

VALUE *of* TREES

VOL. 1

A Community Tree Planting and Public Outreach Initiative

2008



Trees add 10% - 23% to the value of a home.



Trees can reduce home cooling costs up to 40% if planted to the west and south of a house



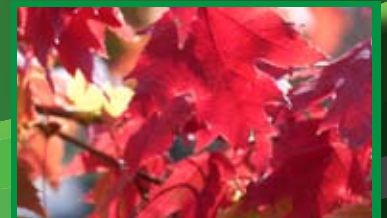
Trees capture rainfall and reduce storm water runoff, erosion, and pollution with an average city tree capable of capturing nearly 1,700 gallons of water each year.



Children's activities in a park with trees may improve ADHD (Attention Deficit Hyperactivity Disorder) symptoms.



Grassy areas and good tree cover can lower crime rates in urban settings.



Trees absorb and store carbon dioxide, CO₂, to make sugar for food and energy; emission reduction through photosynthesis is valued at \$4.31 per tree annually.

The city of Minneapolis, with nearly 200,000 trees, saves \$857,000 in energy savings annually.



Minnesota Landscape
ARBORETUM

T A TRIBUTE TO TREES

INSIDE

2 How to Plant a Tree
4 Why Trees Die
5 Caring for Trees
6 Venerable Oak

8 50 Terrific Trees
10 Common Insects and Diseases
12 Children's Books
14 Tree Aliens
16 Oak Wilt/Oak Antracnose

18 Community
20 Explore Treeology
22 Andersen Horticultural Library
23 More Info

UNIVERSITY OF MINNESOTA

HOW TO PLANT A TREE

New research shows we have been planting trees and shrubs too deeply, and planting them in ways that encourage roots to encircle or girdle the trunk. When not planted correctly, these trees are more likely to topple over in wind storms or die prematurely. Tree trunks that show no flare or angle near the ground may have girdling roots.

Proper planting is critical to the establishment of healthy, thriving trees. The following planting guidelines have been developed to help new trees get off to a successful start. These recommendations assume that an appropriate tree has been selected for the planting site and that the site is suitable for planting.

Making the Planting Hole

Determining Hole Depth: Main roots, often

buried during propagation, should end up at the surface of the soil and the trunk should flare visibly at ground level. Using a piece of wire, probe through the soil until you find roots the width of a pencil. Measure the distance from these roots and subtract it from the height of the soil ball. This is how deep the hole needs to be. All graft unions should be visible above the soil line.

Determining Hole Width: Dig the hole 2 to 5 times the width of the soil ball (3 to 5 times for heavily compacted soils, 2 to 3 times for loamy soils). After the hole has been dug to the correct measurements, carefully center the tree in the hole. Do not drag the tree by the stem; this will damage the root system.

For Trees in Containers: Remove the container by either pushing or cutting it off. If there are roots circling around the surface of the soil, cut or score

the roots in four places around the ball and across the bottom to encourage new growth outward. Reject plants with severely circled or girdled root systems.

For Balled and Burlapped Trees: Stabilize the tree in the hole. Cut and remove as much of the twine, wire basket, and burlap as possible. Push any remaining burlap that you could not remove down into the soil where it will be out of the way of growing roots.

Finish Planting

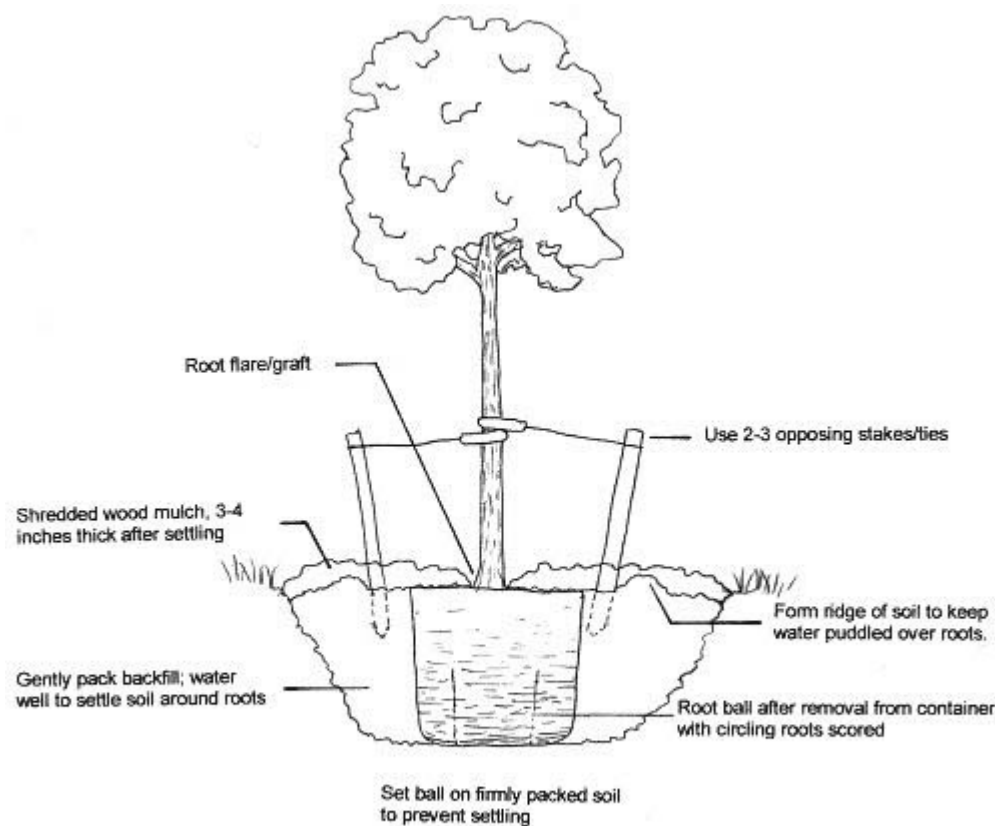
Backfill, tamping or watering the soil as you go to remove air pockets and help stabilize the tree. If the soil is dry, you can water as you fill the hole, this will remove any air pockets. Large clods and soil chunks should be broken up as much as possible. Only fill around the sides of the soil ball, not the top. Most planting soils do not need amendments other than water. If the soil is particularly droughty and nutrient poor, composed organic matter can be mixed in with the existing soil as you plant the tree. It is better to add nutrients and fertilizer after the tree is established.

Watering

After all the soil has been replaced, water the tree thoroughly. Soak the soil close to the trunk. Water often during the first growing season. Adjust the watering schedule for the season and your soil type. Poorly drained soils require less frequent watering. The best way to determine when to water is to feel the soil where the roots are growing. If it is dry, water it.

Mulching

A 2-4" layer of hardwood chips or other organic mulches extending from the trunk to at least the drip line of the tree is the best way to retain moisture while slowly adding organic matter to the soil around trees. Pull the organic mulch back so that it is not touching the trunk. Never pile mulch against the trunk or main stem of



Typical tree planting detail (containerized)

plants. DO NOT USE PLASTIC MULCH that eliminates oxygen to the plant roots and impedes water penetration into the soil. Where possible, mulch trees and other plantings together en masse to help separate from surrounding grass. Add mulch periodically. Keeping 2-4" of mulch over the roots of trees can reduce the need for water, and will prevent weeds which compete for moisture and nutrients.

Staking

Trees will not need to be staked unless they cannot stand up by themselves, are in a very windy area, or need protection. If you do stake, remove all straps and lines after establishment, usually after one year.

Protecting Tree Trunks

Hardware cloth and or light-colored loose winter stem protection devices can reduce damage to stems from critters. cold. When necessary, put them on in late autumn and remove them at the end of the winter.

Pruning

At planting time, prune only to remove dead or damaged branches and to correct structural defects. Never cut back healthy branches or trim the tree to try and "balance" the top with the roots. The tree will benefit from having as many food-producing leaves left on as possible. Also, try to leave lower branches on a tree for as long as possible after planting. Lower branches help

protect the trunk from cracking and sunscald. The first 15-20 years of a tree's life are the most important years for development. Inspect trees annually and remove any dead wood, rubbing branches, multiple leaders (with few exceptions such as crabapples) and weakly attached branches.

*Adapted from **Planting Trees and Shrubs for Long-Term Health** by Rebecca Hargrave, Gary Johnson, Michael Zins, University of Minnesota Extension publication MI 07681-S; 2002 <http://www.extension.umn.edu/distribution/horticulture/DG7681.html>*



WHY TREES DIE

Dan Miller, Integrated Pest Management Specialist
Minnesota Landscape Arboretum

Trees are indeed a valuable part of our environment and with proper conditions they are relatively long-lived organisms. Unfortunately, near our homes and in urban environments, trees are often placed in harsh, stressful conditions and many die before maturity. Many things can



Photographer: David Hansen

cause stress and are generally divided into living (biotic) and non-living (abiotic) causes. Living organisms such as diseases, insects, mites, and deer can stress and eventually kill trees. Non-living things such as weather, soil quality, amount of sunlight, and human activities (soil compaction, construction damage, herbicide injury, etc.) also can stress and kill trees.

Here are **five** reasons trees die and what you can do to keep your trees healthy:

1. Poor location and growing conditions. Many species have specific requirements regarding soil pH, soil texture, nutrients, drainage, and space. Match the tree to the site.

Big trees like oaks, maples, and elms should be given enough space so neither their top growth or their roots will be restricted. Do not plant trees in poor soils with barriers to root growth. Ask your nursery for tree selection suggestions.

2. Poor planting and lack of care. Follow tree planting recommendations (see page 2) and make sure to plant at the correct depth. Trees planted too deep can develop stem girdling roots that can eventually kill the tree. After planting, insufficient or over watering and mechanical damage are the biggest killers. Properly water your trees and make sure to supply at least 1" additional water per week during dry periods.

3. Damage to trunks or limbs. Many trees die from trunk and limb

injuries. Protect the trunk, especially on young trees, by using mulch around the base so lawnmowers and string trimmers do not need to come close. Natural forces such as high winds, lightning, and ice storms often seriously injure trees. Properly prune out deadwood, broken limbs,

“The best friend on Earth of man is the tree.

When we use the tree respectfully and economically, we have one of the greatest resources of the Earth.”

Frank Lloyd Wright

and potentially hazardous defects in structure. Use deer and rabbit repellents and/or trunk protectors to prevent browsing damage.

4. Construction damage. Don't build near your trees if possible. Consider the size of the root zone of any tree that may be affected by construction projects and avoid those areas. Do not change the depth of the soil over the roots. Adding soil around existing trees can reduce the movement of oxygen to the tree roots. Compaction can also reduce the supply of oxygen to the roots. Aerate the soil where compaction occurred and add a 3" layer of organic mulch. Do not sever roots by trenching or digging.

5. Repeated loss of leaves by insects or diseases. Be watchful for insects and diseases. If trees have been

defoliated by diseases or insects, take extra precaution to prevent repeated defoliation. Most established trees will tolerate one defoliation but repeated defoliations during the same or succeeding years may result in fatal decline. Monitor the loss of foliage and provide water, mulch and fertilizer to help your tree recover. If treatment is necessary, use least toxic

hazardous

defects in structure. Use deer and rabbit repellents and/or trunk protectors to prevent browsing damage.

4. Construction damage. Don't build near your trees if possible. Consider the size of the root zone of any tree that may be affected by construction

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pesticides if possible.

The best way to avoid tree decline and death is to **KEEP YOUR TREES HEALTHY** from the time they are planted. A comprehensive tree care program should begin at the time of planting and continue through the life of the tree.



Photographer: Peter Bedker, Bugwood.org

CARING FOR TREES

At first glance a well pruned tree often looks as if no work was done at all. Keep seven criteria in mind as you select a professional arborist to help improve the health of your trees.

1. **Certification** - Ask if the arborists on staff are certified by the International Society of Arboriculture (ISA). The ISA offers certification ranging from certified tree worker to certified arborist. Certified individuals must pass a voluntary comprehensive exam and maintain through continuing education to keep up to date on the latest in technology and acceptable tree care practices. (See ISA certified arborists at www.isa-arbor.com)

2. **City License** - Ask if they are licensed for your location. Contact your local city or municipalities about licensing requirements for tree care companies. The purpose of licensing is to control entry and presumably maintain quality of an activity or profession. It doesn't ensure quality tree work but means that the tree care company may operate within city limits, having paid the required license fee.

3. **Business Accreditations** - When checking the telephone directory yellow pages, websites or business brochures, look for arborists that are ISA Certified Arborists, display professional memberships and business accreditation such as the Tree Care Industry Association (TCIA).

4. **Insurance** - Ask for proof of insurance and then verify coverage with the insurance company. A reputable arborist should have insurance to cover personal and property damage as well as worker's compensation. If you hire an uninsured tree worker, you may be held liable for any damages or injuries

that occur while they are on the job.

5. **References** - Ask for references from past customers and check them or visit the locations where the company or individual has done tree care work.

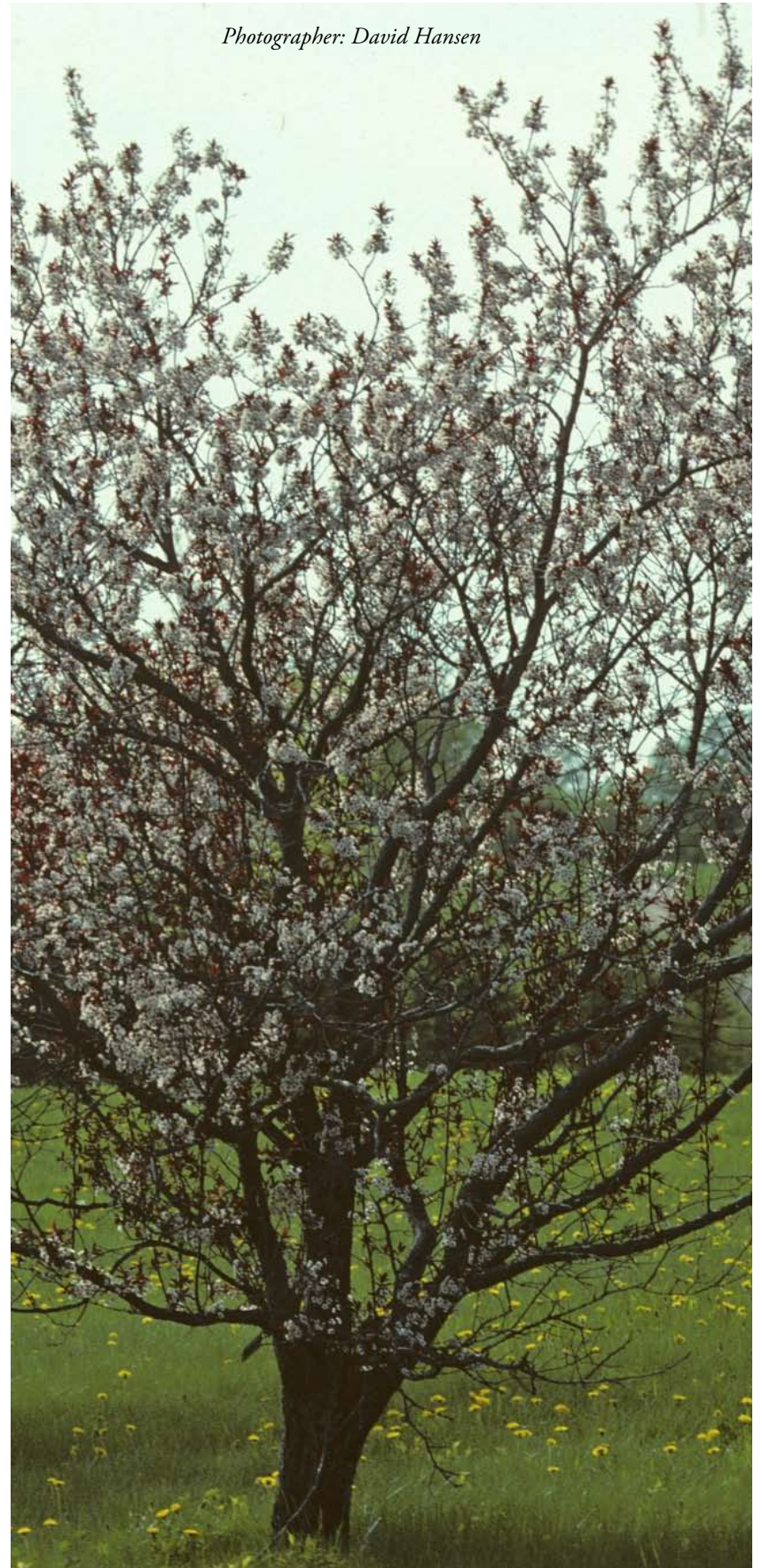
6. **Estimates and Contracts** - Get it in writing. Ask for an estimate from more than one individual or business. The lowest bid is not the sole, best criteria in selecting a tree care company. Look at all specifications and credentials, and the work to be done, to determine which company offers the best skill and professionalism and provides the best service needed to protect your investment. Make sure you know how much the job will cost, who will take care of clean up, when the work will start and what will be done.

Most reputable arborists will have the customer sign a contract, so be sure to review it and ask questions before signing.

7. **Responsible practices** - Reputable arborists will only perform industry-accepted practices. Unacceptable practices include tree topping, using climbing spikes on trees that are not being removed, and removing or pruning trees without a good reason. Be cautious when dealing with businesses in door-to-door soliciting.

*Adapted from **Knowing When to Hire an Arborist** by Patrick Weicherding, Regional Extension Educator, University of Minnesota Extension; **Yard & Garden News**, July 15, 2005; <http://www.extension.umn.edu/yardandgarden/YGLNews/YGLN-July1505.html>. International Society of Arboriculture. www.treesaregood.com 2004*

Photographer: David Hansen



A VENERABLE OAK TREE

*Dan Miller, Integrated Pest Management Specialist
Minnesota Landscape Arboretum*

Behind the Marion Andrus Learning Center at the Minnesota Landscape Arboretum stands an impressive Bur oak (*Quercus macrocarpa*). It is a well shaped tree approximately 60 feet tall and with a canopy spread of 90 feet. Although there are other oak trees at the Arboretum that are both taller and with wider canopies, as far as we know this oak has the distinction of having the trunk with the widest diameter. Arborists and foresters use the measurement 'diameter at breast height' (d.b.h.) to indicate trunk width. This oak tree has a 52" d.b.h. To determine the age of this tree, there is a technique by the International Society of Arboriculture where the age can be estimated by multiplying the d.b.h. of the tree by a species specific growth factor and then making an adjustment based on the quality of the growing site. Using this method we estimate our Bur oak to be 225 years old.

Two hundred and twenty-five years ago our oak tree began its life. Most likely it began when an acorn from a nearby tree serendipitously nestled

into a bare spot in the vegetative ground cover. Foraging birds and mammals such as woodpeckers, jays, mice, squirrels, deer or bears did not discover the acorn and with suitable temperature and moisture conditions, it germinated. It was the early 1780s. At that time, most of the land area that comprises the Arboretum was wooded and part of a large, forested native plant community that was designated by the early French explorers as the *bois fort* or *bois grand*. Later English-speaking inhabitants translated it to the "Big Woods." This forest covered more than 2,000 square miles of south-central Minnesota and extended in a band 40 miles wide from Mankato to Monticello. Our Bur oak seedling penetrated its roots deeply into the soil and established itself among the other tree seedlings and shrubs in the late 1700's. This well-drained site between two wetlands offered an ideal environment for prosperous tree growth and development.

At the turn of the century, the forested area south of Lake Minnewashta was an uninhabited wilderness. The indigenous people of the region were

Photographer: Michael Demit



Summer or winter, the Arboretum's oak is a delight to all.

the Mdewakanton and Wahpeton bands of the Dakota Sioux but their villages were located along the banks of the Lower Minnesota River near Shakopee and Carver. From their homesites, they would travel north out of the river valley on hunting, fishing, and gathering trips. Presumably they would occasionally visit the area that is now the Arboretum and would have passed by our Bur oak sapling that by now may have been 15 to 20 feet high. The vast area of the Upper Mississippi River Valley at this time was French territory. It did not become part of the United States until 1803 when the French sold it to us as part of the Louisiana Purchase. To open up the territory to American development, the government took possession by establishing a fort at the junction of the Mississippi and Minnesota Rivers. Fort Snelling was completed in 1825 and thereby allowed an influx of settlers who

came to the new territory looking for opportunities to acquire land and to begin farming the area.

The first settlers reached the areas south of Lake Minnewashta around the mid-century point and began to clear the trees from the land to grow crops on the fertile forest soils. Several early pioneers homesteaded the lands of the present day Arboretum. The early history of one of these pioneers is chronicled in the book "A Frontier Family in Minnesota: Letters of Theodore and Sophie Bost, 1851-1920." Pioneers like Theodore Bost worked arduously to create farm land. They had to clear the "Big Woods" trees first. They cut the oaks, maples, and basswoods and used the high-quality lumber to build their homes and barns or burned it as firewood to heat their homes. They grew corn, wheat, oats, forage crops, fruit trees, potatoes, rutabagas and

many other vegetables on the cleared land. They raised oxen for work animals, horses for transportation, and dairy and beef cattle for food. Many of their parcels were 160 acres so several homesteads at this time could be found on the lands of the present Arboretum. The Bost farm was located where the Arboretum's red barn currently stands.

According to the plat books at the Carver County Courthouse, the first person to homestead the land of our Bur oak was Joseph Aldritt in 1856. At this time he would have noticed our oak tree which by now was approximately 16" in diameter and would have begun developing a distinct gnarled bur oak shape. Possibly the early pioneers allowed their livestock to browse the understory nearby our oak, reducing the competition and giving our tree an advantage. Nevertheless, our oak

tree thrived under these conditions. It grew massive limbs and developed a wide canopy. It was spared from fatally damaging wind storms or lightning and was not hampered by injurious diseases or insects. By 1958 our Bur oak was a prominent feature in the overstory, among equally majestic white oak neighbors. It was at this time the land was finally purchased by the University of Minnesota to build a landscape arboretum. The original house located on the hill to the north was eventually removed in 1978 and the homestead's barn was torn down in 1983 so the Learning Center could be constructed in its place. Today this tree can be found behind the Learning Center where it towers over a naturalistic playground for kids and nearby teaching gardens. It maintains its intrinsic beauty, its superior form, and more importantly its good health so perhaps it will survive for another 100 years or more.



Photographer: Dan Miller

FIFTY TERRIFIC TREES FOR MINNESOTA

KEY

TREE NAME

Evergreen trees are **bold**

Red = Arboretum Introductions HF = harder to find in garden centers

All trees listed are large trees and hardy in USDA Zone 3 unless otherwise indicated.

WHERE THESE TREES GROW WELL:

Y = yes, does well; I = intermediate; S = sometimes

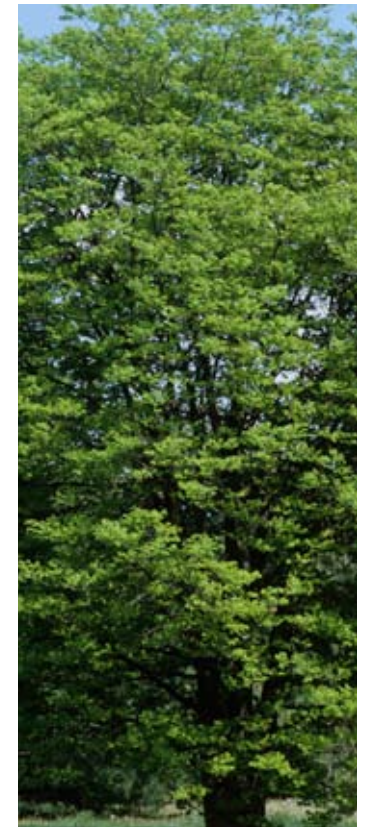
Common (<i>Scientific</i>) Name	Poor Drainage	Dry Soil	Alkaline	Compacted	Salt
Balsam Fir (<i>Abies balsamea</i>)				Y	
Black Maple (<i>Acer nigrum</i>) HF		Y	Y	Y	
Freeman Maple 'Autumn Blaze' Firefall™ (cross between silver and red maple)	Y	S		Y	
Red Maple (<i>A. rubrum</i>)	Y	S		Y	
'Autumn Spire'; 'Northwood'					
Silver Maple (<i>A. saccharinum</i>)	Y	Y	I	Y	I(spray)
Sugar Maple (<i>A. saccharum</i>) 'Green Mountain'			I	Y	
White Fir (<i>Abies concolor</i>)		I	I		
Three-flowered Maple (<i>Acer triflorum</i>) 20-30' HF			I		I
Ohio Buckeye (<i>Aesculus glabra</i>) 'Autumn Splendor' HF	I	I	Y		Y
Black Alder (<i>Alnus glutinosa</i>)	Y		I	Y	Y
Serviceberry (<i>Amelanchier</i> spp.) 20-25'	I				Y
Sweet Birch (<i>Betula lenta</i>) 25-50' HF			Y		
Yellow Birch (<i>Betula alleghaniensis</i>) HF			I		
River Birch (<i>B. nigra</i>)	Y			Y	
Paper Birch (<i>B. papyrifera</i>)	I		I	Y	I
Blue Beech (<i>Carpinus carolinianum</i>) 20-25'			S	Y	S
Bitternut Hickory (<i>Carya cordiformis</i>) zone 4 HF			I	Y	
Shagbark Hickory (<i>Carya ovata</i>) zone 4 HF			I	Y	
Northern Catalpa (<i>Catalpa speciosa</i>) zone 4	I	Y	Y	Y	
Common Hackberry (<i>Celtis occidentalis</i>)	Y	Y	Y	Y	
Redbud (<i>Cercis canadensis</i>) Minnesota strain 15'		I	Y	Y	
Turkish Filbert (<i>Corylus colurna</i>) zone 4 HF	I	Y	Y		
Cockspur Hawthorn (<i>Crataegus crusgalli</i>)	I	Y	Y	Y	
Downy Hawthorn (<i>C. mollis</i>)	I	Y	Y	Y	
Green Ash (<i>Fraxinus pennsylvanica</i>)	Y	Y	Y	Y	I
Ginkgo (<i>Ginkgo biloba</i>) zone 4		Y	Y	Y	Y
Honeylocust (<i>Gleditsia triacanthos inermis</i>) 30-60'	I	Y	Y	Y	Y
Kentucky Coffeetree (<i>Gymnocladus dioicus</i>)		Y	Y	Y	I
'Stately Manor'					
Tamarack (<i>Larix laricina</i>)	Y			Y	Y
European Larch (<i>Larix decidua</i>)	I			Y	Y
Amur Maackia (<i>Maackia amurensis</i>) 'Summertime' 18' HF		Y	Y		
Crabapple (<i>Malus</i> spp.) 15-25'		Y	Y	Y	I(soil)
Ironwood (<i>Ostrya virginiana</i>)			I		

Adapted from *Tough Trees for Tough Sites* by G. Johnson, M. Zins, and M. Shippee; edited by Mary Meyer with recommendations from Peter Olin, Pat Bailey, Jeffrey Johnson, Mike Zins, Stan Hokanson, Jeff Gillman, Gary Johnson, Pete Moe and Steve McNamara.



Kentucky Coffeetree (*Gymnocladus dioicus*) 'Stately Manor'

Common (<i>Scientific</i>) Name	Poor Drainage	Dry Soil	Alkaline	Compacted	Salt
Norway Spruce (<i>Picea abies</i>)			Y		
White Spruce (<i>Glauca</i>)	I		I	Y	
Black Hills Spruce (<i>Picea glauca densata</i>)	I	I	I		Y
Serbian Spruce (<i>P. omorika</i>) zone 4 HF			I		
Ponderosa Pine (<i>Pinus ponderosa</i>) HF		I	I		
Red Pine (<i>P. resinosa</i>)		Y			
White Pine (<i>P. strobus</i>)					
Jack Pine (<i>P. banksiana</i>) HF		Y			Y
Swiss Stone Pine (<i>P. cembra</i>) HF		Y	Y		Y
Austrian Pine (<i>P. nigra</i>)		Y			I
Bigtooth Aspen (<i>Populus grandidentata</i>)	I	I	I	Y	
White Oak (<i>Quercus alba</i>)		I			Y (soil)
Swamp White (<i>Bicolor</i>) Oak (<i>Q. bicolor</i>)	Y			Y	Y (soil)
Northern Pin Oak (<i>Q. ellipsoidalis</i>)		Y			
Bur Oak (<i>Q. macrocarpa</i>)	Y	Y	Y	Y	I (spray)
Eastern Pin Oak (<i>Q. palustris</i>) zone 4	Y	I		Y	
Red Oak (<i>Q. rubra</i>)					Y
Laurel Willow (<i>Salix pentandra</i>)	Y	Y	Y	Y	Y
Japanese Tree Lilac (<i>Syringa paniculata</i>)		Y	Y	Y	Y
American Linden (<i>Tilia americana</i>)	I	I	Y	Y	
Littleleaf Linden (<i>Tilia cordata</i>)	I	I	Y	Y	
Canadian Hemlock (<i>Tsuga canadensis</i>)	Y				
American Elm (<i>Ulmus americana</i>)					
Resistant to Dutch Elm Disease: 'Princeton' or 'American Liberty'	Y	Y	Y	Y	I
Accolade® Elm (<i>Ulmus japonica x wilsoniana</i>) 'Morton'	Y	Y	Y	Y	Y



Amur Maackia (*Maackia amurensis*) 'Summertime'



Redbud (*Cercis canadensis*) Minnesota strain 15'



Red Maple (*A. rubrum*) 'Autumn Spire'; 'Northwood'



Ohio Buckeye (*Aesculus glabra*) 'Autumn Splendor'

COMMON INSECT AND DISEASE PESTS

Dan Miller, *Integrated Pest Management Specialist*
Minnesota Landscape Arboretum

A **comprehensive** tree care program should begin at the time of planting and continue through the life of the tree. Managing insects and diseases can help avoid and reduce a wide variety of problems to landscape trees in Minnesota. Some pests have minor impact on the health of the tree, while others can contribute to gradual plant decay, decline, and death. Integrated Pest Management (IPM) helps manage tree pests too and reduces the use and exposure to pesticides. The IPM approach practices prevention, treats when necessary and uses safe available alternatives.

PREVENTION

The best way to avoid pest problems is to keep your trees healthy from the time they are planted. By providing water, mulch, and fertilizer when necessary to keep your trees healthy and growing vigorously, they may be able to avoid stress and subsequent attack by insects and diseases. Many insects and diseases are secondary problems, attacking trees that are already stressed and taking advantage of the tree's low vigor to accelerate its decline.

TREAT WHEN NECESSARY

Healthy, mature trees can defend against minor insect and disease exposure without human intervention. Most healthy, established trees will tolerate a complete loss of foliage; but **repeated two and three year spring defoliations** will stress the tree and may result in decline and death. If healthy, established trees have been defoliated by diseases or insects, take extra precaution to prevent repeated defoliation and use treatments to control the pest if necessary. Also, older trees with previous stress symptoms should be protected from extensive insect and disease damage. Before using pesticides, be sure to correctly identify the pest, determine the amount of damage and confirm a pesticide will be effective.

USE SAFE, AVAILABLE ALTERNATIVES

To treat smaller trees, use biorational controls, such as soaps, oils, or microbes. Biorationals offer safer alternatives to traditional chemical pesticides because they are less toxic and have fewer effects on non-target organisms. Examples include insecticidal soaps, horticultural oils, microbial insecticides, and insect growth regulators. Biorational controls for diseases include oils, potassium bicarbonate, hydrogen peroxide, salts, and microbial fungicides. If conventional chemical pesticides are necessary, use the lowest rates possible and protect yourself by wearing the personal protective equipment noted on the label (clothing, masks, respirators, boots, gloves, etc.). To treat large, mature trees, contact a professional tree care company.

COMMON TREE INSECTS

Caterpillars (Fall Webworm, Cankerworms, Forest Tent Caterpillar, Yellownecked Caterpillar, etc.)

Caterpillars that feed on trees cause minor damage and do not seriously damage the tree. However, high populations of caterpillars can cause loss of tree vitality if trees are repeatedly defoliated. If treatment is warranted, many biorational pesticides such as Bt (*Bacillus thuringiensis*), spinosad, insecticidal soap, and pyrethrin can be used.

Sawflies (European Pine Sawfly, Roseslug Sawfly, etc.)

Sawfly larvae are caterpillars that chew on leaves or needles. Repeated damage to branches



SAWFLIES Photo by Petr Kapitola, State Phytosanitary Administration, Bugwood.org

can disfigure trees, especially evergreens. Learning to identify sawflies and their damage to trees is important to determine when and if pesticides are necessary. Horticultural oil sprays, insecticidal soaps, and spinosad are effective against young larvae. If larvae are nearly full grown, pesticide treatment is too late and should not be used. Chemicals will not be effective and most of the damage is already done.

Borers (Bronze Birch Borer, Emerald Ash Borer, Flatheaded Apple Tree Borer, Twolined Chestnut Borer, etc.)

Larvae of boring beetles can cause serious and often fatal damage to trees. The larvae will feed under the bark and can completely girdle branches and trunks or



BORERS Photo by Whitney Cranshaw, Colorado State University, Bugwood.org

cause dieback and tree decline. In some cases, borers attack trees that are stressed, so keeping trees healthy is a prevention control strategy. If large populations of adult beetles are observed on the bark, residual insecticides can be applied directly to the bark of the trunk and limbs. Consult an arborist or your local extension office for recommendations.

Aphids (many species)

Aphids feed on many landscape trees and shrubs by sucking fluids from leaf veins and buds. Stunting, chlorosis, deformation, and death of leaves may result. Large populations of aphids may cause unacceptable levels of honeydew and its accompanying sooty mold. Biorational pesticides such as neem (azadirachtin), horticultural oils, and insecticidal soaps can effectively control aphids. Many species of predators such as lady beetle adults and larvae and lacewing

larvae feed on aphids so use pesticides that are safe for biological control.

Leaf-Eating Beetles (Japanese Beetle, Cottonwood Leaf Beetle, etc.)

Adult Japanese beetles can cause extensive feeding damage to landscape trees and shrubs. The beetles emerge from the soil in late June through August and are capable of completely defoliating landscape plants. Remove the first beetles into a bucket of soapy water. Elimination of early beetles



LEAF-EATING BEETLES Photo by Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org

may slow recruitment of other beetles. Conventional pesticides such as imidacloprid and permethrin are necessary if feeding becomes heavy.

Scales (Oystershell Scale, Pine Tortoise Scale, etc.)

Scale insects feed on many landscape trees by sucking sap directly from the leaves and stems. Their hard shell-like bodies offer protection and make them difficult to kill. If branches are heavily infested, prune and destroy these branches. Horticultural oils are often used as dormant season treatments. Scales are attached and immobile for most of the year. However, scale insects go through a “crawler” stage each year when they are not protected by their hard shells and are therefore vulnerable to control measures. Oils and soaps can be effectively used at these times. Use foliar broad spectrum insecticides when scale populations are high.

COMMON TREE DISEASES

Anthracnose (Oak Anthracnose, Maple Anthracnose, Ash Anthracnose, etc.)

Fungal diseases attack young leaves during cool and wet spring weather, and cause leaf blighting, deformation, and in some cases leaf loss. Usually, damage to plant health is not severe. Once leaves mature and warm

dry summer weather arrives, problems with anthracnose naturally decline and the tree is able to releaf and recover. If significant damage occurs annually and controls are justified, properly applying fungicides can reduce damage.

Needle Blights (Dothistroma Needle Blight, Diplodia Shoot Blight and Rhizosphaera Needle Cast)

Choose conifers that are well adapted to Minnesota’s climate. Severity of needle blights can be reduced by practicing prevention. Needle diseases can result in



NEEDLE BLIGHTS Photo by USDA Forest Service Archive, USDA Forest Service, Bugwood.org

browning needles and gradual decay of large portions of the crown. Unlike broad-leaf species, conifers usually are unable to produce new foliage when defoliated. Misshapen trees are often the result. Watch for lower branches that die or whole branches that become discolored. Keep your trees healthy, using preventive fungicides when needed.

Fire Blight

Fire blight caused by the bacteria *Erwinia amylovora* affects many apple, crabapple, and mountain ash trees in Minnesota. Infected trees will have dark brown or black leaves that appear to be scorched by a fire. Infected shoots, twigs, and suckers will also turn brown or black and often bend in a characteristic shepherd’s-crook; cankers are formed when infections spread into larger branches. Cultural practices such as proper pruning, fertilizing, and site selection can help prevent or minimize fire blight. Diseased twigs, branches, and trees may be removed in late winter. For apples and crabapples, fire blight can be avoided by planting resistant varieties. If trees are severely infected or if fire blight continues to be an annual problem, a copper-based

fungicide like Bordeaux or a biocontrol agent like *Bacillus subtilis* can be applied.

Apple Scab

Plant resistant varieties when possible. Apple scab is a fungal disease that can cause velvety, brown to olive-green spots to form on leaves and brown to black corky spots on fruit. Fruit may mature unevenly and crack. Cultural control measures include proper water, fertilizing, and mulching. Fallen leaves and apples should be raked up and destroyed in the fall and all fruit should be removed after harvest. Suckers and branches should be pruned in the crown to improve air circulation. If problems are persistent, protective fungicides may be necessary during wet seasons for fruit trees, but crabapples usually do not warrant pesticide use.

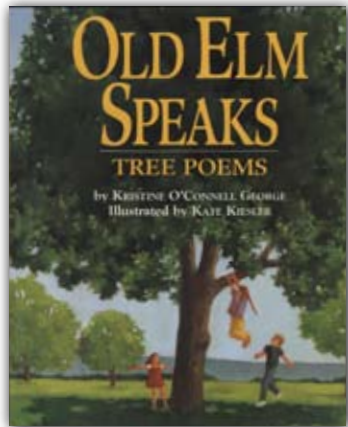
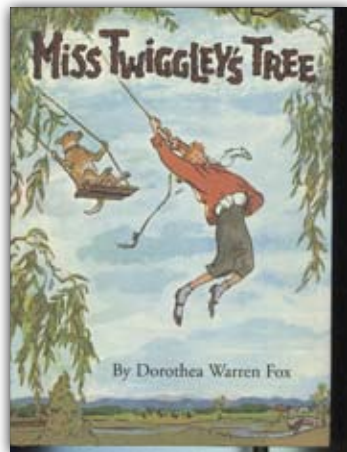
Dutch Elm Disease

Resistant elm trees are available for planting. Dutch elm disease is a fungal disease of elm trees which is spread by the elm bark beetle. Wilting branches in the crown are the first symptoms of the disease. Leaves turn yellow or brown and tend to remain attached to the tree for an extended period. If these symptoms appear, contact a professional arborist to confirm the infection and for treatment. Infected trees should be removed and stored; wood for firewood should be debarked. Avoid pruning of elm trees between April 15 and September 1 in southern Minnesota. Specimen trees can be protected with fungicide injections by tree care companies.

To keep your trees healthy and growing vigorously, protect against insect and disease by choosing trees well adapted to Minnesota’s climate. Before treating for any insect or disease problem, properly identify the pest and determine if the damage warrants treatment. Information for pest identification and control can be found at www.extension.umn.edu/gardeninfo and other internet sites.

BOOKS ABOUT TREES DRAW CHILDREN OUTDOORS

*Sandy Tanck, Manager, Interpretation & Public Programs
Minnesota Landscape Arboretum*



Reading books about trees can encourage children to go outside and enjoy trees. The Minnesota Landscape Arboretum uses books to help spark children's curiosity, imagination and play, and see with fresh eyes the trees living around them. Here are some staff favorites that make great gifts or additions to your own collection:

GENERAL

Hello, Tree! by Joanne Ryder. Lodestar Books, Penguin Books USA Inc. 1991. 4-8 yrs.

Joyful story, full-page paintings of children with trees and rewards of sitting quietly, climbing, noticing, listening.

Have You Seen Trees? by Joanne Oppenheim. Scholastic Inc, New York. 1995. 3-7 yrs.

Playful, lilting language, vibrant illustrations of children experiencing trees of all kinds through the seasons.

POETRY

Old Elm Speaks: Tree Poems by Kristine O'Connell George. Clarion Books. 1998. 5-9 yrs.

Humorous, imaginative, playful free verse, haiku and rhyme about living in, around and with trees.

ART

Sky Tree: Seeing Science Through Art by Thomas Locker. Harper Collins. 1995. 5-9 yrs.

Paintings show the same tree against the changing sky through daily and seasonal cycles.

Leaf Man by Lois Ehlert. Harcourt Children's Books. 2005. 4-8 yrs. Collages of leaves chronicle the Leaf Man's breezy travels, inspiring readers to head outdoors for a fall ramble.

SCIENCE

One Small Square Woods by Donald Silver. Freeman. 1995. 4-8 yrs. Activities, experiments and an illustrated field guide help children observe and discover life in the forest, one square foot at a time.

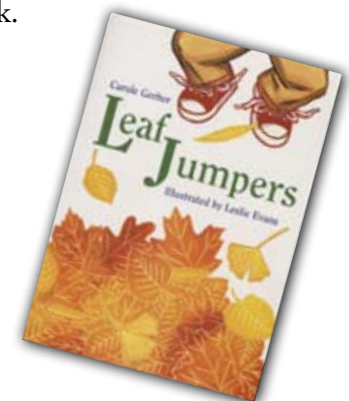
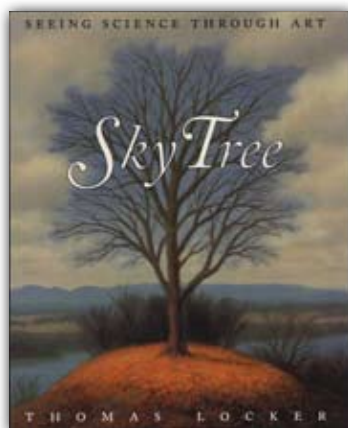
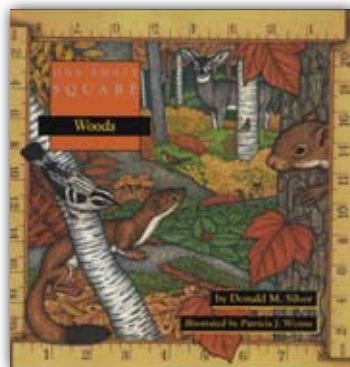
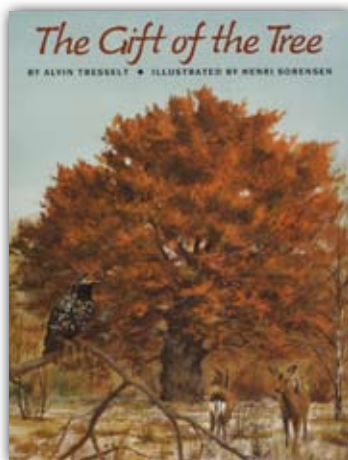
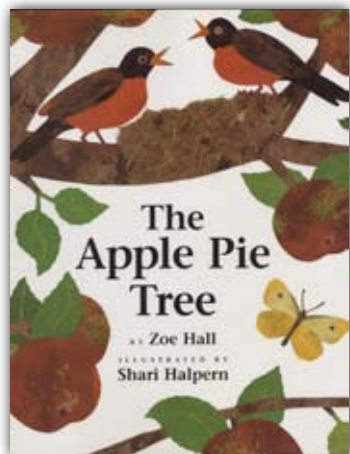
Leaf Jumpers by Carole Gerber. Charlesbridge. 2004. 4-7 yrs. Bright block-cut illustrations depict leaves of common trees in fall colors.

The Gift of the Tree by Alvin Tresselt. Lothrop, Lee and Shepard. 1992. 4-8 yrs.

Story and illustrations show the legacy of an old oak as it slowly dies, falls to earth and decays.

Forest by David Burnie. Dorling Kindersley Inside Guides. 1998. 6-10 yrs.

Intricate pictures show a forest from leaf litter to bursting buds to canopy life. Story reveals hidden details of how trees work.





Photographer: John Gregor

STORIES

Miss Twiggley's Tree by Dorothea Warren Fox. Purple House Press. 1966, 1994, 2002. 4-8 yrs.

A delightful story of the age-old lesson to share and help others in need. May trigger urge to build a treehouse.

Pearl Moscowitz's Last Stand by Arthur A. Levine. Tambourine Books. 1993. 5-9 yrs.

A neighborhood sees many changes through time but Pearl stands firm as a friend to all, especially trees. A funny, triumphant story about a city-dweller and her actions for trees.

Fall is Not Easy by Marty Kelley. Zino Press Children's Books. 1998. 3-5 yrs. Humorous tale of a young tree's highly unusual efforts at fall color. Some science content.

Spirit of the Forest: Tree Tales From Around the World by Helen East & Eric Maddern. Frances Lincoln. 2003. 4-8 yrs.

Twelve legends and stories highlight the impact of trees in human life across the globe and throughout time.

Sugaring by Jessie Haas. Green Willow. 1996. 3-7 yrs.

A young girl and her grandpa gather maple sap in the woods on their Vermont family farm, then cook it down to rich syrup.

The Apple Pie Tree by Zoe Hall and Shari Halpern. Blue Sky Press, Scholastic Inc. 1996. 4-7 yrs.

Colorful collages and story of two young sisters playing under the backyard apple tree, from honeybees that pollinate spring blossoms to fall harvest to apple pie time.



Visit the Arboretum Gift Store

Most titles listed are currently available in the Arboretum Gift Store. With an amazing collection of nature-related books for both children and adults, we're sure you'll find just what you're looking for. Call 952-443-1439 for more information.

ARREST-THE-PEST

TREE ALIEN ALERT

*Jeffrey Johnson, Horticulturist
Minnesota Landscape Arboretum*



Photographer: Barb "Babs" Degroot

Ash trees are common throughout Minnesota.

The public's help is essential in preventing a menacing tree alien creature from entering Minnesota. The pest has escaped from its native east Asian habitat and could kill as many as 800 million defenseless trees if it becomes established in Minnesota.

The pest goes under the name of Emerald Ash Borer (EAB), aka *Agrilus planipennis*

Adult: Emerald green, ½" in length and about 5 times longer than wide, usually seen June through August.

Juvenile: Bores inside of ash trunk, creates squiggly tracks under bark cover, lives under cover for extended time as it grows, emerges as an adult through 1/8" diameter D-shaped holes in trunk.

Tree symptoms signaling the presence of this alien: Unusual sprouts on the ash trunks. All ash trees (green, white, black, blue and European ash) are susceptible. Attacked trees decline and die over 2-5 years.

A Stowaway of Trouble

Emerald Ash Borer likely got here as a stowaway in cargo packing material from Asia via the Great Lakes and escaped at a land port near Toledo, Ohio; Detroit, Michigan and Windsor, Canada in the summer of 2002. It has killed millions of ash trees already and millions more have been removed to try to prevent the pest from jumping a perimeter around the escape site in an attempt to establish a quarantine. Unfortunately, the clandestine nature of the pest has eluded these quarantines, tagging along in ash firewood and manufactured goods

shipped with at least a small section of bark trunks intact.

The Emerald Ash Borer has been tracked moving west-northwest out of Illinois near Chicago. This insect has also been found in the Upper Peninsula of Michigan moving west, but **has not yet been found in Minnesota.**

“This is not a pest we want in Minnesota,” Minnesota Department of Agriculture Plant Protection Division Director Geir Friisoe said. “The good news is that the Emerald Ash Borer is a weak flyer. It spreads mainly by movement of infested firewood, wood products and nursery stock. The public can help keep this pest out of our state just by being aware of the risk and by avoiding moving these products across state lines.”

How You Can Help

Be vigilant in watching for signs and symptoms of this pest in ash trees on your property.

Do not transport firewood or other material with bark attached. One log is capable of introducing a new infestation site. Do not lend a hand to this alien pest by transporting it unsuspectingly as a stowaway or hitchhiker. Purchase firewood locally.

Do not transport uncertified plants or material across state lines. Nursery stock is inspected and certified by local governments for shipment by licensed nurseries.

Containment is the only effective tool in stopping this alien menace at this time. Preventive pesticide treatments use toxic chemicals and are too expensive except for high value trees in infested areas. After-attack treatment is not practical. The beetle has damaged the tree beyond recovery by the time it is discovered.

Call EAB Arrest-the-Pest Hotline 1-888-545-6684 or visit www.emeraldashborer.info



Emerald Ash Borer Photo by Minnesota Department of Natural Resources Archive, Minnesota Department of Natural Resources, Bugwood.org



Emerald Ash Borer Larva Photo by David Cappaert, Michigan State University, Bugwood.org



OAK WILT BRANCHES

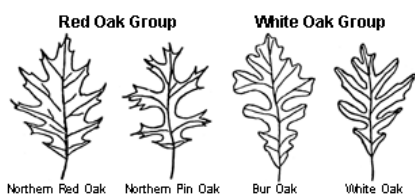
IS IT OAK WILT OR OAK ANTHRACNOSE?

*Michelle Grabowski,
Regional Extension Educator,
University of Minnesota Extension*

Oak wilt kills infected oak trees. Left untreated, oak wilt can spread to neighboring trees. It is very important to properly identify and treat infected oaks to prevent its spread.

Susceptible Plants

All oaks are susceptible to oak wilt. Northern red oak and northern pin oak (*pointed leaf tips*) are VERY susceptible, while oak and white oak (*rounded leaf tips*) are moderately susceptible.



Biology

Oak wilt is caused by the fungus *Ceratocystis fagacearum*, which can spread from diseased trees to healthy trees by sap-feeding beetles.

Oak wilt is also transmitted from tree to tree by underground connections called root grafts. Root grafts commonly occur between trees up to 50 ft apart.

Identification

Leaves first begin to wilt.



OAK WILT BRANCHES

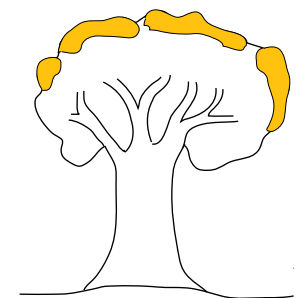
Leaves turn dull bronze to brown from the tip and outer edges of the leaf. The base of the leaf may remain green.



OAK WILT LEAVES

Top most leaves and branches wilt and show symptoms first.

Oak wilt can cause leaf drop and complete defoliation.



Oak Wilt in Red Oaks

Red oaks (*pointed leaf tips*) can wilt completely in two to six weeks. Red oak trees typically die the same year they are infected.



OAK WILT DISCOLORATION Photo: D.W. French, U of MN, www.forestryimages.org

Oak Wilt in White Oaks

White oaks (*rounded leaf tips*) leaves become discolored and wilt just like in the red oaks (*pointed leaf tips*). In the white oaks, however, wilt affects a few individual branches, not the whole tree canopy.

In a cross section of an infected white oak branch, it is common to see black streaks or spots in the inner wood.

White oaks can take months and even years to succumb to oak wilt.



OAK STAINING Photo: R. Blanchette

Controlling Oak Wilt

Prevent the spread of oak wilt to healthy trees as infected oaks eventually die. Red oaks will die in a few weeks to a year. Bur and white oaks may take several months to several years to die.

NEVER prune oak trees in the months of April, May, or June! Sap-feeding beetles are attracted to these cuts and will bring in fungal spores from diseased trees.

If trees are accidentally wounded during the months of April, May, or June, immediately paint the wound with water based (latex) paint or shellac.

If a healthy oak tree must be removed, do not cut the tree down in April, May, or June. However, if the tree must be removed during these months, immediately seal the top of the tree stump with water based (latex) paint or shellac.

The underground connections, or root grafts, between healthy and diseased trees **MUST** be cut. Specialized equipment is required to cut roots at least 5 feet deep in the soil.

Call professional tree care companies for information on what may be available such as fungicidal injections that will slow but not stop the disease.

What can you do with Oak wilt wood?

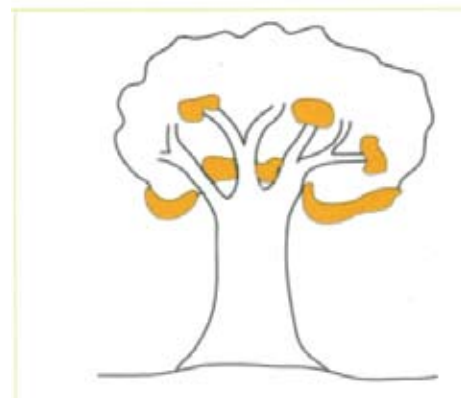
All small branches should be chipped or burned. (Chips can be used in the landscape.)

Larger logs must be split for firewood before September. This causes the wood to dry out and the fungus to die.

Unsplit, unchipped logs must be covered with 4 to 6 mil plastic, with all ends completely sealed down to soil line, from March until late July.

IS IT OAK ANTHRACNOSE?

Oak anthracnose infects twigs, buds, and leaves of the oak tree. This disease can discolor, distort, kill leaves and generally stress the tree but oaks recover from oak anthracnose.



OAK ANTHRACNOSE

Susceptible Plants

Oak anthracnose is most severe in white oak and Bur oak (*rounded leaf tips*). Northern red and northern pin oaks (*pointed leaf tips*) are mildly affected by oak anthracnose.

Biology

Oak anthracnose is caused by the fungus *Discula quercina*.

The oak anthracnose fungus lives in infected areas of twigs and leaves. During a wet spring, spores are splashed onto new leaves and shoots to cause infections.

Identification

Leaves have irregular water-soaked blotches that turn black. Eventually, blotches dry out and become tan or brown.

Discoloration in leaves often start along veins, in random locations. Spots may grow together into large blotches.

Leaves become distorted or cupped by the infection.

Oak anthracnose can cause leaf drop and complete defoliation.

Symptoms first appear in lower and inner branches where humidity is highest.

Controlling Oak Anthracnose

Oaks can recover from oak anthracnose. The fungus needs leaf

moisture to infect and spread, as temperatures rise and rains cease, the disease will be reduced.

Help your tree recover from the anthracnose infection by reducing stress on the tree throughout the season.

Mulch tree roots if possible to the drip line, with an even layer of 2-4" of organic mulch. Do not mound mulch at the trunk; move mulch away from the trunk to discourage decay and rodent damage.

Water young trees, particularly in dry years. Soil should be wet 6-8 inches deep after irrigation.

Avoid using heavy equipment underneath the tree. This will compact the soil and injure the root system.

Take care when mowing and weeding around the base of the tree. Yard and garden equipment can easily injure trees.

Rake up and destroy leaves in the fall. Prune out any dead twigs after November. Fungi survive in leaves and twigs and infect new leaves the following year if not removed.

If a tree has lost the majority of its leaves several years in a row, call a professional tree care company* to apply a fungicide when the leaves open the following spring.



OAK ANTHRACNOSE



Princess Kay

Photographer: David Hansen

TREES ARE COOL

Last year, Bailey Nurseries became an official partner of the United Nations Environment Programme, called the Billion Tree Campaign - with a lead donation of 120,000 trees. This worldwide initiative was intended to draw attention to the devastating effects of deforestation, erosion and global warming by encouraging governments, businesses and individuals to plant one billion trees worldwide in 2007. Thanks to many forward thinking businesses and individuals their goal of one billion was surpassed and pledges are still being taken at: www.unep.org/billiontreecampaign.



BAILEY
NURSERIES

The donation from Bailey Nurseries was distributed to schoolchildren across Minnesota and Oregon to enhance their life science curriculum and were planted on Earth Day and Arbor Day. Each class thought of different ways to incorporate the trees into their communities. Trees were planted at; public libraries, retirement homes, parks, roadsides and of course, in the children's own yards. Bailey employees were later overwhelmed with thousands of thank you cards and letters from the kids and proudly displayed them at their main office in St. Paul, Minnesota.

The "Trees are Cool" promotion was born as a way to help garden centers educate consumers on the value of trees. Bailey customers were given point-of-purchase materials for their stores and special tags were put on their trees that described the benefits trees offer us. "We created the "Trees are Cool" program to spotlight the benefits of planting trees," says Terri McEnaney, Bailey Nurseries President. "Trees play an important roll, not just in global environmental issues but also in the environment of our own backyards. Planting just one tree really can make a difference."

Thank to a terrific response from our customers, the "Trees are Cool" promotion continues. Look for our special "Trees are Cool" tags at garden centers near you. Planting a tree is a wonderful way to introduce children to the outdoors and stimulate their awareness for the environment. Make a difference in your community, it's easy – plant a tree!

Bailey Nurseries is a family-owned wholesale nursery with home offices in St. Paul, Minnesota. It is among the top wholesale nurseries in the United States and provides industry members throughout the U.S. and Canada with a full line of bareroot and container-grown plants from Bailey's properties in Minnesota, Oregon, and Washington.

SELECT SMALL TREES IN YOUR HOME LANDSCAPE

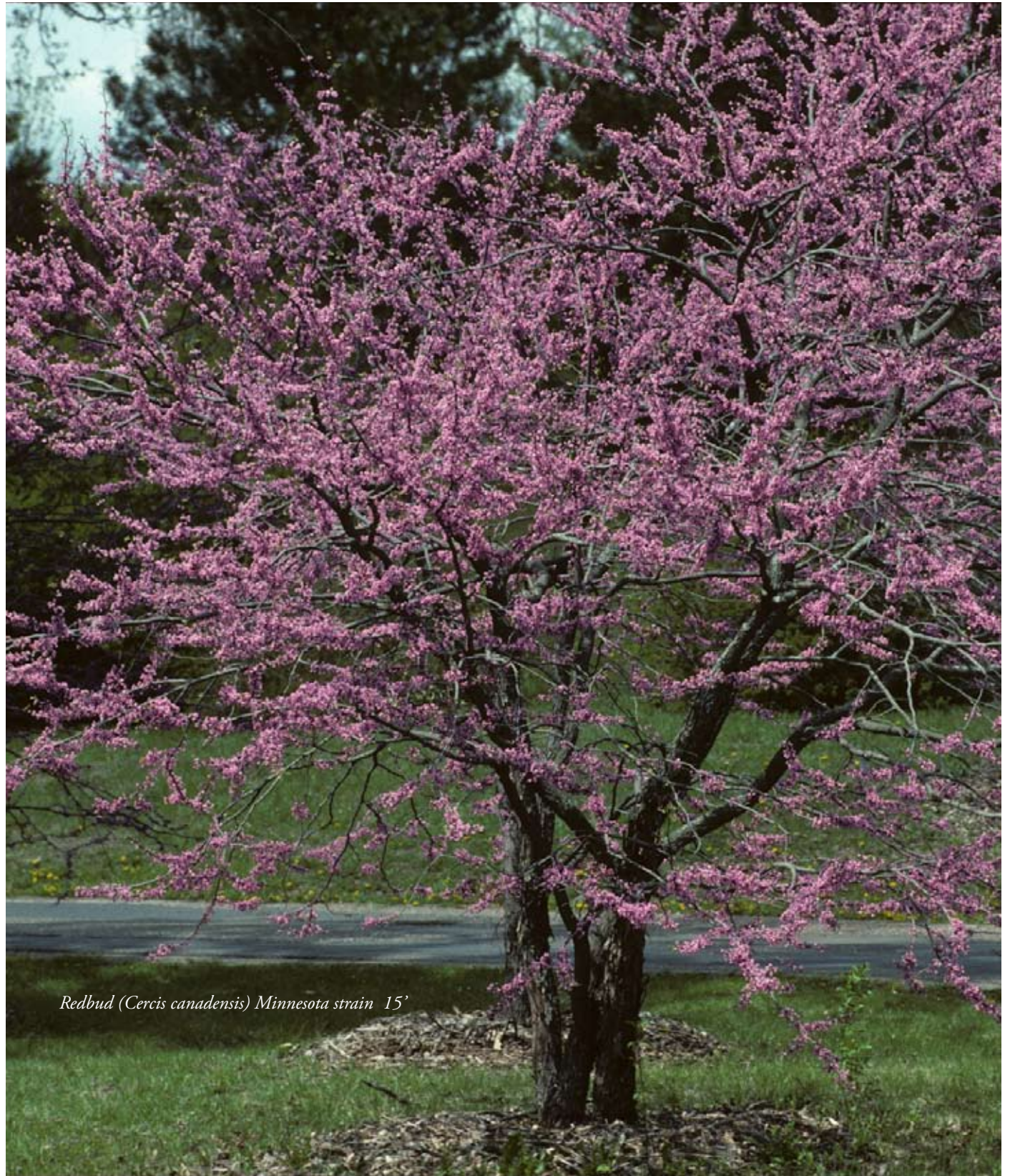
Planting Trees in Your Neighborhood

Small trees are an easy to grow, versatile and beautiful addition to our landscapes. Several hardy, decorative, disease resistant small trees are great for Minnesota climates. And small trees are the best size to use near power lines. If you have above ground power lines on your home property or along a neighborhood street, be sure to select carefully any trees to make sure the tree's size will not interfere with the power lines. General recommendations are that large trees should not be planted within 10 feet of the power line to your home. Larger trees must be planted even farther away from the main power lines that run along backyards, alleys, streets or roadways. Only shrubs or small trees, less than 20' tall, should be planted near these neighborhood main power lines.

Call Before You Dig

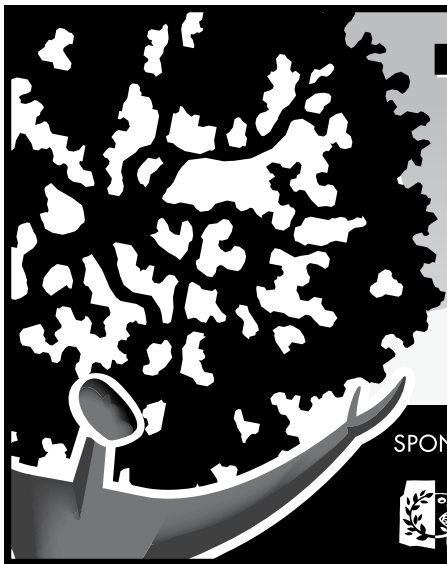
Remember that underground utility lines can present serious safety risks when planting trees or shrubs. Before you start digging, call 811 for the exact location of underground electric and natural gas service, cable television and phone lines.

For more information and a list of recommended tree species to use under and near power lines, visit www.xcelenergy.com and enter "trees" in the search box.



Redbud (Cercis canadensis) Minnesota strain 15'

Photographer: David Hansen



TREEOLOGY

SUMMER EXHIBITION

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EXPLORE TREEOLOGY—AN ÜBER-GREEN, SUMMER-LONG

EXHIBITS

Discover Trees

Snyder Bldg. and Andersen Horticultural Library

History and illustrations of ecological and aesthetic value of trees. Through Oct. 12

Timeless Beauty

Reedy Gallery

Enjoy four seasons of the Arboretum by award-winning photographer John Gregor of ColdSnap Photography. Through Aug. 17.

The Great Hall of Honor Exhibit at the Oswald Visitor Center

More than a century ago, apples, azaleas and many other favorite plants were difficult, even impossible to grow reliably in a northern climate. Now, 100 years later, Minnesotans can proudly celebrate a remarkable legacy of glowing beauty and hardy fruit flourishing in a cold-hardy climate.

Visit the Great Hall of Honor and commemorate the creativity and horticultural genius of University

of Minnesota scientists for the past 50 years at the Minnesota Landscape Arboretum and 100 years at the Horticultural Research Center. Through Dec. 31.

Take the Trek

Along an easy, tree-lined, 1.5 mile walking loop trail. Start in front of the Oswald Visitor Center and follow walkways marked with painted yellow leaves. Visitors who prefer to drive may use Three Mile Drive and several parking lots along trail.

Take the Treeology Cell Phone Audio Tour by calling 952-236-3125 and enter the prompt number next to the title of each exhibit and press #.

You may also leave a message. No cost except for use of your cell phone minutes.

See the Sights

Art 'n' Trees on the Treeology Loop Trail spotlights 18 interactive public art installations of artists and designers to creatively increase appreciation for trees and what they do everyday to make the world more green.

Stop and Stare

Tree-mendous Trees on the Treeology Loop Trail introduces you to 15 most unusual trees including the Arboretum's tallest, oldest and weirdest trees. Nominated by scientists, horticulturists and everyday people, you'll learn the trees' stories.

Visit the Zone—Tree Discovery Zone

Enter the Zone and relate to the rhythm of life as a tree. What's it like to spend your days and years living high, earth to sky? How do trees gather and spend their energy? Find out how to care for trees for best results. Learn about common pests that may affect a tree's health. Understand the right way to plant a tree. Demonstrations highlight recent findings about stem girdling roots and how to avoid common mistakes that can injure or even kill your tree.

Tree Care Advisors Q & A

Talk to the experts about planting and tending the trees in your life. Go to the Tree Discovery Zone and get answers to your questions. No appointments needed on the first and third Saturdays of the month, from 11 a.m. – 2 p.m., through Oct. 4.

University of Minnesota Tree Care Advisors are in the Zone from 11 a.m. – 2 p.m. on June 7 & 21, July 5 & 19, August 2 & 16, September 6 & 20, October 4.

Watch for announcements on additional hours for Tree Care Advisors.

Salute to Whimsy - Grown Home

Rustic open-air retreat of river birch logs featuring willow-woven living furniture—actually growing in place. Inspired by the design of Lois Walpole, a British artist and basketweaver living in rural France, her unique concept is to plant, train and harvest furnishings for eventual use indoors. Arboretum staff produced these living green home furnishings with her personal coaching and detailed instructions.

“I think it is important for everyone to understand how the products we buy are made and the effect their manufacture and design has on the environment,” Walpole says.

“Sustainability is about leaving the world as we found it, or preferably in a better condition, but as long

Grown Home

A tribute to trees that provide shelter and comfort

TRIBUTE TO THE WONDER AND POWER OF TREES

as we continue to consume the earth's resources without having an appreciation of the consequences of our actions there is little hope of that."

If you are interested in growing your own furniture, Walpole's instructions for the wine rack featured in the Arboretum exhibit are available for purchase at the Gift Store.

**Bloomlist - www.arboretum.umn.edu
Bloomline - 952-443-1400 Ext. 5010**

Please note weather conditions may accelerate or delay bloom periods. Detailed lists are compiled weekly and available online at www.arboretum.umn.edu.

Pillsbury Shade Tree Exhibit on the Treeology Loop Trail

A newly restored exhibit and demonstration area tackles tree topics to make your tree planting a wise investment. See what kind of tree to plant, how fast it will grow, where to plant for summer shade or protect against winter winds,

how to save on home energy costs with strategic tree plantings, how long it will take for a bare-root tree one catch up to the tree-spaded one and more.

Bailey Shrub Walk on the Treeology Loop Trail

Stroll through a showcase of the best shrubs for Minnesota gardens. Displayed in home-scale groupings of woody plants, look for useful design and maintenance tips to make it work for your landscape.



TAKE A VACATION AT THE ARBORETUM

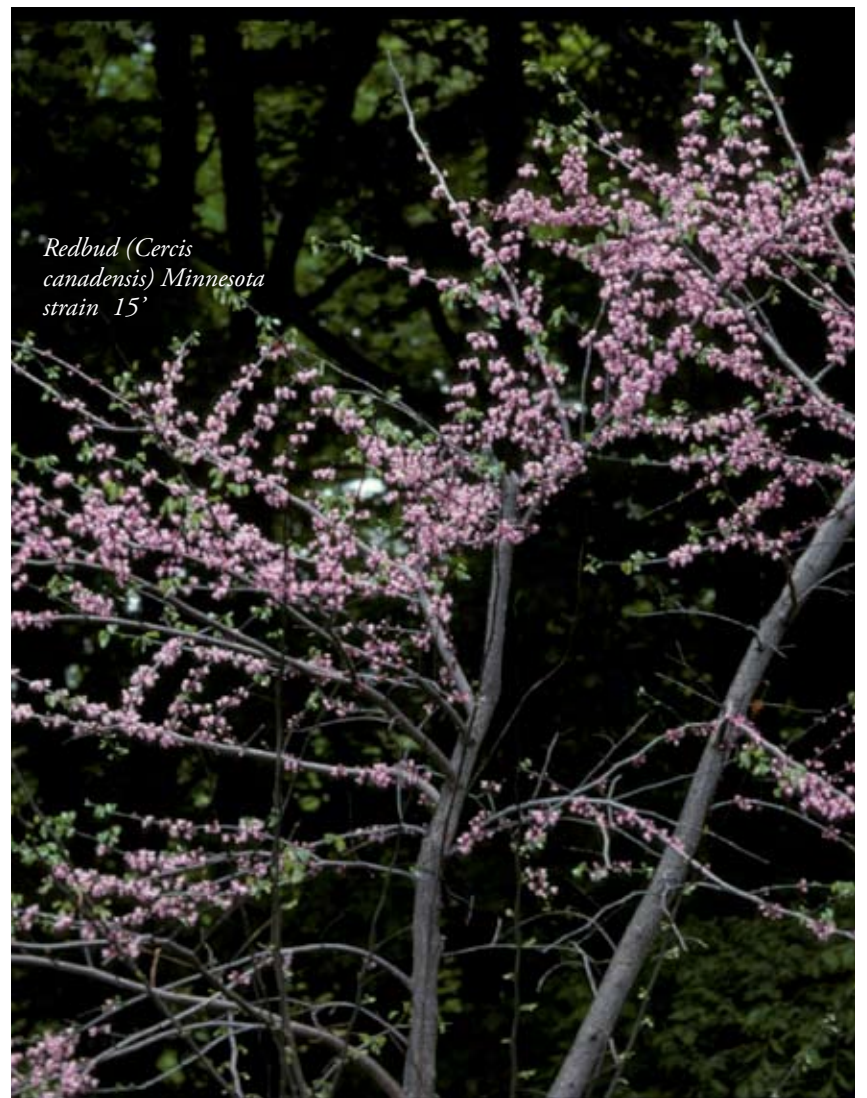
Visit free this summer*

***Free admission for all passengers in one vehicle.**

Expires Aug. 31. Present coupon at gate house. No other offers apply. No facsimiles.

visit us online at www.arboretum.umn.edu

UNIVERSITY OF MINNESOTA



Redbud (Cercis canadensis) Minnesota strain 15'

Photographer: David Hansen

GOT GARDENING QUESTIONS? CONTACT YOUR LOCAL MASTER GARDENER

The University of Minnesota Master Gardener Program trains volunteers to help educate people in their communities about horticulture. For answers to your gardening questions, you can visit the program's website, www.extension.umn.edu/gardeninfo, a one-stop information hub for Minnesota gardeners. The multitude of resources on this site will answer your gardening questions and introduce you to new and creative ideas about caring for the plants in your life!

Some plant questions and problems require assistance from the professionals. You can visit the Yard & Garden Help Desk at the Arboretum during the summer on Mon., Fri. & Sat. from 10 a.m. - 2 p.m., and on Sun., from 11 a.m. - 3 p.m. Or, to contact the University of Minnesota Extension office in your county, visit www.extension.umn.edu/gardeninfo/components/questions_yglines.html. These University trained garden

enthusiasts are happy to provide you with all the information you need to keep your yard and garden beautiful.

Check the website for hours at county extension offices or you can also visit Master Gardeners at the Minnesota State Fair!

VALUE OF TREES COMMUNITY TREE PLANTING INITIATIVE

Continuing the yearlong tribute to trees, the Arboretum is proud to announce the Value of Trees community initiative - a community tree planting and public education program. In honor of the 50/100th anniversary of the Arboretum, every county is invited to plant a tree at or near a county building. Bailey Nurseries has generously donated a commemorative tree to every Minnesota county for this purpose. Contact 952-443-1400 to ask about the community tree planting initiative.



Autumn Splendor

Photographer: David Hansen

LEARN! CLASSES FOR CHILDREN AND ADULTS AT THE ARBORETUM

Take in nature-inspired seasonal exhibitions and events, weekend family programs, guided tours, and classes for all ages in the art and science (and fun and camaraderie!) of plants and gardens. For adults, Gardening School, Horticultural Techniques, Cooking classes, Botanical Arts & Crafts, Writing Workshops, Health Classes and more. For children from preschool to tweens, Summer Day Camps and Drop In and Explore Family Fun. Register today at 952-443-1422 or visit us online for class descriptions at www.arboretum.umn.edu/learn.aspx



Photographer: John Gregor

ANDERSEN HORTICULTURAL LIBRARY

The Andersen Horticultural Library is a reading and reference library specializing in horticulture, botany and natural history. We are the only horticultural research library in the Upper Midwest, with our collection including more than 16,000 volumes and 350 periodicals.

The Library serves many users ranging from University faculty and students to visitors to the Minnesota Landscape Arboretum. As part of being a resource on plants, we have published horticultural books and six editions of Andersen Horticultural Library's Source List of Plants and Seeds. We maintain an online service and database <http://plantinfo.umn.edu>, that provides information on nurseries, plant sources, plant citations and other links.

There is an admission fee for entry into the Minnesota Landscape Arboretum, which is waived for people exclusively using the Library.

Hours

M-F 8 a.m. -4:30 p.m.
Sat 11 a.m. - 4:30 p.m.
Sun 11 a.m. - 4:30 p.m.

DISCOVER TREES

To celebrate the Minnesota Landscape Arboretum's 50th anniversary and 100th anniversary of the Horticultural Research Center, Andersen Horticultural Library is mounting a summer exhibit entitled *Discover Trees*. Utilizing materials from the Library's special collections it focuses on useful and unusual aspects of many of the trees that surround us in our landscapes.

The exhibit runs from April 28 through October 12.



Photographer: John Gregor

BOTANIC ART EXHIBIT ONLINE

Get a preview of one of the University of Minnesota Libraries newest sites. *The Transfer of Knowledge: The Art of Botanical Illustration (1491-1920)*, <http://www.lib.umn.edu/botanical>, traces the development of botanic art through the centuries. This web exhibit highlights images from important botanical works found in special collections held at the Andersen Horticultural Library, Magrath Library and the Wangensteen Historical Library of Medicine and Biology.

Location

Andersen Horticultural Library
Minnesota Landscape Arboretum
3675 Arboretum Drive
Chaska, MN 55318
(952)443-1405



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REFERENCES

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Cornell University Press

Oak Wilt by Charles O. Rexrode and Daniel Brown

Forest Insect and Disease Leaflet Number 29 USDA Forest Service

Oak Wilt in Minnesota by David French and Jennifer Juzwik
University of Minnesota Extension Service MI-03174

Oak Wilt by Paul C. Pecknold
Purdue University Cooperative Extension Services BP-28-W

Anthracnose Disease of Eastern Hardwoods. F.H. Berry
Forest Insect and Disease Leaflet 133
USDA Forest Service

How to Identify, Prevent, and Control Oak Wilt
USDA Forest Service Na-PR-03-00

Oak Wilt People and Trees by S. Cook and J. Juzwik
USDA Forest Service

McPerson, E. G., J. Simpson, P. Peper, S. Maco, S. Gardner, S. Cozad, Q. Xiao. 2005. City of Minneapolis, Minnesota Municipal Tree Resource Analysis. Center for Urban Forest Research, University of California, Davis, CA.

Videos:

YouTube

How to Plant a Tree:
Watch U of M Urban Forestry Specialist Gary Johnson

Part 1:

<http://www.youtube.com/watch?v=DLnMaf0Np-0&feature=related> <<http://www.youtube.com/watch?v=DLnMaf0Np-0&feature=related>>

Part 2:

<http://www.youtube.com/watch?v=vVWi58ZrJxg>

2nd Annual FlowerFest Weekend

On Aug. 16 and 17, from 12:30 to 4:30 p.m., FlowerFest combines two popular attractions of the summer growing season into a single weekend: the 26th annual Arboretum Flower and Garden Show, co-sponsored by the Federated Garden Clubs of Minnesota; and the Minneapolis Men's Garden Club's Food, Flower and Foto Show.

Shop the SummerHouse Garden Market

Visit the Arboretum's SummerHouse for plants, locally grown fruits, flowers, vegetables; U of M-made brats, bacon and sausage, local cheeses, breads and desserts; garden gifts, tools and more. 10 a.m. - 6 p.m.

Wood-Carving Demonstrations

From 1 to 4 p.m. on July 12, Aug. 9 and Sept. 13, stop by the Morgan Terrace behind the Snyder Building for a series of wood-carving demonstrations by Norman Woodard, some of whose works are on display as part of the library exhibition, and several other expert wood carvers.

TELEPHONE DIRECTORY

GENERAL INFORMATION

952-443-1400

ANDERSEN HORTICULTURAL LIBRARY

952-443-1405

AUX. INFO. FROG HOLLOW

952-443-1453

AUXILIARY EVENT INFO

952-443-1400, Ext. 7052

BLOOM LINE

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Minnesota Landscape
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We invite you and your family to become members of this wonderful horticultural resource. Our members love the outdoors, want to learn more about northern plants for their home gardens and landscape projects, or just want to enjoy a serene, beautiful setting away from the pressures of everyday life.

Call 952-443-1440 or visit us online at www.arboretum.umn.edu/join.aspx to sign up today!

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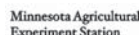
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