"What fungicides should I stock?" is a common question. There is no easy answer since this depends on the type of disease, what plants need protection, the area of the country you live in, and whether you also operate a nursery and/or turfgrass business. There is no one fungicide that controls all diseases on all plants. Also, we do not know what pesticides the federal EPA will classify in the general and restricted use categories.

Table 1 lists the most helpful plant disease control materials, common trade names, and principal uses. Soil fumigants and nematicides have been omitted from this discussion, since they are complete subjects in themselves.

Table 1. Fungicide Inventory for Woody Ornamentals

<table>
<thead>
<tr>
<th>Material and Common trade names</th>
<th>Uses and remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>cycloheximide</td>
<td>Antibiotic fungicide for controlling certain powdery mildews, rusts and turfgrass diseases. Plant injury may occur at high temperatures.</td>
</tr>
<tr>
<td>Actidione PM, Actidione TGF, Actispray</td>
<td></td>
</tr>
<tr>
<td>Bacticin</td>
<td>For therapy of crown gall and olive knot by direct application (as &quot;paint&quot;) to galls on established plants.</td>
</tr>
</tbody>
</table>

benomyl
Benlate Benomyl
Fungicide, Tersan 1991
Turf Fungicide, Bonide
Benomyl (DuPont New Systemic Fungicide), Benomyl Turf Fungicide Granules, Rockland
Benomyl Fungicide, Patterson's Systemic Fungicide, Science
Benomyl Systemic Fungicide, Miller's Benomyl Systemic Fungicide, ProTurf Fertilizer Plus DSB
Fungicide, Lignasan BLP
bordeaux mixture
Acme and Patterson's Bordeaux Mixture, Copper Hydro Bordo, Bor-dox, Pratt Bordeaux Mix, Black Leaf Bordeaux Powder, Bordo Mixture
Botran (dicloran) Botran

captafol
Difolatan 4 Flowable

"Broad-spectrum fungicide with systemic (curative) properties. Effective against many fungus leaf spots and blotches, blights, rots, scabs, powdery mildews, Botrytis blights, plus turf and soil-borne diseases. Ineffective against water mold fungi (e.g., Pythium and Phytophthora) and rusts."

"Broad-spectrum, long-lasting fungicide now used mostly as a dormant spray and on conifers. May "scorch" foliage of some plants (e.g., holly, maples) in cold damp weather. Most effective if freshly mixed."

"Useful in controlling Botrytis blights. Also controls certain storage molds, e.g., Sclerotinia, Penicillium, and Rhizopus."

"Long-lasting protective fungicide closely related to captan and folpet. Controls various fungus leaf spots, anthracnoses, and scabs. Some people develop an allergic skin rash after contacting captafol."
captan
Captain 50-W and 80-W, Orthocide 50 Wettable, Captan 80% Wettable Powder, Captan 80 Spray-Dip, Captan Garden Spray

chlorothalonil
Daconil 2787, Bravo 6F, Exotherm Termil, Diamond 76% Chlorothalonil

copper
(1) basic copper sulfate
Basic Copper Sulfate, Ortho Copper 53 Fungicide, Basi-Cop, Microcop, Tri-Basic Copper Sulfate, Tennessee Copper Sulfate, Spyrocap 530, T-B-C-S 53

(2) basic chlorides
Coprantol, C-O-C-S, Aceto Copper Chloride, Copper Oxochloride, Kaurital (3) oxides
Kuprite, Kocide 101, Cupric Oxide, Copper Oxide, Cuprous Oxide, Brown Copper Oxide, Cuprocide

(4) miscellaneous
Copper Oleate, GH-41 Copper Resinate, Tri-Cop, For-Cop 80, Copper Carbonate, Zinc Coposil Fungicide

(5) liquid, i.e. emulsifiable
TC-90, Oxy Cop, Copoloid, Citcop 4E, Carmel GH-41 Greenhouse Fogging

diazoben
Dexon

dinocap
Karathane WD, Miller’s Garden Karaspray

dodine
Cyprex 65W Fruit Fungicide

ethazol
Terrazole, Truban, Koban

ferbam
Ferbarn, Fermate Ferbam Fungicide, Carbamate, Karbam Black, Ferbam Fungicide

folpet
Phaltan, Folpet, Rose and Garden Fungicide

mancozeb
(or maneb and zinc ion)
Dithane M-45, Manzate 200, Sup’r-Flo Maneb Flowable, Fore, Fore Lawn Fungicide, Pratt Lawn & Garden Fungicide

maneb
Maneb, Dithane M-22, Manzate Maneb Fungicide, Black Leaf Maneb, Aceto Amazine Maneb 80 WP, Agsco Biflex, Tersan LSR, Sears Lawn Fungicide, Maneb Garden Fungicide

parinol
Parnon

PCNB
PCNB, Terraclor, Fungiclor, Pearson’s Green Lawn Fungicide, Lawn Disease Control

piperalin
Pipron

Protectant-eradicant fungicide for control of certain powdery mildews (e.g., catalpa, lilac, rose).
Polyram

Polyram streptomycin compounds
Agrimycin 17, Ag-Strep, Streptomyacin Spray, Agri-mycin 100 and 500, Antibiotic Spray Powder, Streptomyacin Wettable Powder

sulfur compounds
(including liquid lime-sulfur)
Sulfur, Magnetic, Sulfuron, Microfine, Corosul, Kolodust, Kolofog, Lime-Sulfur Solution

thiophanate compounds
Topsin M, Zyban, Banrot, Cleary 3336, Chipco Spot Kleen, Fungo

thiram
Tersan 75, Thiram, Thylate, Thiuram 75, Turflox, Arasan, Fungisan, Thiramad

zineb
Dithane Z-78, Zineb, Zineb Garden Fungicide, Oxy Casonil, Black Leaf Sheen, Science Zineb Fungicide

Greenfield Rose and Ornamental Disease Control contains Pipron and maneb.

General protectant fungicide similar to mancozeb, maneb and zineb in range of effectiveness. Often combined with PCNB (Polyram PCNB Dust).

Anti-bacterial antibiotic effective against fire blight and other bacterial diseases. Ineffective at low temperatures. Effectiveness is impaired if mixed with other pesticides. Gives best control when applied during slow-drying conditions (e.g., night). Agri-mycin 100 and 500 contain the antibiotic oxytetracycline (Terramycin).

Old-time combination fungicide-insecticide-miticide. Controls powdery mildews, rusts, and many leaf spots, blights, scabs, and rots. May injure plants in hot dry weather. Lime-sulfur is more phytotoxic than other sulfurs and will discolor paint. It is primarily used as a dormant spray.

A broad-spectrum systemic fungicide, closely related to benomyl, not yet cleared for use on woody ornamentals. Used as a turf fungicide and as a foliar spray to control powdery and downy mildews, Botrytis blights, numerous leaf and fruit spots, scabs and rots of ornamentals and fruit crops. Zyban and Banrot are used as a soil drench or dry soil mix to control soil-borne fungi of bedding and container-grown plants.

General protectant fungicide for control of fungus leaf spots and blotches, scabs, and rusts. Used as a seed protectant and turf fungicide. Arasan 42-S is also sold as a deer, rodent and bird repellent.

General protectant fungicide for control of fungus leaf spots, blights and blotches, scabs, rots, and anthracnoses. Will not control powdery mildews.

Table 2 should be used as a guide for selecting and applying appropriate fungicides to control specific diseases. It is not intended as a spray program to be followed in all areas of the United States each year. Adapt the spray programs to those suggested by the Cooperative Extension Service for your state.

Many diseases cause slight damage to the plant; their control is only "cosmetic." Learn which diseases are most damaging in your area and concentrate your spray program on those which annually cause the greatest injury.

The disease control materials suggested in Table 2 are those registered for specific uses by the Pesticide Regulation Division of the federal Environmental Protection Agency (EPA), as of February, 1976, when the last update was received plus new EPA registrations received from chemical manufacturers up to October 15, 1976. There are other effective fungicides available to control many of the diseases listed. These products can only be recommended in the future if they are registered by the federal EPA. For the latest plant disease control registrations check with the Extension Plant Pathologist at your land-grant university.

Fungicides, like other pesticides, are generally formulated for sprays as flowables (F), emulsifiable concentrates (EC), and most commonly as wettable powders (WP).

The concentration of fungicide is expressed as a weight per unit volume or as a percent of the commercial product. For example, a fifty percent wettable powder (50% WP) is half active ingredient (a.i.) and half inert material—emulsifying agent, carrier, surfactant, and other diluents. Liquid formulations generally indicate the number of pounds of active ingredient per gallon (lbs. a.i./gal.) on the label. All rates in Table 2 are product rates, not a.i. rates, unless specifically stated otherwise.

The actual amount of material to be applied depends on the concentration of the chemical (a.i.) in the preparation. A manufacturer may sell the same fungicide in a half dozen or more formulations where the percentage of a.i. may vary from 2 to 80 percent or more. Amounts indicated in Table 2 are approximate. Be sure to read and follow the manufacturer's directions on the container label.

Most fungicide spray applications are designed to protect against infection. This requires the material to uniformly and thoroughly cover
susceptible parts before disease occurs. Rainy, foggy or very humid weather greatly favors infection of practically all pathogens. Whenever possible, spray programs should be altered to provide maximum protection during moist periods. The spray recommendations in Table 2 will provide acceptable control under weather conditions with about an inch of rain per week or less during periods of active growth. Extra sprays may be required during wet seasons, while fewer or no applications may be needed in years when the weather in spring, early summer and autumn is unusually dry.

Suggested fungicides in Table 2 are listed by coined names or representative trade names. Mention of a trade name or proprietary product does not constitute warranty of the product and does not imply approval of this material to the exclusion of comparable products that may be equally suitable.

Table 2. Chemical Control of Diseases of Woody Ornamentals

<table>
<thead>
<tr>
<th>Plant &amp; disease</th>
<th>Suggested fungicides</th>
<th>Rate per application</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALDER</td>
<td>Powdery mildew</td>
<td>100 gal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Benomyl, 50% WP</td>
<td>½</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sulfur, 95% WP</td>
<td>2-3</td>
<td></td>
</tr>
<tr>
<td>ALMOND</td>
<td>See Cherry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMELANCHIER</td>
<td>(Shadbush, Serviceberry, Juneberry)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cedar rusts</td>
<td>Ferbam, 76% WP</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thiram, 65-75% WP</td>
<td>1½-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zineb, 75% WP</td>
<td>1½-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mancozeb, 80% WP</td>
<td>1½-2</td>
<td></td>
</tr>
<tr>
<td>APPLE</td>
<td>See Crabapple</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARBORVITAE</td>
<td>Phomopsis needle and twig</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coryneum twig blight</td>
<td>Benomyl, 50% WP</td>
<td>1</td>
<td>Only new growth is susceptible. Spray whenever new growth appears. Spray after shearing or wet weather and repeat at 10- to 14-day intervals until new growth has matured.</td>
</tr>
<tr>
<td>ARBUTUS</td>
<td>See Madrone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASH</td>
<td>Anthracnose, fungus leaf spots</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Copper Zineb, 75% WP</td>
<td>½-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Benomyl, 50% WP</td>
<td>½</td>
<td></td>
</tr>
<tr>
<td>AZALEA</td>
<td>See Rhododendron</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BARBERRY</td>
<td>Bacterial leaf spot and twig blight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Copper Zineb, 75% WP</td>
<td>½-2</td>
<td>See label Spray at least monthly during autumn and winter rainy seasons.</td>
</tr>
<tr>
<td></td>
<td>Benomyl, 50% WP</td>
<td>½</td>
<td></td>
</tr>
<tr>
<td>BASSWOOD</td>
<td>See Linden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIRCH</td>
<td>Leaf blister</td>
<td>Copper Liquid lime-sulfur</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zineb, 75% WP</td>
<td>1½-2</td>
<td></td>
</tr>
<tr>
<td>BUTTERSWEET</td>
<td>Powdery mildew</td>
<td>Benomyl, 50% WP</td>
<td>½-1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Make 2 or more weekly sprays. Start when disease first appears.</td>
<td></td>
</tr>
<tr>
<td>BOXELDER</td>
<td>See Maple</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOXWOOD</td>
<td>Canker, fungus leaf blights or spots</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Copper Zineb, 75% WP</td>
<td>½-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mancozeb, 80% WP</td>
<td>½</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1½-2</td>
<td>Make 2 or more weekly sprays. Start when disease first appears.</td>
<td></td>
</tr>
<tr>
<td>Plant Type</td>
<td>Suggested Fungicide(s)</td>
<td>Dosage</td>
<td>Application Method</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------------</td>
<td>--------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Liquid-lime-sulfur</td>
<td>Ethazol, 30-35% Diazoben</td>
<td>2 gal.</td>
<td>Old leaves cleaned up and before new growth starts; 10 to 14 days later; when growth is half complete; in autumn when fall growth has ceased.</td>
</tr>
<tr>
<td><strong>Phytophthora root rot</strong></td>
<td>Ethazol, 30-35% Diazoben</td>
<td>See label</td>
<td>Apply as drench around plants to saturate the soil. Repeat at 4- to 12-week intervals during spring and autumn.</td>
</tr>
<tr>
<td><strong>BUCKEYE</strong></td>
<td>See Horseshoeatnutished</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BUTTONBUSH</strong></td>
<td>Powderly mildew</td>
<td>½-1</td>
<td>Make several weekly sprays. Start when disease first appears.</td>
</tr>
<tr>
<td><strong>BUTTONWOOD</strong></td>
<td>See Sycamore</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CAMELLIA</strong></td>
<td>Sclerotinia flower blight</td>
<td>See label</td>
<td>Drench soil surface in early November to early January. Apply 1 cup in 1 gal. water to thoroughly cover 100 sq. ft. (100 lb./450 gal./acre).</td>
</tr>
<tr>
<td><strong>CHERRY, PEACH, PLUM, AMOND, MAYDAY-TREE, CHERRY PLUM, CHERRY-LAUREL</strong></td>
<td>Black know</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ethazol, 30-35% Diazoben</td>
<td>See label</td>
<td>Drench soil around roots at 14-day intervals during April-May and again in September-October.</td>
</tr>
<tr>
<td></td>
<td>Zineb, 75% WP</td>
<td>½-1</td>
<td>Spray as buds begin to swell. Repeat at pink bud, full bloom, 10 and 20 days later.</td>
</tr>
<tr>
<td></td>
<td>Mancozeb, 80% WP</td>
<td>1½-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ferbam, 76% WP</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Benomyl, 50% WP</td>
<td>½-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brown rot, blossom and twig blight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Benomyl, 50% WP</td>
<td>See label</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Captan, 50% WP</td>
<td>½-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sulfur, 95% WP</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaf blister or curl, plum pockets, witches'-broom</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Captan, 50% WP</td>
<td>½-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Liquid lime-sulfur</td>
<td>2 gal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ferbam, 76% WP</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dodine, 65% WP</td>
<td>½-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Copper</td>
<td>See label</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coccomyces leaf spot, blight, or shot-hole</td>
<td>Benomyl, 50% WP</td>
<td>½-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dodine, 65% WP</td>
<td>½-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acti-dione</td>
<td>See label</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Captan, 50% WP</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perennial canker</td>
<td>Ferbam, 76% WP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Benomyl, 50% WP</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Powdery mildew</td>
<td>Benomyl, 50% WP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Karathane,</td>
<td>½-1</td>
</tr>
</tbody>
</table>

**Sooty mold**

Sooty mold fungi grow in honeydew secreted by aphids, scale and other insects. Spray in spring and summer for insect control.

**Chamaecyparis**

**Phytophthora root rots**

(Pacific Northwest)

Delay pruning until buds open in spring. Spray just after pruning.

Spray 3 or 4 times, 2 weeks apart. Start as buds are opening. Apply Acti-dione only to non-bearing cherry trees.
<table>
<thead>
<tr>
<th>Disease</th>
<th>Sprays</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.5% WP</td>
<td>½</td>
</tr>
<tr>
<td>2-3</td>
<td></td>
</tr>
</tbody>
</table>
| Sulfur, 95% WP | ½-
| 2 |
| Acti-dione PM | See label |
| Scab, fungus | Leaf spots, shot-hole |
| Benomyl, 50% WP | ½-1 |
| Sulfur, 95% WP | 5-10 |
| Captan, 50% WP | 2 |
| Ferbam, 76% WP | 2 |
| Zineb, 75% WP | 1½-2 |
| Scab, fungus | Leaf spots, shot-hole |
| Benomyl, 50% WP | ½-1 |
| Sulfur, 95% WP | 5-10 |
| Captan, 50% WP | 2 |
| Ferbam, 76% WP | 2 |
| Zineb, 75% WP | 1½-2 |
| CONIFERS | See Pine |
| COTONEASTER | Fire blight |
| Streptomycin formulations Bordeaux mixture | 2-6-100 |
| Scab | Benomyl, 50% WP | ½-1 |
| Dodine, 65% WP | ½-1 |
| Fungus leaf spots | Maneb, 80% WP | 1½-2 |
| Zineb, 75% WP | 1½-2 |
| CRABAPPLE, APPLE | Cedar rusts (Apple, hawthorn, quince) |
| Ferbam, 76% WP | 2 |
| Maneb, 80% WP | 1½-2 |
| Mancozeb, 80% WP | 1½-2 |
| Thiram, 65-75% WP | 1½-2 |
| Zineb, 75% WP | 1½-2 |
| Polyram, 80% WP | 1½-2 |
| Scab | Zineb, 75% WP | 1½-2 |
| Benomyl, 50% WP | ½-1 |
| Sulfur, 95% WP | 6-8 |
| Dodine, 65% WP | ½-1 |
| Captan, 50% WP | 2 |
| Maneb, 80% WP | 1½-2 |
| Mancozeb, 80% WP | 1½-2 |

<table>
<thead>
<tr>
<th>Disease</th>
<th>Sprays</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% WP</td>
<td>1½-2</td>
</tr>
<tr>
<td>Polyram, 80% WP</td>
<td>1½-2</td>
</tr>
<tr>
<td>Dikar, 80% WP</td>
<td>2</td>
</tr>
<tr>
<td>Folpet, 50% WP</td>
<td>1½-2</td>
</tr>
<tr>
<td>Captafol</td>
<td>1½-2 pts.</td>
</tr>
<tr>
<td>Fire blight</td>
<td>Streptomycin formulations Copper</td>
</tr>
<tr>
<td>Powdery mildew</td>
<td>Benomyl, 50% WP</td>
</tr>
<tr>
<td>Karathane, 22.5% WP</td>
<td>½</td>
</tr>
<tr>
<td>Crupe-myrtle</td>
<td>Fungus leaf spots or blotch, black spot, tip blight</td>
</tr>
<tr>
<td>Copper</td>
<td>See label</td>
</tr>
<tr>
<td>Zineb, 75% WP</td>
<td>1½-2</td>
</tr>
<tr>
<td>Maneb, 80% WP</td>
<td>1½-2</td>
</tr>
<tr>
<td>Mancozeb, 80% WP</td>
<td>1½-2</td>
</tr>
<tr>
<td>Powdery mildew</td>
<td>Benomyl, 50% WP</td>
</tr>
<tr>
<td>Karathane, 22.5% WP</td>
<td>½</td>
</tr>
<tr>
<td>Sulfur, 95% WP</td>
<td>2-3</td>
</tr>
<tr>
<td>Acti-dione PM</td>
<td>See label</td>
</tr>
<tr>
<td>Lime-sulfur</td>
<td>See label</td>
</tr>
<tr>
<td>CURRANT, ALPINE</td>
<td>Anthracnose and fungus leaf spots</td>
</tr>
<tr>
<td>Benomyl, 50% WP</td>
<td>½-1</td>
</tr>
<tr>
<td>Ferbam, 76% WP</td>
<td>2</td>
</tr>
<tr>
<td>Maneb, 80% WP</td>
<td>1½-2</td>
</tr>
<tr>
<td>Mancozeb, 80% WP</td>
<td>1½-2</td>
</tr>
<tr>
<td>Zineb, 75% WP</td>
<td>1½-2</td>
</tr>
<tr>
<td>Cypress</td>
<td>Coryneum blight, canker</td>
</tr>
<tr>
<td>Bordeaux mixture</td>
<td>4-4-50</td>
</tr>
<tr>
<td>Dogwood</td>
<td>Fungus leaf spot or blotch, anthracnose, spot anthracnose, flower</td>
</tr>
<tr>
<td>Shurtleff and Simone: Disease Control Sprays</td>
<td></td>
</tr>
<tr>
<td>Apply Acti-dione only to non-bearing cherry trees.</td>
<td></td>
</tr>
<tr>
<td>Spray several times, about 10 days apart. Start about 2 weeks after petal-fall.</td>
<td></td>
</tr>
<tr>
<td>Spray about 3 times, 10 to 14 days apart, starting at petal-fall.</td>
<td></td>
</tr>
<tr>
<td>Apply during bloom at 5-7 day intervals. Do not use streptomycin on C. racemifolia; may substitute bordeaux if temperature is above 65 deg. F.</td>
<td></td>
</tr>
<tr>
<td>Apply in spring as buds start to swell and repeat 2 to 3 weeks later.</td>
<td></td>
</tr>
<tr>
<td>Spray several times 10 to 14 days apart. Commence at budbreak.</td>
<td></td>
</tr>
<tr>
<td>Spray as new growth appears and flower buds start to open. Repeat 3 or 4 more times at 10-day intervals.</td>
<td></td>
</tr>
<tr>
<td>Spray as new growth appears. Repeat 4 more times, 7 to 10 days apart. Thorough coverage of new growth is essential. Captafol (Difolatan 4F) is applied to apple and crabapple as a single application before bloom for control of primary scab. See label.</td>
<td></td>
</tr>
<tr>
<td>Make several applications, 2 to 3 weeks apart. Start when new growth appears in the spring.</td>
<td></td>
</tr>
<tr>
<td>Make several spring and autumn sprays. Start when disease is first seen. Apply lime-sulfur once, just as the buds are breaking open.</td>
<td></td>
</tr>
<tr>
<td>Spray 2 or 3 times, 10 to 14 days apart. Start at leaf emergence or when leaves are nearly expanded.</td>
<td></td>
</tr>
<tr>
<td>Apply in early spring and late fall at 7-10 day intervals.</td>
<td></td>
</tr>
</tbody>
</table>
and leaf blight
Benomyl, 50% WP
Maneb, 80% WP 1½-2
Mancozeb, 80% WP 1½-2
Zineb, 75% WP 1½-2
Captan, 50% WP
Folpet, 50% WP 1½-2
Copper See label

Powdery mildew
Benomyl, 50% WP ½-1
Sulfur, 95% WP 2-3
DOUGLAS-FIR

Needle cast
Copper See label

Spray at budbreak and just before flower bracts are fully expanded. Repeat 2 or 3 more times about 2 weeks apart.

ELM
Anthracnose, black leaf spot, other fungus leaf spots, twig blight
Sulfur, 95% WP 2-3
Copper See label
Zineb, 75% WP 1½-2
Mancozeb, 80% WP 1½-2
Ferbam, 76% WP

Dutch elm disease
Metham (Vapam Soil Fumigant) See label
+ Methoxychlor See label
+ Lignasan BLP See label

Copper See label

Spray when new growth appears.

Nectria canker
(Pacific Northwest)
Copper See label

Spray in October and 2 or 3 times in spring, starting when new growth appears.

EUONYMUS
Leaf spots
Maneb, 80% WP 1½-2
Mancozeb

Spray when 20 to 25% of blossoms are open and at 5-
HEATHER  
(Calluna)  
Botrytis blight  
Benomyl, 50%  
WP  
\( \text{1/4-1} \)  
Drench when symptoms appear; repeat if Botrytis re-appears.  
Phytophthora root rot  
Ethazol, See label  
\( \text{30-35\%} \)  
Diazoben See label  
\( \text{HIBISCUS} \)  
Powdery mildew  
Sulfur, 95% WP  
\( \text{2-3} \)  
Apply at first sign of disease and repeat 2 or 3 times at weekly intervals.  
HICKORY  
Anthracnose, fungus leaf spot or blotch, scab, spot anthracnose  
Benomyl, 50%  
WP  
\( \text{1/4-1} \)  
Spray 3 or 4 times, 7 to 10 days apart, starting when the buds break open.  
HOLLY  
Fungus leaf spots, tar spot, anthracnose, spot anthracnose  
Benomyl, 50%  
WP  
\( \text{1/4-1} \)  
Apply 3 or 4 sprays at 10- to 14-day intervals. Start as leaves begin to unfold. Some holly species and cultivars are sensitive to copper materials in cold damp weather.  
Leaf and twig blight, algae  
Copper  
Zineb, 75% WP  
\( \text{1/4-2} \)  
Spray 3 or 4 times, 10 days apart. Start with the first autumn rains.  
Powdery mildew  
Sulfur, 95% WP  
\( \text{2-3} \)  
Apply at first disease appearance. Repeat at 7-day intervals as needed.  
HONEYSUCKLE  
Herpobasidium leaf blight  
Mancozeb, 80% WP  
\( \text{1/4-2} \)  
Apply several sprays 7 to 10 days apart. Start when new growth appears.  
KALANCHOË  
Powdery mildew  
Benomyl, 50%  
WP  
\( \text{1/4-1} \)  
Spray several times at 7- to 10-day intervals. Start when disease first appears.
LAUREL
See Mountain-laurel

LILAC
Powdery mildew
Benomyl, 50% WP ½-1
Sulfur, 95% WP 4-6
Kerathane, 22.5% WP ½-1
Bacterial and Phytophthora blights
Copper See label
Spray several times at 7- to 10-day intervals. Start when disease first appears. If using benomyl, apply at 3-week intervals.

LINDEN, BASSWOOD
Anthracnose, fungus leaf spots, leaf blight, spot anthracnose
Copper See label
Benomyl, 50% WP ½-1
Powdery mildew
Benomyl, 50% WP ½-1
Sulfur, 95% WP 2-3
MADRONE (Arbutus)
Hendersonula canker
Zineb, 75% WP plus 1
Ferbam, 76% WP 1
Fungus leaf spots
Captan, 50% WP 2
Zineb, 75% WP 1½-2
Maneb, 80% WP 1½-2
Mancozeb, 80% WP 1½-2
Thiram, 65-75% WP 1½-2
Dodine, 65% WP ½-2
MAGNOLIA
Powdery mildews
Benomyl, 50% WP ½-1
Acti-dione PM See label
Spray 2 or 3 times, 7 to 10 days apart. Start when disease first appears.

MAYDAY-TREE
See Cherry

MOUNTAIN-ASH
Leaf blight, scab, fungus leaf spots
Benomyl, 50% WP ½-1
Mancozeb, 80% WP 1½-2
Zineb, 75% WP 1½-2
Rust
Zineb, 75% WP 1½-2
Fire blight
Streptomycin formulations See label
Copper See label
Spray when disease is first noticed and repeat 10 to 14 later.

NEW JERSY TEA (Ceanothus)
Powdery mildew
Benomyl, 50% WP ½-1
Spray 3 times starting at budbreak. Repeat 10 and 20 days later.

OAK
Anthracnose, fungus leaf spots and blight or blotch, leaf scab, tar spot, leaf blister
Copper See label
Zineb, 75% WP 1½-2
Mancozeb, 80% WP 1½-2
Maneb, 80% WP 1½-2
Nectria canker (Pacific Northwest)
Copper See label
Spray once in October and 2 or 3 times in spring starting when growth commences.

Spray 2 or 3 times at 7- to 10-day intervals. Start when new growth appears in spring.

Spray just after budbreak and again 10 and 20 days later.

Spray when mildew first appears. Repeat 10 days later.

Spray when disease is first noticed and repeat 10 to 14 later.

Usually not needed except in rainy seasons. Apply several sprays at 7- to 10-day intervals.

Fire blight
Streptomycin formulations See label
Copper See label
Spray when 20 to 25 percent of blossoms are open and again at full bloom.

Bacterial blight
Bordeaux mixture 5-5-100
Apply at budbreak and repeat at 7-day intervals during moist periods.

NEW JERSEY TEA (Ceanothus)
Powdery mildew
Benomyl, 50% WP ½-1
Make several sprays 7 to 10 days apart. Start when disease appears.
Spot, anthracnose, leaf blotch, leaf blisters

**Copper**
- Zineb, 75% WP: 1 1/2-2
- Captan, 50% WP: 2-4
- Benomyl, 50% WP: 1
- Dodine, 65% WP: 1
- Mancozeb, 80% WP: 1 1/2-2

**Oak Wilt**
- 2,4,5-T: 4 lbs. a.i./gal. oil

**Metham (Vapam Soil Fumigant)**
- See label

**PEACH**
- See Cherry

**PEAR**
- See label

**Fire blight**
- Streptomycin formulations: See label

**Scab**
- Several fungicides
  - **Leaf spot**
    - Benomyl, 50% WP: 1/4-1
    - Ferbam, 76% WP: 2
    - Mancozeb, 80% WP: 1 1/2-2
    - Dodine, 65% WP: 1/4-1
    - Zineb, 75% WP: 1 1/2-2

**PECAN**
- Scab, fungus leaf spots, leaf blight, and scorch, spot anthracnose, antrhacnose
  - Benomyl, 50% WP: 1/4-1
  - Zineb, 75% WP: 1 1/2-2
  - Maneb, 80% WP: 1 1/2-2
  - Mancozeb, 80% WP: 1 1/2-2
  - Dodine, 65% WP: 1 1/2-2

**Scirrhia brown spot needle blight**
- Copper: See label
  - Mancozeb, 80% WP: 1 1/2-2
  - Maneb, 80% WP: 1 1/2-2
  - Chlorothalonil: 2% pts.
  - Daconil 2787: 1 1/2-2
  - Bravo 6F: 3 qts.

**Lophodermium needle cast or blight**
- Mancozeb, 80% WP: 1 1/2-2
- Maneb, 80% WP: 1 1/2-2
- Chlorothalonil: 2% pts.
- Daconil 2787: 1 1/2-2
- Bravo 6F: 3 qts.

**Diplodia tip blight**
- Copper: See label
  - Benomyl, 50% WP: 1

**Fusiform rust**
- (nurseries in southern states)
  - Ferbam, 76% WP: 2

**Sclerotodrris canker**
- Chlorothalonil: 1 1/2 qts.

**Shurtleff and Simone: Disease Control Sprays**

**WP**
- Copper
- Polyram, 80%
- Du-Ter, 47.5%
- Powdery mildew
- Benomyl, 50%
- Du-Ter, 47.5%
- PHOTINIA Powdery mildew
- Benomyl, 50%
- Sulfur, 95% WP

**PINE**
- Dothiostroma needle blight
  - Copper: See label

**Spray 3 times: just before buds open, when leaves are half grown, and 10 to 14 days later.**

**Oak Wilt**
- See label

**Apply to deep girdle and axe cuts in roots to runoff before 50% wilt of tree develops.**

**Treatment kills infected trees and prevents spread to healthy oaks.**

**Soil treatment when disease first appears to prevent transmission to healthy oaks by root grafts. Follow label directions.**

**Scrub when 20 to 25% of blossoms are open and repeat at 5- to 7-day intervals during bloom. Then apply weekly for 5 or 6 weeks. Best control when spraying at night.**

**See label Spray twice: when new needles are just emerging and again when new needles are fully expanded.**

**Spray when mildew is first seen. Repeat at 10- to 14-day intervals.**

**Spray several times at 10- to 14-day intervals. Start when new leaf growth or disease first appears.**

**Spray when 20 to 25% of blossoms are open and repeat at 5- to 7-day intervals during bloom. Then apply weekly for 5 or 6 weeks. Best control when spraying at night.**

**Spray 3 to 4 times, 10 days apart, starting at budbreak.**

**Spray 4 times, 2 to 3 weeks apart, starting about midsummer when the new needles are full-grown.**

**Spray seedlings at 5-day intervals after emergence; continue to about July 1.**

**Spray as new growth appears in spring. Repeat at 2- to 3-week intervals until early July; then monthly until early September.**
<table>
<thead>
<tr>
<th>Condition</th>
<th>Treatment</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slrococcus tip blight and Phoma spp. (West Coast only)</td>
<td>Chlorothalonil: 1 qt.</td>
<td>Start spraying in early November and repeat at 2- to 4-week intervals during the autumn and winter rainy period.</td>
</tr>
<tr>
<td>Anosus root and butt rot</td>
<td>Borax: 1 lb./50 sq. ft. of stump surface</td>
<td>Cover fresh cut stump surface immediately after falling tree. Sprinkle liberally and evenly.</td>
</tr>
<tr>
<td>Cylindrocladium blight</td>
<td>Benomyl, 50% WP 1/2; Ferbam, 76% WP 2</td>
<td>Apply as a soil drench to seedling beds at 2- to 4-week intervals.</td>
</tr>
<tr>
<td>Damping-off</td>
<td>Ethanol: 30-35%</td>
<td>Drench around plants in nursery beds at 2- to 4-week intervals. Drench nursery beds of southern pines prior to seeding. Follow with 0.5 inch of water.</td>
</tr>
<tr>
<td>PLANETREE</td>
<td>See Sycamore</td>
<td></td>
</tr>
<tr>
<td>PLUM</td>
<td>See Cherry</td>
<td></td>
</tr>
<tr>
<td>POPLAR</td>
<td>Leaf rusts: Zineb, 75% WP 2; Captan, 50% WP 2; Maneb, 80% WP 2</td>
<td>Spray about a week before rust is expected and again 10 to 14 days later.</td>
</tr>
<tr>
<td>Yellow leaf blisters</td>
<td>Zineb, 75% WP 2; Maneb, 80% WP 2</td>
<td>Apply several weekly sprays when spots first appear on the lower leaves.</td>
</tr>
<tr>
<td>Powdery mildew</td>
<td>Sulfur: 95% WP 4 1/2-5 1/2</td>
<td>Apply at first sign of disease. Repeat 2 or 3 times at 5- to 10-day intervals.</td>
</tr>
<tr>
<td>PRIVET</td>
<td>Anthracnose, leaf spot, twig blight</td>
<td>Spraying several times at 10-day intervals, starting in mid-spring.</td>
</tr>
<tr>
<td>PYRACANTHA (Firethorn)</td>
<td>Fire blight: Streptomycin formulations Copper</td>
<td>Spray when 20 to 25% of blossoms are open and repeat at 5- to 7-day intervals during bloom.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Condition</th>
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<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scab</td>
<td>Benomyl, 50% WP 1; Folpet, 50% WP 2; Dodine, 85% WP ½-1; Zineb, 75% WP ½-1; Ferbam, 76% WP ½-1</td>
<td>Spray 4 times: just before blossoms open, petal-fall, 2 weeks and 4 weeks later.</td>
</tr>
<tr>
<td>Rust, scab, fungus leaf spots</td>
<td>Maneb, 80% WP 1 ½-2; Ferbam, 76% WP 2; Zineb, 75% WP 1 ½-2</td>
<td>Apply several times at 10-day intervals starting at budbreak.</td>
</tr>
<tr>
<td>REDBUD</td>
<td>Cercospora and other fungus leaf spots</td>
<td>Captan, 50% WP 2; Maneb, 80% WP 1 ½-2; Zineb, 75% WP 2</td>
</tr>
<tr>
<td>RHODODENDRON, AZALEA</td>
<td>Ovulinia petal or flower blight of azalea</td>
<td>Benomyl, 50% WP ½; Zineb, 75% WP 1; Maneb, 80% WP 1; Thiram, 65-75% WP 1</td>
</tr>
<tr>
<td>Powdery mildew</td>
<td>Benomyl, 50% WP ½-1; Sulfur, 95% WP 3-6; Karathane, 22.5% WP ½-1</td>
<td>Spray several times at 7- to 10-day intervals. Start when disease first appears.</td>
</tr>
<tr>
<td>Fungus leaf spots, rusts</td>
<td>Zineb, 75% WP 1 ½-2; Maneb, 80% WP 1 ½-2; Mancozeb, 80% WP 1 ½-2; Ferbam, 76% WP ½-1</td>
<td>Spray several times at 7- to 10-day intervals. Start when new growth appears or right after bloom. Zineb, maneb, mancozeb, and ferbam are effective against rusts.</td>
</tr>
</tbody>
</table>
and stem gall
Zineb, 75% WP 1½ Spray just before budbreak and continue as for Fungus leaf spots.
Ferbam, 76% WP 2

Bud and twig blight, dieback
Copper See label Make 3 sprays, 7 to 10 days apart, starting at budbreak.

Root and crown rot or wilt
(Phytophthora cinnamomi and other fungi)
Ethazol, 30-35% See label Apply as drench around plants to saturate the soil. Repeat at 4- to 12-week intervals during spring and autumn.
Diazoben See label

Cutting rot
Benomyl, 50% WP Mix 1 part benomyl with 39 parts of root-inducing hormone powder by weight. Treat cutting ends with mixture before "sticking" in rooting medium. Then drench soil as for Root and crown rot or wilt (above). Apply as for Root and crown rot or wilt (above).

Ethazol, 30-35% See label

ROSE
Botrytis blight
Benomyl, 50% WP ½ Apply to flowers at 7- to 10-day intervals during moist weather.
Botran, 50-75% WP See label
Zineb, 75% WP 1

Black spot, cane blights or cankers, spot anthracnose, anthracnose, fungus leaf spots
Chlorothalonil, 75% WP 1½-2 Spray at 7- to 10-day intervals, starting when new growth appears. Thorough coverage is required.
Folpet, 50% WP 1½-2
Maneb, 80% WP 1½-2
Mancozeb, 80% WP 1½-2
Polyram, 80% WP 1½-2
Benomyl, 50% WP 1
Zineb, 75% WP 1½-2

Powdery mildew
Benomyl, 50% WP ½-1 Spray at 7- to 10-day intervals, starting when new growth appears. Thorough coverage is required.
Sulfur, 95% WP 1½

WALNUT,
BUTTERNUT
Anthracnose, yellow leaf blotch, fungus leaf spots or blights
Benomyl, 50% WP ½-1 Spray 3 or 4 times at 2-week intervals, starting when the leaves begin to unfold. Thorough coverage is required.
Dodine, 65% WP ½-1
Zineb, 75% WP 1½-2
Mancozeb, 80% WP 1½-2
Maneb, 80% WP 1½-2

Bacterial blight
(fer derived from English walnut)
Copper See label
Streptomycin formulations See label Sprays 3 times: when flowering starts, at full bloom, and at petal-fall.

SHADDBUSH
See Amelanchier

SPRUCE
See Pine

SUMAC
Fungus leaf spots
Maneb, 80% WP 1½-2 Apply when disease is first seen. Repeat as needed at 7- to 10-day intervals during wet periods.
Sulfur, 95% WP 4-6

SYCAMORE,
PLANETREE,
BUTTONWOOD
 Anthracnose, fungus leaf spots, leaf blight
Benomyl, 50% WP 1 Spray 3 times, 10 days apart, starting just before budbreak. Thorough coverage is required.
Copper See label
Mancozeb, 80% WP 1½-2
Maneb, 80% WP 1½-2
Dodine, 65% WP 1
Captafol 2 pts.
Zineb, 75% WP 1½-2

POWDERY mildew
Benomyl, 50% WP ½-1 Spray 2 or 3 times, 7 to 10 days apart, starting when disease first appears.
Sulfur, 95% WP 2-3

TAXUS
See Yew

VIBURNUM
Powdery mildew
Benomyl, 50% WP ½-1 Spray 2 or more times, 7 to 10 days apart. Start when disease first appears. Some viburnums are sensitive to sulfur.
Sulfur, 95% WP 1½
Karathane, 22.5% WP ½

Acti-dione See label
Parinol See label
Piperalin See label

SERVICEBERRY,
**WILLOW**

Tar spot, leaf blight or scab, black canker, spot anthracnose

Copper See label Spray 3 times, 10 days apart, starting as the buds open. Zineb, maneb and mancozeb also control rust.

Zineb, 75% WP 1½-2
Mancozeb, 80% WP 1½-2
Maneb, 80% WP 1½-2
Dodine, 65% WP ½-1

Powdery mildew and rust

Sulfur, 95% WP 4½-5½ Apply 2 or more times, 7 to 10 days apart. Start when disease first appears.

**WITCH HAZEL**

Powdery mildew

Benomyl, 50% WP ½-1 Spray 2 or more times, 7 to 10 days apart. Start when disease appears.

**YEW (Taxus)**

Phytophthora root rot (Pacific Northwest)

Ethazol, 30-35% See label Drench soil around plants at 2- to 4-week intervals during April-May and again in September-October.

Diazoben See label

**Twig blight**

Bordeaux mixture 4-4-100 Apply when new growth emerges. Repeat twice more at 7- to 10-day intervals.

**ALL TREES AND SHRUBS**

Seed decay, damping-off, seedling blights

Thiram, 50-75% WP Apply 2 oz./lb. of seed. If damping-off occurs, drench seedbed (4 T./gal.) when first seen. Follow label directions.

Captan, 50-75% WP

Mylone, DMTT See label Apply as a soil drench 2 to 3 weeks prior to planting in nursery beds.

Diazoben See label Apply as a soil drench after plants are set; repeat at 2- to 4-week intervals.

Wood rots or decays

Thiram, 75% WP 1% Apply thinly in an asphalt or other non-fortified tree wound preparation.

Copper naphthenate 3.3-10.0% WP ¼t./gal.

Benomyl, 50% WP

Sodium o-phenylphenate 2%

1The rates given are based on hydraulic application. If using a mistblower, follow label directions.

2Copper fungicides include bordeaux mixture (usually 4-4-100 or 8-8-100) and fixed or neutral copper compounds.

2Lignasan BLP has not been adequately tested in most states by specialists in the area of tree pathology, and hence cannot be fully recommended at this time.

3Do not use 2,4,5-T around the home, recreational areas, pond or ditch banks, or similar sites.

4Recommended for the leaf-blight stage of anthracnose only.

**Additional Comments:**

1. The vigor of unthrifty and undernourished woody ornamentals, commonly susceptible to a variety of diseases and environmental stresses, can often be greatly improved by periodic applications of fertilizer and timely watering. Soil tests are always suggested prior to feeding, especially if a soil (or lawn) fertilization program has been in effect. In general, a 10-10-10 (NPK) fertilizer at the rate of 2 to 4 lbs. per inch of trunk diameter at breast height can be applied in a series of holes evenly distributed in the ground beneath the tree and extending well beyond the drip line.

2. Proper selection of planting site, planting and spacing, pruning, winter protection, control of other diseases and pests, and avoidance of unnecessary wounding will aid in control of a wide range of diseases.

*Prune during dry weather,* sterilizing tools frequently between cuts using a fresh 10% solution of liquid household bleach, 70% alcohol, or formaldehyde. When pruning or removing diseased wood, paint the newly exposed inner bark and sapwood with a germicidal or fungicidal coating. Shellac is useful for diseases caused by bacteria, such as fire blight. Follow the shellac with a tree wound paint containing benomyl (Benlate) fungicide 50% WP at the rate of 1 gram in 5,000 grams (or 2 2/3 oz. in 100 gal.). This mixture, although harmless to living bark, is toxic to spores of such canker-producing fungi as Cytospora (Valsa), Ceratocystis and Botryosphaeria. Some tree pathologists believe that the application of wound paints is primarily for "cosmetic effect."

3. Wetting, spreading, and sticking agents (surfactants), are often added to spray mixes
when spraying hard-to-wet foliage such as that of conifers, broadleaf evergreens, boxwood, and roses. A few commercial spreader-stickers available for tank mixing include Biofilm Spreader-Sticker, Chevron Spray Sticker, Citowatt, and Nu-Film P and 17. Commercial spreaders include Chevron Spreader, Multifilm L, Ortho X-77, Pinolene, Sure Spred, Surfactant II, and Triton B-1956.

The fungicide label usually indicates any restrictions in selection of compatible surfactants. Use these commercial preparations according to label directions. The addition of excess wetting or spreading agent may cause excess runoff and result in a poor spray deposit.

4. Winter drying (leaf scorch) of broadleaf evergreens (e.g. magnolia, rhododendron, etc.) can often be prevented by applying an antidesiccant such as Folicote, Foli-Guard, Vapor Guard, or Wilt Pruf NCF, according to label directions. Apply to the upper surfaces of leaves in late November or early December and repeat again in mid-winter.


Noise is perhaps mankind's most widespread social irritant, and also the most insidious. Ever since the days when Julius Caesar banned chariots from the streets of Rome at night, man has attempted to control noise. Suburban noise, resulting from increased vehicular traffic has been a major concern of highway engineers and property owners who live adjacent to main thoroughfares. Researchers measuring sound levels at 48 locations in Buffalo, New York have found some suburban areas to be almost as noisy as downtown locations during the rush-hour. Individual attempts have often been made to control this noise, with some success, but the process has been rather haphazard, and more concerted efforts are needed. It has been known for many years that plant materials have some ability to absorb, and diffuse sound, thereby reducing noise levels; also solid barriers of earth concrete or wood are known to reduce noise transmission, when properly placed. Experiments by the authors in 1972, using combinations of belts of tall trees and earthen dykes or land forms, gave indications that the loudness of sounds could be reduced by half over distances from 45 to 140 meters when a barrier consisting of trees and land form was interposed between the noise source and receiver. More recently experiments in residential areas of the city in 1975 have shown that significant reductions are possible by the proper use of plant materials and barriers, and in many cases the devices used may be both attractive and relatively inexpensive.

**RECOMMENDATIONS**

1. To reduce noise from suburban automobiles and light trucks to an acceptable level where the residence is at least 25 meters from the centerline of the roadway, plant one or two continuous rows of dense shrubs as close to the curb as possible, and one or two continuous rows of dense trees behind the shrubs. One or both plantings should be of evergreens for year-round protection.

2. Where immediate relief from traffic noise is desired, erect an earthen dike, masonry wall, or solid wooden fence. The height should be sufficient to screen the noise source from view at the location to be protected. Landscaping should be included to provide additional protection, when the trees become larger, and to decrease the reflection from the hard wall surface back across the street.

3. Where the residence is less than about 20 meters from the centerline of the roadway, both trees and a solid barrier are necessary, as in recommendations 1 and 2.