The southern U.S. is blessed with an ideal environment for the growth of most ornamentals plants. Unfortunately, the same environment is also ideal for the development of a number of disease agents, especially fungi.

In a short article it is impossible to list all ornamentals grown in this region and the diseases that attack them. Rather, we will list nine of the more common ornamentals grown in the sunbelt and the major disease problems they face.

Azaleas

Azalea Petal Blight: This disease is largely confined to azaleas grown in the southern coastal states from Maryland to Texas. Indian and Kurume azaleas are especially susceptible.

The disease first appears as small, water-soaked spots on the petal. These spots sometimes give the flower a freckled appearance.

Under favorable conditions the spots enlarge rapidly and cause the flower to become limp and eventually collapse. The entire flower appears to "melt down" and tends to cling to the foliage rather than fall to the ground as spent healthy flowers.

Petal blight often affects the blooms of entire plants within a matter of a few hours, progressing so rapidly that it destroys the beauty of the plant overnight.

The fungus lives from season to season on infected blossoms in the mulch. Therefore, to control flower blight, one must remove all the old mulch from around the plants and replace with new mulch before the plants begin to bloom. Drench the soil with Terraclor in early January using one cup of 75 percent WP in enough water to wet 100 sq. ft.

When the blossoms begin to open, apply either Thylate, Bayleton, or Zyban as a blossom spray. Additional applications may be needed during the blooming period.

Twig Die-Back: Several fungi are associated with this disease complex.

These fungi normally enter the plant through either bud or leaf scars. The die-back organism may kill a few inches of the twigs or, if untreated, consume the entire plant.

To control die-back one must prune and destroy all infected branches. Remember that the normal pruning period for these plants is just after blooming. Since the infection period is just after the bloom season, one must continue his spray program for petal blight beyond the blooming period.

Leaf Gall: Leaf and flower gall is a common disease on azaleas and camellias in the south. The fungus may infect the developing leaves, stems, and flowers—causing severe distortion, swelling, and thickening of the plant parts.

As the galls form, the infected parts may become white or light green. The
DISEASE CONTROL GUIDE warm season

disease may be particularly severe during cool, moist weather.

The best control is to remove the galls when first noticed, at a time when only a few galls are present. 

There may be situations where removing galls is not practical. In such cases, a spray program may control the disease. Spray the plants once before the new leaves are unfurled using Maneb, Captan, or Zineb. Apply at 14-day intervals during the spring or as long as young leaves are present.

Boxwood
Boxwood Blight (Canker): The term branch and twig blight, is used to describe the problem of twigs or entire branches dying when the remaining parts of the plant appear healthy. Leaves may shed prematurely leading to the death of the twig. The affected foliage takes on a light, straw color.

Several fungi are associated with boxwood blight in the south. To ensure maintenance of healthy plants where blight is a problem, one must utilize an annual program of pruning, sanitation, and spraying. The annual removal and burning of all dead leaves and twigs lodged in and around the plants is important.

Several applications of a broad-spectrum fungicide—Daconil, Maneb, or fixed copper—have been effective in preventing most blighting problems.

The first application should be made when the plants are pruned, followed by a second application when new growth is approximately one-half completed. The remaining applications can be made at various intervals depending upon further disease development.

Nematodes: Nematodes are small, worm-like organisms that attack a plant’s root system. Boxwoods grown in the south are susceptible to a number of nematodes including rootknot, lesion, spiral, stubby-root, lance, and ring.

The weak nematode-affected plants gradually decline. If nematodes are suspected, a soil nematode analysis is needed to determine the types and population of the nematodes present.

Few chemicals are available for the homeowner’s use in controlling nematodes. In some cases it is more practical to replace infested plants with a different variety of plant that is not affected by the disease.

Phytophthora Root Rot: Off-color foliage followed by sudden wilting and death of the entire plant is characteristic of this disease. Yews, rhododendrons, and a large number of other woody ornamental plants are also subject to Phytophthora. It is extremely difficult to rid infected plants of this disease.

The disease is more severe in poorly drained soil. Although Subdue and several other soil fungicides are labeled, chemical control is difficult.

Camellia
Flower Blight: This blight is confined to the flowers which turn brown and drop. Most species and varieties of camellias appear to be equally susceptible to this blight.

The control of camellia flower blight, although caused by a different fungus, is similar to that for azalea petal blight.

Die-Back: A canker and die-back of camellias is widespread and frequently destructive in the southern states. The fungus normally enters through wounds or through natural openings such as scars left by abscissing leaves or petals in the spring.

Once inside the plant the fungus moves down the twigs causing a gradual die-back. If left untreated the organism will move back to the main stem and kill the plant.

To control, prune and destroy all cankered twigs. Surgical removal of diseased portions may be effective when the cankers occur on a plant’s main stem. Use tree paint containing a fungicide to cover all cut areas.

A fungicide application shortly after the blooming season can protect the plant from entrance of the fungus through natural openings. Materials such as benomyl or daconil have proven to be effective.

Leaf Gall: The symptoms and control of leaf gall on camellias are similar to those that occur on azaleas.

Virus Diseases: The several diseases appearing on camellias normally appear as variegation or yellowing in the leaf or flower. Not all yellowing of camellia leaves is a result of a viral infection. They may indicate a type of nutritional disorder.

Plants suspected of harboring a virus should be discarded or at least isolated from healthy plants. Care should be taken while pruning so that suspected plants are pruned last to prevent spreading the virus to healthy plants.

Six steps for healthy camellias: A successful camellia disease control program requires a well-planned, integrated plan. Here is an example of such a program that will help reduce many of the camellia diseases:

1. Buy only disease-free plants. Isolate new plants from existing plants for three to six months to check for any possible disease development.

2. Take cuttings from current season’s growth from the top of healthy plants.

3. Root in a disease-free environment. If possible, use a sterile rooting medium.

4. Prune plants properly. Do the major pruning just after the flowering period. Paint the wounds properly with a pruning paint.

5. Use good cultural practices such as:
   - proper air circulation;
   - correct amounts of fertilizer.

6. Use chemical controls. In areas where flower blight and die-back are problems, follow an annual spray program along with the previous suggested practices.

Dogwood
Anthracnose: Spot anthracnose is a serious disease that attacks flowers, leaves, young shoots, and berries.

The flowers are usually malformed and covered with small, circular reddish to purple spots. The margins of these spots are normally much darker in color than the centers.

Leaf infection occurs after the blooming season is over. Heavily infected young twigs may die back sev-
## PLANT DISEASE DEVELOPMENT CALENDAR

<table>
<thead>
<tr>
<th>PLANTS</th>
<th>DEVELOPMENT OR DISEASE</th>
<th>PATHOGEN SCIENTIFIC NAME</th>
<th>PLANT PARTS AFFECTED</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
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**Notes:**
- **JAN:** January
- **FEB:** February
- **MAR:** March
- **APR:** April
- **MAY:** May
- **JUN:** June
- **JUL:** July
- **AUG:** August
- **SEP:** September
- **OCT:** October
- **NOV:** November
- **DEC:** December

**Pathogen Scientific Names:**
- Gymnosporangium sp.
- Erwinia amylovora
- Podosphaera leucotricha
- Venturia inaequalis
- Elsinoe corni
- Septoria flondae
- Physiological
- Gnomonia veneta
- Taphrina caerulescens
- Cronartium quercuum
- Cronartium fusiforme
- Hypoderma lethale
- Gymnosporangium sp.
- Exobasidium vaccini
- Ovulina azaleae
- Sclerotinia camelliae
- Exobasidium camelliae
- Erysiphe lagerstroemiae
- Diplocarpon rosae
- Erwinia amylovora
- Exobasidium camelliae
- Phytophthora cactorum
- Sphaerotheca pannosa

**Plant Parts Affected:**
- Leaves
- Shoots
- Fruit
- Trunk
- Flowers
The fungus can survive from year to year on these dead twigs. If die-back is severe, the dead twigs should be removed before a spray program is begun.

Anthracnose control requires early application of fungicides prior to blooming. A regular spray program is required for good control. Monthly applications of fungicides such as Benlate, Maneb, Captain, or Zyban can be applied during March, April, May, and September.

Nectria Canker: This fungus attacks dogwoods as well as other hardwoods in the southeast.

The first symptom is usually a dark area on the bark with a water-soaked appearance. These areas will begin to swell, resulting in a great deal of bark splitting. Infected areas may be a few inches to several feet in diameter and can completely gird the trunk.

Cankers are targets for insects and are easily broken during heavy winds. Control is difficult after infection occurs.

If the canker is small, cut the tissue back to healthy wood and paint with a wound dressing. Severely affected trees should be removed. No effective chemical controls are available.

Gardenia Canker: Symptoms of this fungus disease are yellowing, wilting, shriveling, and falling of leaves and buds. The cankers girdle the stems causing die-back. Cankers may enlarge to twice the size of the normal stem.

The fungus gains entrance through mechanical injuries so care should be taken when pruning the plants or mowing to prevent the disease from spreading.

Spraying with a broad-spectrum fungicide—Maneb or Daconil—soon after pruning is recommended.

Sooty Mold: Sooty mold is a frequent problem on leaves of evergreen shrubs such as azaleas, camellias, and gardenias.

The black, powdery coating develops on leaves and twigs during the cool, moist weather of late winter and early spring and fall.

There are several fungi or molds that grow in the sugary dew left on plants by insects such as aphids, scale, white flies, and others that suck sap from plants. This honey dew or sugary substance may occur on low shrubs where insects are not feeding but where the material falls from larger shrubs or overhanging limbs of trees.

The fungi that cause sooty mold do not attack the plants directly but derive their nutrients directly from the honey dew itself. These fungi will also grow on honey dew on walls, sidewalks, fences, automobiles, or anything where honey dew is present.

Control of sooty mold is indirectly achieved by controlling the insects that produce this sugary material. Once sooty mold has been established it is not easy to remove.

The best method is to soak affected plants in a water and detergent mixture by using one tablespoon of household liquid detergent per gallon of water and spraying on these plants. Wait for a few minutes and then wash the material off with a strong stream of water.

You may have to repeat the procedure several times. However, once completed, control of the insects should begin.

Holly
In the South, holly is subject to attack by only a few disease-causing organisms. Many times poor appearance of plants is often caused by improper planting, dry weather, cold weather, and planting varieties that are not adapted to the area.

The amount of damage from disease on hollies can be minimized by giving plants ample growing space and pruning out all diseased twigs and branches as they appear.

Tar Spot: Yellow spots appear on the leaves of American and English hollies in the spring. These later turn reddish-brown and finally, by fall, a dark black color.

If at all possible, all diseased leaves should be burned. Make several applications of a broad-spectrum fungicide such as Maneb, Ferbam, or a copper fungicide.

Die-Back and Canker: There are several fungi that cause die-back and canker of holly. These are usually noted as sunken areas on the twigs and stems that cause varying degrees of die-back of young twigs.

Prune and destroy all diseased twigs and begin a spray program with a broad-spectrum fungicide such as Maneb or copper fungicide. Repeat at weekly intervals until all new growth is established.

Junipers

Twig Blight: Juniper twig blight, also known as Phomopsis blight, infects several species of juniper and arborvitaes growing in the southeast.

Early disease symptoms consist of yellowing and drying of the scale leaves, especially the tips. This is followed by a progressive die back of the new growth. Small black lesions are formed on the stems and cankers may form on the woody stems especially near a side branch.

In the southeast, twig blight spreads rapidly during periods of rainy, humid weather in the spring and fall. During dry weather, prune as much of the infected branches as possible and destroy.

Research has shown some varieties are more tolerant to twig blight than others.

Protective fungicides should be used frequently to protect new foliage. In most cases applications can be limited to periods in which flushes of new growth occur.

Fungicides shown to be effective in controlling twig blight are copper fungicides (such as copper sulphate), benomyl (Benlate), or Zyban. A spreader sticker should be added to

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### Junipers Resistant to Phomopsis and Twig Blight

<table>
<thead>
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<th>Juniper species</th>
<th>Fungicide</th>
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<tbody>
<tr>
<td>Juniperus chinensis</td>
<td>Maneb</td>
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<td>cv. Depressa</td>
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<tr>
<td>cv. Depressa Aurea</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Procumbens</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Titripartita</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Communis</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Depressa</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Depressa Aurea</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Procumbens</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Suecia</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Broadmoor</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Knapp Hill</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Skandia</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Campbells</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Fargesi</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Prostrate</td>
<td>Maneb</td>
</tr>
<tr>
<td>cv. Pumila</td>
<td>Maneb</td>
</tr>
</tbody>
</table>

*Also reported resistant to cedar-apple rust.
the spray for best results.

**Cedar-Apple Rust:** In areas where apples and red cedar grow together, the cedars may become covered with hundreds of galls an inch or more in diameter. Infection occurs on the leaves which stimulates the development of the gall. The second spring after infection, the galls form numerous, long, yellow, tongue-like outgrowths during warm, rainy weather. The spores from these galls are spread by wind to leaves of nearby apples which may become seriously diseased and fall prematurely. The damage to red cedar is usually not serious.

**Photinia Leaf Spot:** The major problem on photinia (red top) grown in the south is Entomosporium leaf spot. The fungus attacks old growth as well as new succulent tissue. The spots occur on both lower and upper surfaces of the leaf and are usually surrounded by a purple to red margin. As they mature these lesions will have a gray center. Once the disease is well established, it is sometimes very difficult to control. For successful control, a good spray sprayer program, along with sanitation and pruning, must be carried out. Diseased plants should be pruned in the spring just before they put on new growth. Prune out as much of the diseased areas as possible. Remove and burn any fallen leaves beneath the plant that may contain disease.

As the leaves begin to unfold, start the spray program and continue on a 10- to 14-day schedule throughout the early part of the growing season. Effective fungicides against this disease include Maneb, Funginex, Zineb, or copper fungicides.

**Roses**

Many different disease agents affect roses in the southeast. To adequately control these diseases the landscaper or grower must recognize these diseases and be able to control either by variety selection, sanitation, or chemical control.

**Black Spot:** As the name implies, the disease's most prominent symptoms are black spots on either side of the leaves. A number of other diseases cause dark spots on the leaves but you can distinguish black spot by the darker color and the fringed borders of the spots.

**Powdery Mildew:** A white powdery fungus growth on the surface of leaves, buds, or stems usually indicates powdery mildew. Infection on young leaves may cause curling and sometimes a purple discoloration. Badly infected flower buds do not open properly. Most sanitation procedures for the control of other rose diseases are also valuable in controlling powdery mildew. When the disease is a problem, spray dormant plants with commercial lime sulfur (1:15). During the growing season you can hold powdery mildew in check by spraying with benomyl, cycloheximide (Acti-dione), or wettable sulfur. Be sure to add a spreader sticker and follow label directions closely.

**Viruses:** There are several virus diseases that attack roses in the south. The symptom expressed will depend on the type of virus present. Some of the mosaic viruses will cause pale to bright yellow spots on the leaves. Occasionally, ring spots will occur or some type of light yellow zig-zag pattern across the leaf. Also, the mosaics will result in a puckering of the younger leaves.

Some of the streak viruses will produce a brown to reddish ring pattern in the leaves. Brown or green rings may also occur on some of the canes. Generally speaking, the viruses cause little loss of plant vigor. Nor does it affect flower production. The major problem is with discoloration and deformity of the foliage. Occasionally symptoms may be masked during hot weather. Infected roses should not be used for budding or grafting. Propagators can use heat treatment of root stock to rid the plants of most viruses. If virus symptoms do occur on established plants, severe pruning may eradicate the virus. If this is not successful, it is best to remove the plant since the virus may be transmitted to healthy plants either by pruning instruments or by insects.
pathogenic organisms such as fungi or bacteria commonly attack and infect stressed plants that may already show symptoms of a non-infectious disease condition.

When the pathogen is present, the health imbalance and stress of infectious disease are added to that of the previously existing non-infectious disease. There are disease organisms that are so pathogenic that they will vigorously attack even growing and reasonably healthy plants.

Nevertheless, stress management can promote the management of infectious as well as non-infectious disease problems. This is why pathologists often emphasize "disease." Control or prevention tactics that are truly "holistic" plant health management concepts fall into three integrated areas: selection tactics, cultural or care tactics, and pesticide use tactics.

Control or prevention tactics (plant selection):
Using resistant varieties is an important disease management tactic in much of agriculture.

Plant selection tactics are a phase of plant health management that have been difficult to successfully implement. New plants or cultivars are constantly being developed. They are bred or selected because of beauty or other growth characteristics over and above those relating to disease.

When considering a plant's future healthfulness, you should consider its known susceptibilities to particular pests and diseases, and its known tolerance or ability to handle environmental imbalances.

For instance, a new crabapple susceptible to scab would not be a wise choice. In the same way, a crabapple with scab resistance but questionable tolerance of dry sites would be an equally poor choice.

TABLE 1 ————
Ornamental Plants Resistant to Some Common Diseases

I. FLOWERING CRABAPPLES:
The following cultivars are moderately to highly resistant to powdery mildew, scab, fireblight and rust:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob White</td>
<td>Ormiston Roy</td>
</tr>
<tr>
<td>Centurian</td>
<td>Red Baron</td>
</tr>
<tr>
<td>Coralburst</td>
<td>Red Jade</td>
</tr>
<tr>
<td>Donald</td>
<td>Sargent</td>
</tr>
<tr>
<td>Donald Wyman</td>
<td>Sentinel</td>
</tr>
<tr>
<td>Inglis</td>
<td>Tina</td>
</tr>
<tr>
<td>M. halliana 'Parkmanii'</td>
<td>White Angel</td>
</tr>
<tr>
<td>M. hupenhensis 'Tea'</td>
<td>White Cascade</td>
</tr>
<tr>
<td>Molten Lava</td>
<td></td>
</tr>
</tbody>
</table>

II. JUNIPERS:
The following varieties are believed to be at least moderately resistant to twig blight and rust:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. chinesis 'Hetzii'</td>
<td>J. horizontalis 'Wiltonii'</td>
</tr>
<tr>
<td>J. chinesis 'Keteleeri'</td>
<td>J. procumbens</td>
</tr>
<tr>
<td>J. communis</td>
<td>J. squamata 'Meyeri'</td>
</tr>
<tr>
<td>J. horizontalis 'Douglasii'</td>
<td>J. virginiana 'Tripartita'</td>
</tr>
<tr>
<td>J. horizontalis 'Plumosa'</td>
<td></td>
</tr>
</tbody>
</table>

III. TREES:
The following types are resistant to Verticillium wilt disease:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceridophyllum sp.-katsura</td>
<td>Malus spp.-flowering crabapples</td>
</tr>
<tr>
<td>Carpinus spp.-hornbeams</td>
<td>Morus sp.-mulberry</td>
</tr>
<tr>
<td>Crataegus spp.-hawthorns</td>
<td>Platanus spp.-plant trees</td>
</tr>
<tr>
<td>Gingko biloba-gingko</td>
<td>Quercus spp.-oaks</td>
</tr>
<tr>
<td>Gleditsia sp.-honey locusts</td>
<td>Salix spp.-willows</td>
</tr>
<tr>
<td>Liquidambar sp.-sweetgum</td>
<td>Sorbus aucuparia-European mountain ash</td>
</tr>
</tbody>
</table>

These lists are not complete. They are intended as guides to assist in plant selection decisions. In some instances, listed plants are susceptible to other disease, insect or environmental problems. Thus, it may not be wise to plant them even though they are resistant to a specific common disease.
Vertical mulching can improve aeration, improve drainage of excess water, improve penetration of water into dry soils, and provide places for roots to grow and proliferate.

Control or prevention Tactics (using pesticides):

Last in integrated control or prevention tactics are those involving pesticides. Remember that pesticides only are effective when pests or infectious diseases are truly the cause of the problem. Table 2 gives some chemicals that are used against common ornamentals diseases.

Pesticides are only effective if several rules are followed.

First, the correct material must be selected. This depends on correct diagnosis and identification of the pathogen or pest.

Second, the chemical must be applied at the proper time of year and frequently enough to protect plant material adequately.

Third, pesticides must be applied properly over plant surfaces.

The rules depend on your making correct decisions based on correct knowledge.

The following chemicals are commonly used for control of diseases of trees and ornamentals:

- **Benomyl (Benlate, Tersan 1991)**: This systemic fungicide is effective against apple scab, powdery mildews, botrytis, anthracnose, and other leaf spots commonly seen on landscape plants. A good spreader-sticker is necessary for best results from sprays.

- **Bordeaux Mixture (Bordo-Mix)**: This broad-spectrum carbamate fungicide controls a broad range of activity. It is labeled for control of many leaf spots and blights on all ornamentals. Use of Bordeaux mixture leaves a residue and may be phytotoxic to some crops.

- **Captan (Orthocide)**: This broad-spectrum fungicide has limited registrations for use on ornamentals. It is effective on certain foliar diseases.

- **Chlorothalonil (Daconil 2787)**: Daconil 2787 is quite good for control of leaf spotting fungi on ornamentals. It is commonly sold as a flowable formulation.

- **Cupric hydroxide (Kocide 101, Kocide 404)**: These are “fixed copper” fungicides, quite safe to users but potentially damaging to plants. They have a wide range of activity against many leaf spots and blights.

- **Cycloheximide (Actidione-PM)**: This antibiotic material is effective for powdery mildew and rusts but may cause plant injury, especially spotting of new foliage on roses.

- **Dodomorph (Milban)**: This EC fungicide is currently registered for powdery mildew control on a few ornamentals. Make sure to wear eye protection when using this restricted-use material. Do not mix Milban with other chemicals in the spray tank.

- **Fenarimol (Rubigan)**: Fenarimol is a locally-systemic fungicide for the prevention or therapeutic control of powdery mildew in commercially-grown field or greenhouse roses, and in a few other field-grown ornamental crops. A 12.5 percent emulsifiable concentrate, it can be tank mixed with properly labeled wettable powder fungicides when needed. To avoid growth effects (phytotoxicity), use the lower end of dosage ranges given on the label whenever possible. Lower dosages are also recommended under cool, foggy, or overcast conditions.

- **Ferbam**: This broad-spectrum carbamate fungicide, registered for control of several leaf spots, rusts and blights, is somewhat difficult to wet. The black color may leave a conspicuous residue, especially on flowers.

- **Folpet (Phaltan)**: Folpet, a close relative of Captan, provides good control of certain leaf spots on ornamentals.

- **Iprodione (Chipco 26019)**: Many ornamentals can be sprayed with this 50 percent WP fungicide for control of botrytis blights and a few other diseases.

- **Mancozeb (FORE, Dithane M-45, Manzate 200)**: This is a coordination product of maneb fungicide and a zinc salt, registered for the control of leaf spots and blights. The product is a broad-spectrum material but does leave a heavy continued on page 78
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residue. The label on the wettable powder mancozeb sold as FORE and Dithane M-45 has recently been expanded to include many common diseases of trees and shrubs.

**Streptomycin (Agrimycin, Agristrep)**
This antibiotic is effective for control of some bacterial plant pathogens. Because of the diversity of bacterial diseases, check the label for specific uses. The product may cause plant damage.

**Thiophanate-ethyl (3336-F)**
As the trade name indicates, this is a 4-pound per gallon flowable product. Similar in mode of action to benomyl, it is labeled as a foliar spray for anthracnose, botrytis, and a few other diseases of ornamentals.

**Thiophanate-m plus mancozeb (Zyban, Duosan)**
This broad-spectrum, systemic-contact fungicide consists of a 15 percent WP thiophanate-methyl, 60 percent WP mancozeb mixture. It is labeled for professional use only on many herbaceous and woody ornamentals in greenhouses or fields. A good spreader-sticker is recommended for use on hard-to-wet foliage. You may not want to use the product on French Marigold or Gloxinia.

**Triadimefon (Bayleton)**
This systemic fungicide is quite effective for its labeled uses, primarily involving powdery mildew and rust diseases. Labeled directions must be followed closely. Overdoses of Bayleton will stunt plants and darken foliage.

**Triforine (Funginex)**
This EC fungicide wets foliage well without the need for additional spreader-sticker. This may be a key to its effectiveness but you should avoid excessive runoff while spraying. Eye protection is needed when using the material.

**Vinclozolin (Ornalyn)**
This 50 percent WP fungicide is effective for control of Botrytis spp. and Sclerotinia spp. on ornamental herbaceous, woody, and bulb crop. Similar in action to iprodione fungicide, it is said not to leave as noticeable a residue. It is labeled for professional use only.

**Zineb (Dithane Z-78)**
For leaf spots, rusts, and blights, use this product a a foliar spray. It should be reapplied every seven days until the disease is under control.

The application
Scheduling fungicide sprays into routine management programs is a difficult subject which has been approached in many different ways by many different practitioners.

Generally, most combine two fungicides to get the broad spectrum of disease control needed when trying to service diversely-planted landscape accounts.

Over the years, many landscapers have found that a combination of mancozeb fungicide plus a fixed copper fungicide has given good results.

This is especially important where control of bacterial fire blight is needed because of close spacings of large blocks of susceptible plants (such as crabapples, cotoneasters, or pyracantha). Generally, these bacterial diseases are not successfully controlled with sprays because of the need to spray frequently throughout the growing season.

Many landscapers, on the other hand, have gained from a combination of mancozeb plus benomyl. The combination provides long lasting, broad-spectrum control of most common ornamental plant diseases.

The new product Zyban is a combination very similar in mode of action to mancozeb plus benomyl.

Both Bayleton and Daconil 2787 are effective products that are probably best used alone.

Many landscapers and nurserymen are alternating one of the above combinations with either Daconil 2787 or Bayleton, applying sprays monthly or bi-weekly depending on prevalence of rainy weather.

Not much change
Whereas you may think that the world of fungicides has changed in recent years, you must realize that the basic approaches and the usefulness of chemicals in the landscape to control infectious diseases has remained essentially the same.

Preventive spray programs with proper intervals between applications are the secrets to successful disease management.

Obtain labels of the new products, study them, and see how they will fit into your disease management program.