Guide for Disease and Insect Control

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Insect or Disease	Pesticide	Remarks & Precautions
Adelgids	ultra-fine horticultural oil d-Limonene	See General Notes caution See General Notes caution
Aphids	ultra-fine horticultural oil pyrethrins spray sabadilla dust or WP neem oil or extract products Enstar (kinoprene) growth regulator d-Limonene	See General Notes caution Dust: apply to wet plants Do not use on hibiscus flowers, on new foliage, or in direct sunlight See General Notes caution
Bacterial wilts, galls	streptomycin sulfate spray	
Leaf beetles: adults Immatures	sabadilla dust or WP pyrethrins: dust or spray neem extract or oil products ultra-fine horticultural oil B.t. var san diego ultra-fine horticultural oil pyrethrin spray	Dust: apply to wet plants Apply when insects are feeding
Black spot	Bordeaux mix pyrethrins: dust or spray Rose Defense (neem oil)	Can burn plants when applied at temperatures below 50° F and humidity is high.
True bugs (Hemiptera)	ultra-fine horticultural oil pyrethrins sabadilla dust or WP	See General Notes caution Dust: apply to wet plants

ORGANIC PESTICIDE GUIDE (continued)

Insect or Disease	Pesticide	Remarks & Precautions
Caterpillars	ultra-fine horticultural oil B.t. var kurstaki neem extract (azadirachtin)	See General Notes caution Apply when insects are feeding
Eriophyid mites	ultra-fine horticultural oil	See General Notes caution
Lace bug	ultra-fine horticultural oil pyrethrins spray neem extract (azadirachtin) d-Limonene	See General Notes caution. Apply materials to underside of leaves. See General Notes caution
Leafminer	ultra-fine horticultural oil neem extract (azadirachtin)	See General Notes caution
Leaf spots	copper spray or dust Bordeaux mix lime-sulfur	See under Black Spot, above See General Notes caution
Mealybugs	ultra-fine horticultural oil neem extract (azadirachtin) Enstar (kinoprene) d-Limonene	See General Notes caution See under Aphids, above See General Notes caution
Powdery mildew	pyrethrins: dust or spray Bordeaux mix lime-sulfur	see under Black Spot, above Apply at bud break & 7 d later. See General Notes caution.
Rust	pyrethrins: spray or dust	
Scale insects	ultra-fine horticultural oil Enstar (kinoprene) insecticidal soap d-Limonene	See General Notes caution See General Notes caution
Spider mites	ultra-fine horticultural oil Rose Defense (neem oil)	See General Notes caution
Thrips	neem extract (azadirachtin)	
Whitefly	insecticidal soap ultra-fine horticultural oil pyrethrins spray neem extract (azadirachtin) d-Limonene	Repeat applications necessary to control heavy populations See General Notes caution See General Notes caution

HERBACEOUS ORNAMENTALS (not including houseplants)
Organic Pesticide Guide for Disease and Insect Control

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Insect or Disease	Pesticide	Remarks & Precautions
Aphids	insecticidal soap ultra-fine horticultural oil pyrethrins spray sabadilla dust or WP neem extract (azadirachtin) Enstar (kinoprene) d-Limonene	See General Notes caution Dust: apply to wet plants Do not use on hibiscus flowers, on new foliage, or in direct sunlight See General Notes caution
Beetles: adults adults & larvae leaf beetle larvae	pyrethrins sabadilla dust or WP neem extract (azadirachtin) ultra-fine horticultural oil	Dust: apply to wet plants See General Notes caution

ORGANIC PESTICIDE GUIDE (continued)

Insect or Disease	Pesticide	Remarks & Precautions
True bugs (Hemiptera)- immatures	ultra-fine horticultural oil sabadilla dust or WP	See General Notes caution Dust: apply to wet plants
Caterpillars	B.t. var kurstaki	Apply when insects are feeding
Leafminer	ultra-fine horticultural oil neem extract (azadirachtin)	See General Notes caution
Leaf spots- General	copper spray or dust Bordeaux mix	See General Notes caution
Mealybugs	insecticidal soap ultra-fine horticultural oil neem extract (azadirachtin) Enstar (kinoprene) d-Limonene	See General Notes caution Do not use on hibiscus flowers, on new foliage, or in direct sunlight See General Notes caution
Scale insects	ultra-fine horticultural oil d-Limonene	See General Notes caution See General Notes caution
Spider mites	ultra-fine horticultural oil	See General Notes caution
Thrips	neem extract (azadirachtin)	
Whitefly	ultra-fine horticultural oil pyrethrin spray neem extract (azadirachtin) Enstar (kinoprene) d-Limonene	See General Notes caution Do not use on hibiscus flowers, on new foliage, or in direct sunlight See General Notes caution