

STRATEGIES FOR MAINTAINING HEALTHY TREES AND SHRUBS

C. C. Powell
Department of Plant Pathology
The Ohio State University

Introduction

The successful management of a landscape or golf course planting demands a person of varied skills. One of these skills is that of being a good plant health manager. Keeping plants healthy and looking their best is basic to our profession.

Plant health problems such as environmental stress reactions, infectious diseases, or pest infestations are best dealt with if we view them from a preventive or health maintenance point of view. Of course, the realities of our jobs dictate that we often have to deal reactively with trying to recover plant health on sick or infested trees, shrubs, or turf. When such reactive exercises are used to help us learn more about preventive plant health management strategies, we become more skilled. We then become better landscape managers.

Many insect pests and pathogenic organisms such as fungi or bacteria attack plants that have been stressed. The kinds of urban environments we often have to deal with are full of stress promoting elements. When the pathogen or pest is involved, the health imbalance of infestation or of infectious disease is added to that of the previously existing noninfectious stress disease. Thus strategies aimed at management of stress can do a lot toward the management of infectious as well as noninfectious plant problems. This is why pathologists often emphasize disease control or prevention tactics that are integrated or "holistic" plant health management concepts. They fall into three areas: plant selection strategies, cultural or care strategies, and pesticide use strategies.

Plant Selection Strategies

Using resistant varieties is an important disease management tactic in much of agriculture. Such strategies always have been difficult parts of ornamental plant health management to implement successfully. New plants or cultivars constantly are becoming available. They are bred or selected because of beauty or other growth characteristics over and above those relating to diseases. When considering the future healthfulness of a plant, 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 that is susceptible to scab would not be a wise choice. On the other hand, a crabapple with scab resistance but questionable tolerance of dry sites would be an equally bad choice. The plant lists in table one illustrate the use of plant selection to prevent plant disease. Note that it does not relate to insect resistance, stress tolerance, or horticultural cosmetics (color, size, shape, etc.)! To make

this sort of information useful, use it as a part of a "holistic" plant selection strategy.

Cultural Care and Environmental Improvement Strategies

Cultural activities to modify environments may be the most important ways to manage plant health. Table two lists some cultural activities that many use to maintain plant health and prevent infectious diseases in urban landscapes. The most common reason for poor urban landscape plant health may well be bad root and soil environments. Many urban soil environments are not able to support the continued growth and functioning of healthy roots for many reasons. Compacted soils, poor aeration, droughtiness, wetness and nutrient or pH imbalances are stresses often encountered. The integrated cultural tactics used to correct poor root health are to improve the root-shoot ratio (usually done by pruning back shoots), undertake extensive irrigation and fertilization programs, if needed and/or attempt to restructure the root environment. Restructuring the root environment recently has been emphasized by many throughout the country, especially where soils tend to be heavy and poorly drained.

Such root environmental improvement has been called **vertical mulching** or **core aeration**. Vertical mulching may be the most effective root stress management tool available to us. Drilling holes into the soil into the fibrous root growth area of trees and shrubs can correct several imbalances and thus is applicable in a variety of situations. 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.

Pesticide Use Strategies

Last in integrated control or prevention strategies are those involving pesticides. Remember that pesticides only are effective when pests or infectious diseases are truly the cause of the problem. Table three gives some chemicals that are used against common ornamentals diseases. Again, such information serves only as a start to a good integrated plant health management program.

Pesticides are only effective if three 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 right time of year and frequently enough to protect plant material adequately. This depends on being able to begin treatments early in the pest or disease development cycle. For diseases, we commonly emphasize prevention of infection of the plant. Repeated application may be needed depending on the correctness of our initial treatment, as well as the nature of the disease or pest we are dealing with. Third, pesticides must be applied properly over plant surfaces. The three rules depend on your making correct decisions based on correct knowledge. Too many people simply "spray and pray."

There are many chemicals labelled for control of diseases of trees and ornamentals in landscapes in the midwest. The following are commonly used:

Benomyl (Benlate, Tersan 1991)

This systemic fungicide is very effective against apple scab, powdery mildews, botrytis, anthracnose, and other leafspots commonly seen on landscape plants. The label generally states that the fungicide can be used on any ornamental. A good spreaderstick is necessary for best results from sprays. It comes as a 50 percent wettable powder. Benomyl is also labelled for use against Rhizoctonia and Fusarium crown and root rots.

Chlorothalonil (Daconil 2787)

Daconil 2787 is quite good for the control of leaf spotting fungi on ornamentals. Daconil 2787 is commonly sold as a flowable formulation, but also comes as a 75WP for those who prefer to use dry products.

Cupric hydroxide (Kocide 101, Kocide 404)

These are "fixed copper" fungicides. These fungicides are quite safe to users but may cause plant damage. They have a wide range of activity against many leaf spots and blights, particularly those caused by bacterial pathogens.

Iprodione (Chipco 26019)

Many ornamentals can be sprayed with this 50 percent WP fungicide for the control of Botrytis blights, alternaria leaf spots, and a few other diseases. It is also labelled for Rhizoctonia crown rots on many plants.

Mancozeb (FORE, Dithane M-45, Manzate 200)

This is a coordination product of a maneb like fungicide and a zinc salt. It is registered for the control of leaf spots and blights. The product is a broad spectrum material, but does leave a rather heavy residue. The labels on the wettable powder mancozeb sold as FORE and Dithane M-45 have recently been expanded to include many common diseases of trees and shrubs. It is hoped that the label on the flowable Manzate 200 will be expanded in the near future.

Thiophanate-ethyl (3336-F)

As the trade name indicates, this is a 4 lbs per gallon flowable product. It is similar in mode of action to benomyl. As such, it is labeled as a foliar spray for anthracnose, Botrytis and several other listed diseases on all ornamentals.

Thiophanate-m plus mancozeb (Zyban, Duosan)

This is a broad spectrum systemic - contact fungicide consisting of a mixture of 15 percent WP thiophanate-methyl and 60 percent WP mancozeb. It is labeled for professional use only on many herbaceous and woody ornamentals. A good spreader-sticker is recommended for use on hard to wet foliage.

Triadimefon (Bayleton)

This new 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 can stunt plants and darken foliage as a growth regulator.

A careful study of the labels of fungicides currently available will enable landscapers to select products that are properly labeled and registered on the plants they wish to spray. Table three gives some fungicide information. Generally, most users combine two fungicides together to get the broad spectrum of disease control that is needed when trying to service landscape accounts that contain a diversity of plant materials.

Many landscapers have gained from using a combination of mancozeb plus benomyl. The combination provides long lasting, broad spectrum control of most common ornamental plant diseases. The new product Zyban (Duosan) is, in fact, a combination very similar in mode of action to that of mancozeb plus benomyl. Others have found that a combination of mancozeb fungicide plus a fixed copper fungicide has given good results. This would be especially important where control of bacterial diseases such as fire blight, is needed. However, it should be noted that these bacterial diseases are not often successfully controlled with even this combination of materials because of the need to spray frequently throughout the rainy periods of the growing season.

Bayleton, Daconil 2787, and Chipco 26019 are excellent products that are probably best used alone. Many landscapers and nurserymen are alternating one of the above combinations with either Daconil 2787, Chipco 26019 or Bayleton. They are applying sprays monthly or bi-weekly depending on prevalence of rainy weather. Bayleton would be an excellent fungicide to choose if there were a severe powdery mildew or rust disease that required special attention.

Whereas it may seem that the world of fungicides has changed a lot in recent years, one 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. Spray programs used in an integrated manner along with the other health management strategies mentioned in this article can serve to enable all plant health managers to become more skillful. As we become more skillful in implementing these strategies, we become more successful as landscape or golf course managers.

Table One. Ornamental Plants Resistant to Some Common Diseases¹

I. Flowering Crabapples:

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

Bob White	Ormiston Roy
Centurian	Red Baron
Coralburst	Red Jade
Donald	Sargent
Donald Wyman	Sentinel
Inglis	Tina
M. halliana 'Parkmanii'	White Angel
M. hupehensis 'Tea'	White Cascade
Molten Lava	

II. Junipers:

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

J. chinensis 'Hetzii'	J. horizontalis 'Wiltonii'
J. chinensis 'Keteleeri'	J. procumbens
J. communis	J. squamata 'Meyeri'
J. horizontalis 'Douglasii'	J. virginiana 'Tripartita'
J. horizontalis 'Plumosa'	

III. Trees:

The following types are resistant to Verticillium wilt disease:

Ceridophyllum sp.-	katsura
Carpinus spp.-	hornbeams
Crataegus spp.-	hawthorns
Gingko biloba-	gingko
Gleditsia sp.-	honey locusts
Liquidambar sp.-	sweetgum
Malus spp.-	flowering crabapples
Morus sp.-	mulberry
Plantanus spp.-	plant trees
Quercus spp.-	oaks
Salix spp.-	willows
Sorbus aucuparia-	European mountain ash

¹These 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.

Table Two. Common Cultural Activities That Often Serve to Control or Prevent Infectious Plant Diseases¹

Do not crowd plants.

Place plants in open sites with good sun and air movement.

Protect plants from hot sun and drying winds.

Avoid overhead irrigations, especially late in the day.

Prune out diseased or dead branches promptly.

Improve vigor of plants with fertilization.

Counter drought stress with deep root watering.

Alleviate poor root environments with vertical mulching or core aeration.

¹All of these activities are not appropriate in all situations where plant health problems exist. The specific situation will dictate your choice of cultural activities to control or prevent plant diseases.

Table Three. Some Common Diseases of Woody Ornamentals and Fungicides That Can Be Used For Control¹

<u>HOST</u>	<u>DISEASE</u>	<u>FUNGICIDES</u>
Azalea	Blight and Dieback	Dithane M-45, FORE, Kocide 101, Zyban, Duosan
Crabapple	Scab	Benlate, Tersan 1991, Daconil 2787, Dithane M-45, FORE, Phaltan, Zyban, Duosan
Dogwood	Leaf spot	Benlate, Tersan 1991, Daconil 2787, Dithane M-45, FORE, Zyban, Duosan
Hawthorne	Leaf spot	Benlate, Tersan 1991, Daconil 2787, Dithane M-45, FORE, Zyban, Duosan
Hawthorne	Rust	Bayleton, Daconil 2787, Dithane M-45, FORE, Zyban, Duosan
Juniper	Tip blight	Benlate, Tersan 1991, Dithane M-45, FORE, Zyban, Duosan
Lilac	Powdery mildew	Benlate, Tersan 1991, Bayleton, Karathane, Triforine, Zyban, Duosan
Maple	Leaf spot	Dithane M-45, FORE
Pachysandra	Blight	Kocide 101, Dithane M-45, FORE, Zyban, Duosan
Pine	Tip blight	Benlate, Tersan 1991
Pyracantha	Scab	Benlate, Tersan 1991, Daconil 2787, Kocide 101, Zyban, Duosan
Roses	Black spot	Benlate, Tersan 1991, Captan, Daconil 2787, Kocide 101, Dithane M-45, FORE, Phaltan, Triforine, Zyban, Duosan, Manzate 200

¹This list is presented for information only. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. Registration data derived from labels and from the National Pesticide Information Retrieval Service. Before using any pesticide, read and follow all label directions.