Ever since its introduction, BAYLETON® Turf and Ornamental Fungicide has been one of the most popular products of its kind.

And no wonder. Its systemic action is not only effective, it keeps the control you need from being washed away or mowed off. So you can apply BAYLETON whenever--and wherever--you want.

And now, that famous BAYLETON control is available in a convenient new package. The drum. It not only keeps BAYLETON fresh and dry, it enables you to use exactly how much you need.

That's especially important when you tank mix BAYLETON for even broader control. Its ability to be used in combination with other products is one of the most outstanding features of BAYLETON, and now, that's even easier to do.

To find out more, contact Bayer Corporation, Specialty Products, Box 4913, Kansas City, MO 64120. (800) 842-8020.

ALWAYS READ AND FOLLOW LABEL DIRECTIONS.

Bayer

Circle No. 109 on Reader Inquiry Card

Disease control in warm-season ornamentals

by JANELL STEVENS JOHNK, Ph.D.

The great variety of ornamental host plants and their many diseases precludes a comprehensive list of common diseases. Fortunately, several common diseases attack a wide range of host plants.

As with turfgrasses, many diseases of ornamentals are caused by fungi. However, the leading causes of death of most ornamentals are cultural or environmental problems.

Powdery mildew on rose leaves appears as whitish or grayish mildewy growth on young plant tissues or upper leaf surfaces.

Powdery mildew

(Erysiphe spp., Sphaerotheca spp., Phyllactinia spp., Microsphaera spp., Podoshaera spp., Uncinula spp.)

Powdery mildews are probably the most wide-spread and easily recognizable plant diseases. They seldom kill the host plant but they do reduce photosynthesis and impair growth. Whitish or grayish mildewy growth appears on young plant tissues or upper leaf surfaces. Slight reddening and curling of leaves may occur before fungal mycelium is seen. Tiny, black pinhead-sized spherical fruiting bodies may be present in older areas of infection. Plants may be stunted and flower buds deformed.

Powdery mildews are specialized pathogens specific to a given host. The powdery mildew found on roses won't infect zinnias, crape myrtles, or turfgrass. Unlike most fungal pathogens, powdery mildew spores don't require free water to germinate, so mildews are more abundant in semi-arid regions than areas of high rainfall. Powdery mildew needs moderate to high relative humidity for infection to occur.

Management strategies

1) Avoid overcrowding of plants and use selective pruning to improve air circulation.

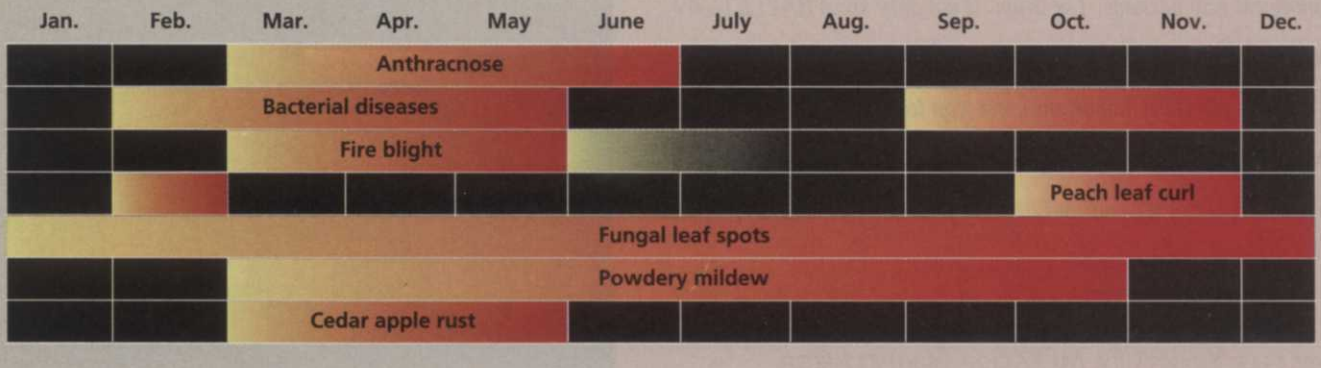
2) Irrigate early to allow the relative humidity at the leaf surface to drop quickly.

3) Select resistance species or cultivars.

4) Fungicides are available, when needed, to control established infections.

LANDSCAPE ORNAMENTALS - TIMING OF COMMON DISEASES

Chart gives general times when common ornamental diseases occur. They may occur at other times, however, depending on location and environmental conditions.



Rust (various fungal species)

Rusts attack leaves and stems, although sometimes flowers and fruits are affected. Most rusts are very specialized and attack only specific host plants. However, there are more than 4,000 kinds of rusts and many ornamental plants are susceptible to at least one of them.

Rusty, orange, yellow or even white spots break through the leaf surface. Spots don't enlarge, unlike most fungal leaf spots. Reddish discoloration (caused by spray injury, weather, or other leaf spot fungi) is often mistaken for rust. When rusts cause disease, the tissue around the pustule is usually yellow and the pustules have a powdery, rusty "dust" in them. Frequently, plants are stunted.

Management strategies

1) Plant resistant varieties when available.

2) Fungicides are effective in controlling many rust diseases.

Botrytis

(Botrytis spp.)

Many bedding plants are susceptible to botrytis. Symptoms vary depending on the host plant but may include bud and flower blights, blossom blights, gray-mold rot and stem and crown rots. When infection occurs on leaves, they appear watersoaked and often a brownish-gray mold covers the affected area. Dark spores can be rubbed off affected areas with a light touch. Botrytis diseases generally occur in areas of high humidity or excessive moisture. They are especially damaging in greenhouse situations.

Management strategies

1) Sanitize; remove fading flowers, blighted foliage or whole plants if infection is near the base.

2) Use proper plant spacings and good ventilation.

3) Avoid overhead watering and too cool temperatures.

4) Fungicide applications may be necessary.

General foliar leaf spots

Fungal leaf spots are the most common ornamental diseases, so common we seldom notice them, which is good. It would be impossible to control the myriad of leaf spots every season. Most leaf-spot-causing fungi require a thin layer of moisture on the leaf surface for them to germinate and infect. While many leaf spots are unsightly, few cause significant damage to the plant and, in many instances, can be ignored.

Management strategies

1) Irrigate to allow leaves to dry quickly.

2) Improve air circulation.

3) Several broad-spectrum fungicides are available.

Pythium and phytophthora rots

These fungi are known as water molds, and cause more damage in poorly-drained areas when temperatures prevent optimum plant growth and when excessive nitrogen has been applied. Both cause seed rots, damping-off, root rots, and soft rots. Infected seeds fail to germinate, become soft and mushy, and finally disintegrate. Seedlings can be infected at the roots, sometimes at or below the soil line. Invaded areas become water soaked and discolored. Infection of older roots is usually limited to the outer cortex of the root. The cortex slips easily from the rest of the root when held between the thumb and forefinger and gently tugged. In some cases, Phytophthora can cause aerial diseases of foliage. Leaves appear to melt away very rapidly.

Management strategies

1) Improve surface and subsurface drainage.

2) Manage water carefully.

3) Plant when temperatures are favorable for fast germination and growth.

4) Seed treatments and foliar-applied fungicides are available.

Rhizoctonia, Fusarium, Thielaviopsis Rots / Blights

These fungi cause root rots, stem rots, and in some cases, leaf spots and blights. As soil-borne organisms, these fungi attack roots or stems near the soil line. While *Pythium* and *Phytophthora* do best in the low oxygen environment of poorly drained soils, *Rhizoctonia* causes similar root rots in well-drained soils. *Thielaviopsis* is most destructive in heavy, cold wet soils with lots of organic matter. All of these diseases are problems in greenhouses where cuttings are being started.

Management strategies

1) Use sterile potting mix.

2) Optimize environmental conditions for rapid plant growth.

3) Practice good sanitation.

4) Fungicides may be necessary to bring these diseases under control once they become established. **LM**

The author is extension plant pathologist, Texas A&M University at Dallas

Botrytis causes leaves to appear watersoaked. Brownish-gray mold often covers leaves.

It's any bod

Whether you go with a regular bed or a special body, Dodge Ram is one truck that means business.

Because Ram starts with a rock-solid, ladder-type frame that handles payloads up to 5,695 pounds. And there's plenty of Magnum® muscle, too, with a choice of two available V-8s, a 300-horsepower V-10, and a Cummins Turbo Diesel that are part of what's, overall, the most powerful line of pickup engines on the planet.

We also gave Ram the roomiest regular and extended cabs of any full-size pickup… to comfortably handle a crew of 3 to 6 people with tools and equipment. A driver's airbag is standard. And so is better resale value than Ford, Chevy or GMC.†

Add the fact that your Dodge dealer can work with a local special equipment upfitter

y's business.

to meet your specific needs, and you've got the ideal truck for just about any body. Dodge Ram.

For still more information, call 1-800-WORK RAM or visit our Web site at http://www.4adodge.com

Always wear your seat belt for a fully effective airbag.

† We calculated resale using avg. trade-in values for '94-'95 full-size models vs. MSRPs, published in Jan. '95-July '96 *N.A.D.A. Official Used Car Guide®* monthly editions.

America's Truck Stop The New Dodge

Flooding and landscape trees

Damage to trees from prolonged submersion depends on water temperature, species, age of the tree and length of time under water.

by ELIZABETH BUCHANAN, Ph. D. / CHRISTOPHER LULEY, Ph. D. / BALAKRISHNA RAO, Ph.D.

Floods washed over various parts of the United States this spring causing damage to thousands of acres of property.

The primary concern during floods, of course, is for the safety of residents. After flood waters recede, however, preservation of personal property, including valued landscape trees, becomes a priority.

▶ **Damaged root systems often mean that flood-damaged trees are more susceptible to insect and disease attack in the years after flood waters recede.**

Although floods are natural events, human activity has made them worse. Natural wetlands and flood plains serve as nature's controls. Development along stream banks and coast lines have altered or destroyed these natural habitats which are nature's way of mitigating storm water. This problem is worsened as more land in watersheds is developed. Land that is made impervious or less pervious by development results in more storm water run off directly into receiving streams. This water bypasses natural filtration into ground water. All these conditions add up to increased flooding of landscapes in susceptible watershed areas.

Flooding's affects

It is important to understand how woody plants respond to flooding in order to manage existing situations, as well as to plan for landscape designs in flood prone areas.

Even though trees are amazingly resistant to environmental extremes, there are times when they succumb to prolonged flooding, ice/wind storms or other extremes. In the case of flooding, trees may be uprooted by water current, blown over after the soil is saturated, or be chronically weakened by the event and eventually be predisposed to secondary factors such as insects and disease. Additionally, trees can be injured mechanically by flood waters laden with debris, waste and logs that cause trunk wounding and limb breakage. The severity of the effects of flooding on landscape trees varies depending on the season, the duration of the event, water level, whether the water is flowing or stagnant, and the degree to which siltation has occurred. Other factors that influence whether plants can survive flooding include: species (or genetic constitution), the age and size of the tree, and general vigor of the plant.

Season

Flooding is less detrimental to woody plants during the dormant season than during the growing season. Actively

growing trees and shrubs are more susceptible to the detrimental effects of flooding. Many species of trees may not be adversely affected at all by flooding during the dormant season. They may even be stimulated if the flood waters recede before the growing season beings.

Duration of flooding

The longer trees are exposed to flooding, the more likely they will be impacted or

killed. Most trees can withstand only one to four months of continuous inundation of the root crown by flood waters. Shorter periods of flooding (less than one month) during the growing season are not as detrimental to trees unless the flooding is recurrent and the soil remains saturated.

Water level, movement and temperature

Tree mortality is higher when exposed to standing water as compared to saturated soils. After water covers the soil, the depth may have little significance until the lower foliage is covered. Flowing water is generally less detrimental than standing water because flowing water usually has higher oxygen content. Colder water is less injurious than warmer water because cold water has the capacity to hold more dissolved oxygen.

Sedimentation and scouring

As flood waters recede, sediment often remains. If silt and sand deposits of three inches or more cover the tree roots, the roots may experience oxygen deprivation and the tree may die. Species vary in tolerance to sedimentation but young trees and seedlings are especially susceptible to root injury. Trees that have evolved on flood plains such as cottonwood, bald cypress, tupelo and black willow can withstand moderate siltation.

The opposite extreme is scouring of the soil around the base of trees. Strong currents associated with flooding may cause soils around trees to be washed away, thus exposing tree roots. Exposed roots result in stress, and also make the trees more vulnerable to wind throw.

Species and age

Certain tree species seem to be genetically programmed to tolerate flood conditions, while others are quite intolerant. Very tolerant species are able to survive deep prolonged flooding for more than one year. Tolerant species are able to survive deep flooding for one growing season. Somewhat tolerant trees survive flooding or saturated soils for 30 consecutive days during the growing season, and intolerant species can not tolerate more than a few days of flooding during the growing season without significant mortality.

Younger trees and older declining trees are the most susceptible to flooding. Seedlings and young trees may die because they are buried in mud or uprooted by the flood. Newly transplanted trees may show various degrees of distress from flooding because of insufficient root systems and poor recovery after transplanting. Older trees may be further weakened by flooding and succumb to secondary problems such as insect and fungal damage.

Physiological effects of flooding

Inundation, even if only short in duration, dramatically effects the ability of a tree to grow normally and defend itself against other stresses in the environment. Many of the negative effects of flooding are related to the changes that occur in the tree's root system environment.

Low oxygen levels in saturated soils cause most of the negative impacts of flooding. Flooded soils are rapidly depleted of oxygen that is required by tree roots to thrive. In this regard, flooded soils are similar to heavily compacted soils. Both flooded soils and compacted soils cannot exchange enough oxygen with the atmosphere to support normal root tissue metabolism and growth.

Along with the depletion of oxygen, toxic compounds begin to accumulate in the root zone of flooded trees. These toxins may be produced by tree roots themselves or by soil microorganisms. Eventually, roots and microbes quickly use all the oxygen in the soil. This creates anaerobic (without oxygen) conditions in flooded soils. In flooded soils, many of the compounds that are toxic to trees are produced under these anaerobic conditions.

Trees react to flooding and the stressful environment surrounding their roots in a number of ways. First, tree growth slows. Reduced growth may occur only after a few weeks of flooding. Flooding may also slow the initiation and expansion of leaves if it occurs in the spring of the year. Other symptoms include yellowing or browning of leaves, premature leaf drop, sparsely foliated branches, branch dieback, and tree mortality.

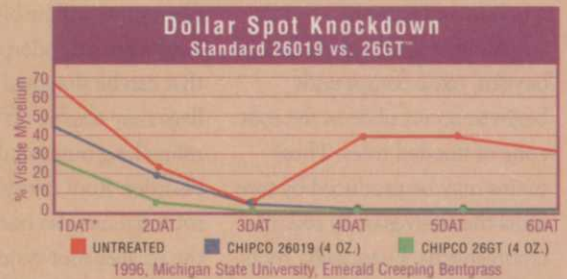
Health impacts of flooding can vary greatly depending on tree species, tree age and prior health of the tree. Many flood tolerant trees produce adventitious roots in response to the flooding. These extra roots are an adaptation that helps them survive the saturated, low-oxygen conditions.

Effects on roots

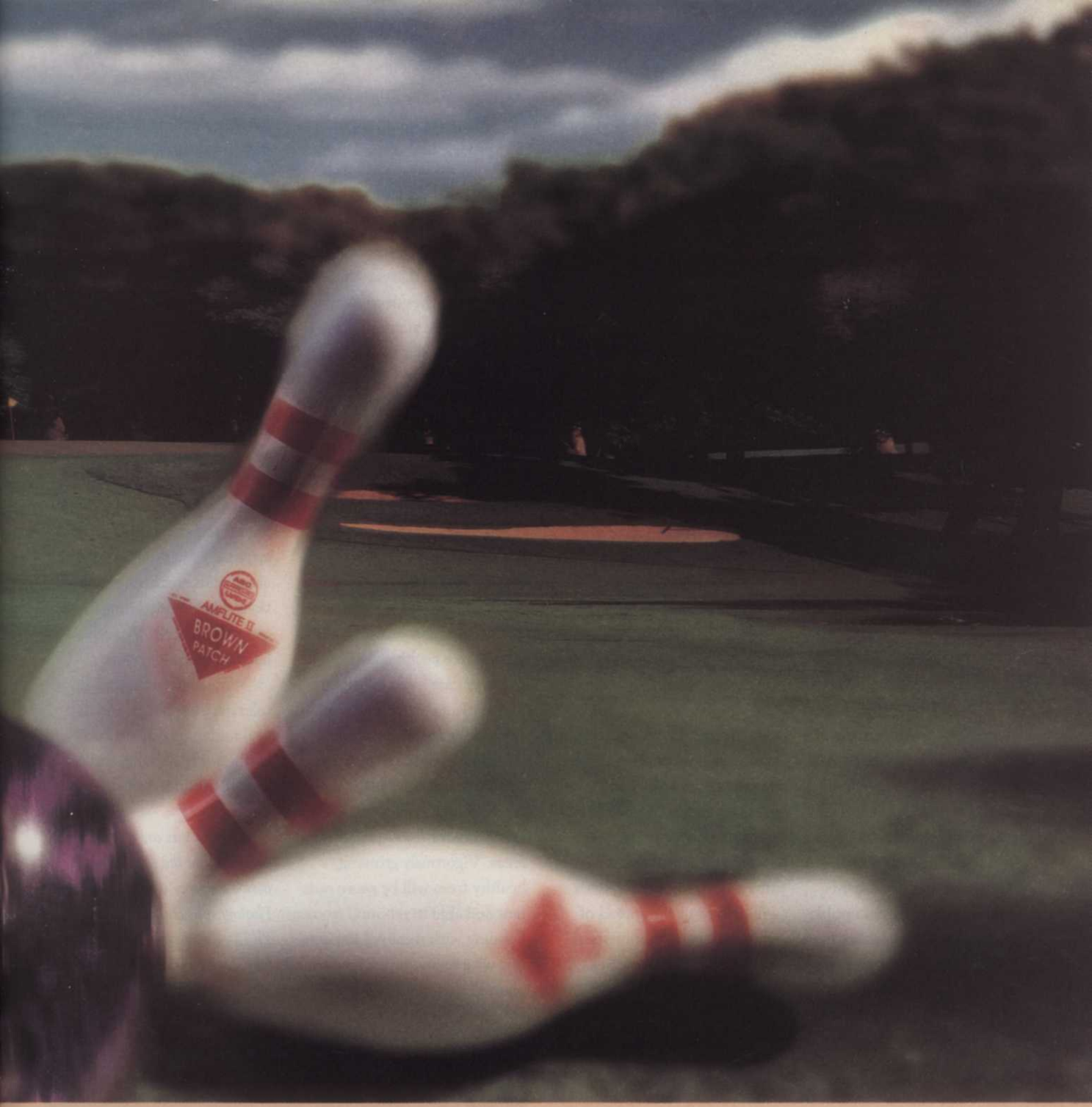
Flooding also reduces root growth. But smaller root systems found on flooded trees are probably due to a number of factors in addition to slower growth. Small absorbing roots often die because of suffocation after a tree is flooded resulting in "wet feet disorder." Affected plant roots will be bluish black, have a pig pen odor, and bark that can be sloughed off. Foliage may display off color, mimicking nutrient deficiency disorder. Root decay from root rot fungi has also been found in the smaller root systems of trees after flooding. In addition, stud-

NOTHING KNOCKS DOWN TOUGH TURF DISEASES FASTER THAN NEW CHIPCO 26GT.

For years, you've relied on CHIPCO® 26019 brand fungicide to deliver the best brown patch and dollar spot control available. But, sometimes, when soaring summer temperatures made you feel the heat, you've turned to contact materials to give you the quick disease knockdown you need. Now, you can get the same powerful, long-lasting disease control you've come to expect from CHIPCO® 26019, plus the quick knockdown you demand. Introducing new CHIPCO® 26GT™. • University trials prove that new CHIPCO® 26GT™ provides consistently quicker knockdown of dollar spot and brown



1996, Michigan State University, Emerald Creeping Bentgrass



patch than the standard CHIPCO® 26019 • In fact, CHIPCO® 26GT™ was as much as 48 hours faster. That means you'll see activity against disease mycelium within just 24 hours after application. And that means faster turf recovery. You can also count on CHIPCO® 26GT™ to give you both preventative and curative activity against dollar spot and brown patch. • Best of all, new CHIPCO® 26GT™ gives you the same powerful, broad-spectrum, long-lasting disease control you've come to expect from CHIPCO® 26019. Now you don't have to sacrifice quality and duration for quickness. You get them all with new CHIPCO® 26GT™.

Brown Patch Knockdown
Chipco® 26GT™

	0DAY*	1DAT	2DAT
UNTREATED	PRESENT	PRESENT	PRESENT
CHIPCO®26GT™	PRESENT	NONE	NONE

*0DAY = Spray applied; DAT = Day(s) After Treatment
1996, Ohio State University, Penncross Bentgrass

chipco 26GT

chemical, always read and follow instructions on the label. For additional product information, please call 1-800-334-9745. © 1997 Rhône-Poulenc Ag Company. RHÔNE-POULENC

Circle No. 123 on Reader Inquiry Card

FLOOD TOLERANCE OF SELECTED TREE SPECIES

Very tolerant*/ tolerant	Somewhat tolerant	Intolerant
bald cypress*	American elm	bitternut hickory
black willow*	American holly	black cherry
boxelder	black gum	blackjack oak
eastern cottonwood	burr oak	black oak
green ash	downey hawthorn	black walnut
hackberry	honeylocust	flowering dogwood
nutall oak*	red elm	Kentucky coffeetree
overcup oak*	river birch	linden
pin oak	southern red oak	loblolly pine
red maple	swamp white oak	mockernut hickory
shingle oak	water oak	post oak
silver maple	willow oak	redbud
sugarberry	winged elm	red mulberry
sweetgum		red oak
sycamore		sassafras
water tupelo*		shellbark hickory
		shagbark hickory
		shortleaf pine
		shumard oak
		white oak

PRIMARY SOURCE: WHITLOW, T., H. AND R.W. HARRIS, FLOOD TOLERANCE IN PLANTS: A STATE-OF-THE-ART REVIEW; NATIONAL TECHNICAL INFORMATION SERVICE, U.S. DEPT. OF COMMERCE, AUGUST 1979: 1-161.

ies have also shown that mycorrhizal fungi, or beneficial fungi that help trees take up water and certain nutrients, are reduced on flood-impacted trees.

Damaged root systems often means that flood-damaged trees are more susceptible to insect and disease attack in the years after flood waters recede. Low oxygen conditions in soils often persist after flood waters abate, particularly in finer textured soils. Other environmental stresses that follow a flood, such as drought, can be particularly hard on flood-weakened trees. Reducing any additional tree mortality is often the main challenge facing landscape managers after flood waters are gone.

Managing flood-affected trees

Most prescriptions for flood-affected trees are similar to those recommended for the care of stressed trees in the landscape. Appropriate plant health care practices and timely management of insect and disease pests are essential.

Prompt sanitation or removal of dead or dying trees will help limit the spread of secondary pests that establish on flood-injured trees. Selective pruning of branches that have died or been damaged as a result of flooding is important. Proper pruning minimizes the size of the pruning wound. Flush cutting is not appropriate and it is not necessary to use wound treatments. Wound repair on lower stems may also be needed. Removing only loose bark and scribing or bark tracing wounds will help the compartmentalization process and wound closure.

Injured trees may also require care for problems that are unique to flooding. For example, removal of sediment, if greater than three inches deep, may improve soil aeration. Lesser amounts of sediments can usually be incorporated depending on the situation. In addition to the removal of sediment, vertical mulching or aeration may be beneficial (research and field trials are needed to verify this).

The impact of flooding may linger for years after flood waters recede. Monitor tree health annually and alter care levels in response to plant vitality, until conditions in the landscape stabilize.

In the long term, planting flood tolerant trees is the most reasonable landscape management tool for flood-prone areas. Vigorously growing, healthy trees will be more resistant and able to rebound from flooding with minimal impacts. It is wise to invest in a routine plant health care program prior to flooding to ensure maximum survival of any landscape trees in susceptible areas.

Planning to mitigate flooding

Engineered solutions to flood problems have traditionally included dikes, levees and dams. Alternative ecological solutions should also be considered under certain situations. When possible, natural plant communities in undeveloped parts of the watershed and along riparian corridors should be preserved or restored to maintain a more natural hydrological regime. This biological approach should be considered along with engineering solutions when landscaping large grounds adjacent to wetlands, lakes, streams, or rivers.

Wide natural buffers, flood-tolerant tree species and natural understory plants can be aesthetically pleasing and ecologically sound. **LM**

The authors are plant science specialists at the Dave Tree Expert Company in Kent, Ohio. Photographs courtesy of Jeff Iles, Ph.D., Department of Horticulture, Iowa State University.

▶ Along with the depletion of oxygen, toxic compounds begin to accumulate in the root zone of flooded trees.