

Fungicides and Bactericides for Home Fruits, Vegetables, and Ornamentals

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| <u>Material</u> | <u>Most Common Uses</u> | <u>Example Brand Names</u> |
|------------------------|---------------------------------|--|
| captan | fruits, ornamentals | Bonide Captan Bonide Fruit Tree Spray* Captan Fungicide (Southern Ag) Gordon's Liquid Fruit Tree Spray* Hi-Yield Captan |
| chlorothalonil | vegetables, ornamentals, turf | Bonide Fung-onil Ferti-lome Broad Spectrum Landscape & Garden GardenTech Daconil Liquid Ornamental and Vegetable Fungicide (Southern Ortho Max Garden Disease Control Ortho Disease B Gon Garden Fungicide |
| copper** | fruits, vegetables | Fixed copper: Various brand names. Look for "basic copper sulfate," "copper hydroxide," or "copper octanoate" as active ingredient. Bordeaux mixture: Sold as Bordeaux Mixture, or you can mix spray lime with bluestone copper (copper |
| lime sulfur | fruits | Lime Sulfur Solution (Miller) |
| mancozeb | vegetables, ornamentals | Bonide Mancozeb Flowable Dithane Manzate |
| myclobutanil | ornamentals, fruits, turf | Immunox (ornamentals, fruits, turf) Immunox Plus (ornamentals and turf only) Eagle 20EW (ornamentals, fruits turf) |
| phosphorous acid | ornamentals, fruits, vegetables | Monterrey Agri-Fos |
| propiconazole | ornamentals, turf | Bonide Infuse Ferti-lome Liquid Systemic Fungicide II Monterey |
| sulfur** | fruits, vegetables, ornamentals | Sulfur and other brand names |

| | | |
|--------------------|---------------------|--|
| streptomycin** | fruits, ornamentals | Agri-mycin 17 Agricultural Streptomycin Ferti-lome Fire Blight Spray |
| tebuconazole | ornamentals | Bayer Advanced Disease Control for Roses, Flowers and Shrubs |
| thiophanate methyl | ornamentals, fruit | 3336 (Cleary) Thiomyl (Southern Ag) |
| triforine | ornamentals | Ortho Rosepride Fungicide |

*Fruit tree combination products contain insecticides in addition to captan.

**Acceptable for organic production.

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Fungicide, Nematicide and Bactericide Table

The following information will help you interpret the Fungicide, Nematicide, and Bactericide Table:

Restricted or Cancelled Pesticides

Certain formulations, uses, or amounts of the pesticide compound have been restricted (R) or canceled (C). Check a current label (the label of the product to be purchased) to determine which are restricted or general uses. Pesticides or pesticide uses which are restricted require the applicator to be certified or working under supervision of a certified applicator.

Common Names

USDA, and later EPA, has assigned most pesticide chemicals an official common name. This name has been listed where possible. It should not be capitalized.

Other Names

Fungicides, bactericides, and nematicides originate from a wide range of compounds and are classified according to use: fungicide (F), nematicide (N), or bactericide (B).

Toxicity Category and LD₅₀ Values

When pesticides are registered, the Environmental Protection Agency uses the acute LD₅₀ values to determine the toxicity category and the words or symbols which must be placed on the label. The categories assigned in the following table are based on information available and may not reflect EPA's toxicity category.

LD₅₀ is the dosage at which one-half of the test animals are killed. Usually rats are tested, although mice or rabbits may be used. LD₅₀ is measured in milligrams of chemical being tested per kilogram of animal (mg/kg). One part per million (ppm) is equal to one mg/kg. LD₅₀ is usually determined for the technical material rather than the formulated product. The higher the LD₅₀, the less toxic the material is. LC₅₀ is the lethal concentration at which 50% of test animals would be killed.

Chemicals may be tested by mouth (oral), by skin (dermal), or inhalation.

Acute toxicity refers to single exposure and quick action, while chronic toxicity refers to the effects of repeated exposures over a period of time.

Table of Toxicity Categories

| Hazard Indicators | Categories | | | |
|---|---|--|--|--|
| | I | II | III | IV |
| Oral LD ₅₀ | 0 – 50 mg/kg | 50 – 500 mg/kg | 500 – 5,000 mg/kg | 5,000 (+) mg/kg |
| Inhalation LC ₅₀ | 0 – 0.2 mg/l. | 0.2 – 2 mg/l. | 2 – 20 mg/l. | 20 + mg/l. |
| Dermal LD ₅₀ | 0 – 200 mg/kg | 200 – 2,000 mg/kg | 2,000 – 20,000 mg/kg | 20,000 (+) mg/kg |
| Eye effects | Corrosive: Corneal opacity not reversible within 7 days | Corneal opacity reversible within 7 days: irritation persisting for 7 days | No corneal opacity. Irritation reversible within 7 days. | No irritation |
| Skin effects | Corrosive | Severe irritation at 72 hours | Moderate irritation at 72 hours | Mild or slight irritations at 72 hours |
| Signal Words/ Symbols | Danger/Poison: in large boldfaced letters and usually accompanied by skull and crossbones symbol. | WARNING | CAUTION | CAUTION |
| Common terms for dosage lethal to human adults (oral) | Few drops to 1 teaspoon | 1 teaspoon to 2 tablespoon | 1 ounce to 1 pint | >1 pint |

| Common Name | Other Names | Class | Toxicity | Acute LD50 For Rats | |
|-----------------------------------|---|-------|----------|---------------------|----------------------|
| | | | | Dermal (Mg/Kg) | Oral (Mg/Kg) |
| acibenzolar-S-methyl | Actigard | F | III | >2,000 (rabbits) | > 5,000 |
| allyl isothiocyanate | Dominus | F | | | |
| ametoctradin + dimethomorph | Zampro | F | | | |
| azoxystrobin | Abound Azoxystar Equation Quadris Heritage Dynasty Satori Trevo Willowood Azoxy | F | III | >2,000 | >2,000 |
| azoxystrobin + chlorothalonil | Quadris Opti | F | | | |
| azoxystrobin + difenoconazole | Quadris Top | F | | | |
| azoxystrobin + propiconazole | Avaris Quilt Trivapro B | F | | | |
| benzovindiflupyr | Trivapro A | F | | | |
| benzovindiflupyr + azoxystrobin | Elatus | F | | | |
| benzovindiflupyr + difenoconazole | Aprovia Top | F | | | |
| boscalid | Endura | F | | | |
| calcium hypochlorite | HTH | F | | | |
| captan | Captan Captec | F | III | | 9,000 |
| carboxin | Vitavax | F | III | >8,000 (rabbits) | 3,820 |
| chloroneb | Proturf Fung. Teremec SP | F | I I | >5,000 (rabbits) | >5,000 |
| (R) chloropicrin | Chloro-pic | F,N,B | I | Vapor Toxicity | 250 20 ppm |
| chlorothalonil | Bravo Chloronil Daconil Echo Equus Exotherm Termil Initiate | F | II | >10,000 (rabbits) | >10,000 (rabbits) |

| Common Name | Other Names | Class | Toxicity | Acute LD50 For Rats | |
|-----------------------------|---|-------|----------|------------------------|--------------|
| | | | | Dermal (Mg/Kg) | Oral (Mg/Kg) |
| copper hydroxide | Champ CuPro 5000 Kocide Nu-Cop | F, B | III | | 1,000 |
| copper octanoate | Cueva | F, B | | | |
| copper oxychloride sulfate | COCS | F, B | III | >8,000 | 1,000 |
| | | | | | |
| copper sulfate, basic | Cuproxtat Basic Copper 53 Copper Sulfate Cuprofix Disperss | F, B | III | 1 TWA (Vapor Toxicity) | 1,000 |
| copper sulfate pentahydrate | MasterCop Phyton 27 bluestone | F, B | I | | 472 |
| copper sulfate + lime | Bordeaux mixture | F, B | IV | | |
| cyazofamid | Ranman | F | | | |
| cyflufenamid | Torino | F | | | |
| cymoxanil | Curzate | F | | | |
| cymoxanil + chlorothalonil | Ariston | F | | | |
| cyproconazole | Alto Sentinel | F | III | 72,000 (rat) | 1,000 (rat) |
| cyprodinil | Vangard | F | III | >2,000 | >2,000 |
| cyprodinil + fludioxonil | Switch | F | | | |
| dazomet | Basamid | F,N | III | | 640 |
| dichloran | Botran | F | III | | >5,000 |
| (R) dichloropropene | Telone II | N | I | Vapor Toxicity 500 | 127 - 250 |
| difenoconazole + cyprodinil | Inspire Super | F | | | |
| dimethomorph | Forum | F | | | |
| dimethyl disulfide | Paladin | F | | | |
| dodemorph acetate | Milban | F | III | | 4,180 |
| dodine | Syllit | F | II | >1,500 | 1,000 |

| ethazol or etridiazole | Koban Terracoat Terramaster Terrazole Truban | F | II | 1,700 (rabbits) | 1,077 |
|------------------------------|--|-------|-------------------------|-------------------------|--------------|
| Common Name | Other Names | Class | Toxicity | Acute LD50 For Rats | |
| | | | | Dermal (Mg/Kg) | Oral (Mg/Kg) |
| ethazol + thiophanate-methyl | Banrot | F | I (WP) III (Granule) | 2,000 – 4,000 (rabbits) | 5,000 |
| (R) ethoprop | Mocap | N | I | 2.4 (rabbits) | 61.5 |
| famoxadone + cymoxanil | Tanos | F | | | |
| | | | | | |
| fenamidone | Reason | F | | | |
| fenarimol | Rubigan | F | III | | 2,500 |
| fenbuconazole | Indar | F | III | | |
| fenhexamid | Decree | F | | | |
| fentin hydroxide | Super Tin triphenyltin hydroxide | F | I | 1,600 (rabbits) | 156 |
| ferbam | Carbamate | F | IV | | >17,000 |
| fluazinam | Omega | F | | | |
| fludioxonil | Maxim Scholar | F | | | |
| fluensulfone | Nimitz | N | | | |
| fluopicolide | Presidio | F | | | |
| fluopyram + tebuconazole | Luna Experience | F | | | |
| fluopyram + pyrimethanil | Luna Tranquility | F | | | |
| fluopyram + trifloxystrobin | Luna Sensation | F | | | |
| fluoxastrobin | Aftersho ck Evito | F | | | |
| flutriafol | Topgard | F | | | |
| flutolanil | Prostar | F | IV | >5,000 | 10,000 |

| flutolanil + mancozeb | Moncoat MZ | | | | |
|--------------------------------|---|-------|----------|---------------------|-----------------|
| fosetyl-Al | Aliette Linebac | F | III | 2,000 (rabbits) | >5,000 |
| Common Name | Other Names | Class | Toxicity | Acute LD50 For Rats | |
| | | | | Dermal (Mg/Kg) | Oral (Mg/Kg) |
| fluxapyroxad + pyraclostrobin | Merivon Priaxor | F | | | |
| hydrated lime | slaked lime | F | | | |
| ipconazole | Ranco na | F | | | |
| iprodione | Chipco 26019 Nevado | F | III | >5,000 (rabbits) | >10,000 |
| kasugamycin | Kasumin | B | | | |
| kresoxim-methyl | Sovran | F | III | >2,000 | >5,000 |
| lime sulfur | Lime Sulfur Solution | F | III | caustic | medium toxicity |
| mancozeb | Dithane DF Rainshield Dithane M-45 | F | IV | >15,000 | 11,200 |
| mandipropamid | Revus | F | | | |
| mandipropamid + difenoconazole | Revus Top | F | | | |
| mefenoxam | Apron XL Ridomil Gold SL Subdue MAXX Ultra Flourish | F | II | | |
| mefenoxam + chlorothalonil | Ridomil Gold Bravo Flouronil | F | II | | |
| mefenoxam + copper | Ridomil Gold Copper | F | II | | |
| mefenoxam + mancozeb | Ridomil Gold MZ | F | | | |
| metalaxyl | MetaStar | F | | | |
| (R) metam-sodium | Vapa m S.M.D .C | F,N | II | | 1,700 – 1,800 |
| metconazole | Quash | | | | |

| Common Name | Other Names | Class | Toxicity | Acute LD50 For Rats | |
|-----------------------------------|-------------|-------|----------|---------------------|--------------|
| | | | | Dermal (Mg/Kg) | Oral (Mg/Kg) |
| metrafenone | Virando | F | | | |
| (R) methyl bromide + chloropicrin | Terr-O-Gas | F,N | I | Vapor Toxicity 200 | 214 |

| Common Name | Other Names | Class | Toxicity | Acute LD50 For Rats | |
|-------------------------------------|---|-------|----------|---------------------------------|-----------------------|
| | | | | Dermal (Mg/Kg) | Oral (Mg/Kg) |
| metiram | Polyram | F | IV | | >10,000 |
| myclobutanil | Rally Eagle Laredo Sonoma | F | II | | |
| oxamyl | Vydate L | N | I | 2,960 (24% liquid) (rabbits) | 5.4 (unformulated) |
| oxycarboxin | Plantvax | F | III | >16,000 (rabbits) | >2,000 |
| pentachloronitro- benzene (PCNB) | Blocker Terraclor | F | III | 5,000 | 5,000 |
| penthiopyrad | Fontelis Vertisan | F | | | |
| phosphorous acid | Agri-Fos Fosphite Fungi-Phite ProPhyt Phostrol Reliant | F | | | |
| picoxystrobin | Aproach | F | | | |
| polyoxin D zinc salt | Affirm Endorse Ph-D Veranda | F | | | |
| potassium methyl dithiocarbamate | K-Pam HL | F,N | | | |
| propamocarb hydrochloride | Banol Previcur | F | III | >3,900 (rabbits) | 8,600 |
| propiconazole | Alamo Banner Banner MAXX Bumper Orbit PropiMax Tilt | F | III | | 1,517 |
| propiconazole + trifloxystrobin | Stratego | F | | | |
| prothioconazole | Proline | F | | | |
| pyraclostrobin | Cabrio Headline | F | | | |
| pyraclostrobin + boscalid | Pristine | F | | | |
| Pyrimethanil | Scala | F | | | |

| Common Name | Other Names | Class | Toxicity | Acute LD50 For Rats | |
|------------------------|--|-------|----------|---------------------|--------------|
| | | | | Dermal (Mg/Kg) | Oral (Mg/Kg) |
| quaternary ammonium | Consan Physa 20 | F | | | |
| quinoxifen | Quintec | F | | | |
| quintozene | Blocker PCNB Terraclor | F | III | >4,000 | 1,700 |
| sodium hypochlorite | Agclor 310 bleach | F,B | | | |
| sodium o-phenylphenate | Deccosol 122 | F | III | | 1,160 |
| streptomycin sulfate | Agrimycin Firewall Harbour | B | III | | 9,000 |
| sulfur | Brimstone Kumulus Magnetic 6 Microthiol Disperss Wettable Sulfur Thiolux Thiovit | F | III | | low |
| TCMTB | Busan 30A Busan 72A | F | II | | 1,590 |
| tebuconazole | Amtide Tebu Elite Folicur Monsoon Onset Orius Tebuzol Tebusha Savannah Toledo | F | | | |
| tetraconazole | Domark | F | | | |
| thiabendazole | Arbotect Mertect Mertect 340- F TBZ | F | III | | 3,100 |
| thiophanate | Domain Cleary 3336 Topsin E | F | III | | >15,000 |
| thiophanate-methyl | Fungo 50 Inc ogni to Topsin M 3336 T-Methyl | F | III | | 7,500 |

| Common Name | Other Names | Class | Toxicity | Acute LD50 For Rats | |
|---|---|-------|----------|---------------------|---------------|
| | | | | Dermal (Mg/Kg) | Oral (Mg/Kg) |
| thiophanate-methyl + mancozeb | Duo san Zyb | F | III | | 7,500 |
| thiram | Tersan 75 Thiram 42-S Thiram Granuflo Spotrete | F | III | | 780 |
| triadimefon | Bayle ton Strik | F | II | >5,000 | 1,020 – 1,855 |
| triadimenol | Baytan | F | II | >5,000 | 689 – 752 |
| trifloxystrobin | F " | F | III | >2,000 (rabbits) | >5,000 |
| triflumizole | Procure Terragu ard | F | | | |
| triforine | Trifori ne Fungi | F | III | >10,000 | >16,000 |
| triphenyltin hydroxide- See fentin hydroxide | | | | | |
| vinclozolin | Ornalin Ronilan Vorlan | F | III | >2,000 | >10,000 |
| ziram | Ziram 76 | F | III | >2,000 | 1,540 |
| zoxium + mancozeb | Gavel | F | | | |
| zoxium + chlorothalonil | Zing! | F | | | |

DISCONTINUED

Fungicides, Nematicides, and Bactericides

| Common Name | Other Names | Class | Toxicity | Acute LD50 For Rats | |
|---|---|-------|----------|--|---------------|
| | | | | Dermal (Mg/Kg) | Oral (Mg/Kg) |
| benomyl | Benlate Tersan 1991 | F | IV | >10,000 (rabbits) | >10,000 |
| cadmium chloride | Caddy | F | II | NA | NA |
| cadmium succinate | Cadminate | F | II | 200 (rabbits) | 660 |
| captafol | Difolatan | F | II | | 6,200 |
| cycloheximide | Actidione PM Actidione TGF Actidione-Thiram | F | I | | 2 |
| dichlone | Phygon Quintar | F | III | 5,000 | 1,300 |
| dichloropropene - dichloropropane | D-D Soil Fumigant Nemafene Vidden-D | F,N | II | 2,100 (rabbits) Vapor Toxicity 500 ppm | 250 – 500 |
| dinocap | Karathane Mildex | F | III | | 980 |
| fenaminsulf | Dexon (former name) Lesan Diazoben | F | I | >100 | 75 |
| (R) fensulfothion | Dasanit | N | I | 3 - 30 | 2 – 10 |
| folpet | Phaltan | F | IV | >22,600 (rabbits) | >10,000 |
| glyodin | | F | III | | 4,600 – 7,600 |
| mancozeb + dinocap | Dikar | F | IV | | >5,000 |
| parinol | Parnon | F | III | | 5,000 |
| thiram | Arasan | F | III | | 780 |
| zineb | Zineb | F | IV | >2,500 | >5,200 |