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.

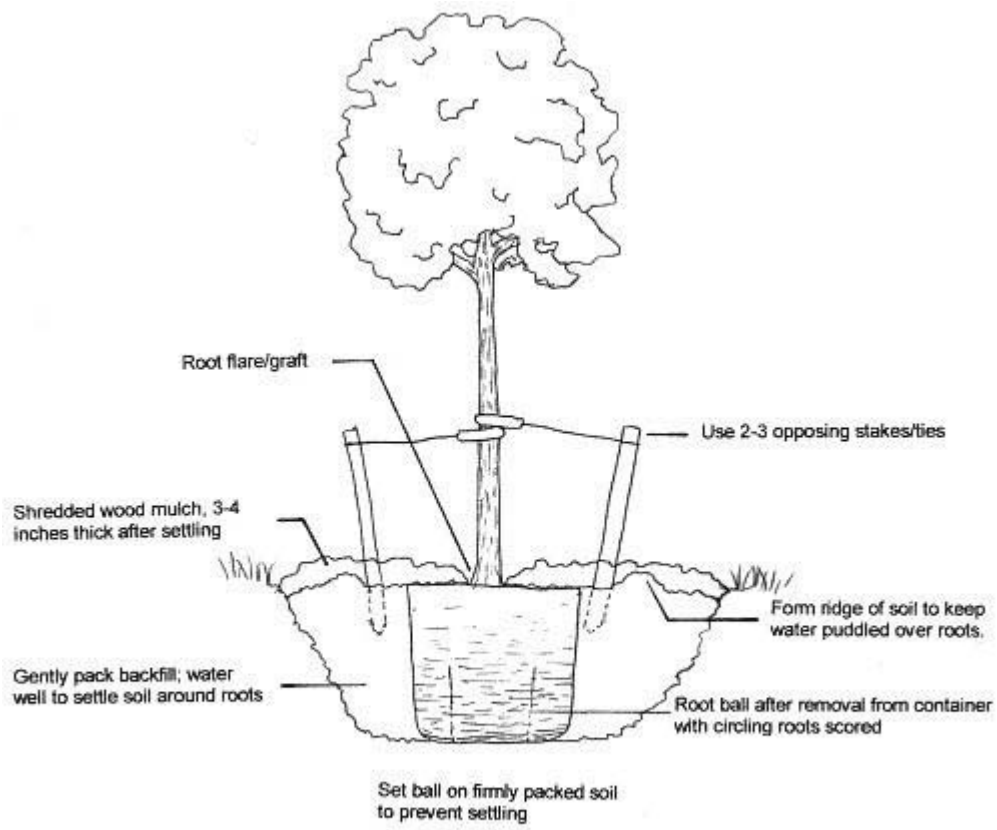
Making the Planting Hole

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.



Typical tree planting detail (containerized)

University of Minnesota Sustainable Urban Landscape Information Series

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

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*

Proper pruning is important for long term health of trees.

WHY TREES DIE

Dan Miller, Integrated Pest Management Specialist
Minnesota Landscape Arboretum

Photographer: Peter Bedker, Bugwood.org

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.

"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

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, insuf cient 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, 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

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.

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

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 home sites, 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 (*Scientif c*) Name	Poor Drainage	Dry Soil	Alkaline	Compacted	Salt
Balsam Fir (*Abies balsamea*)				Y	
Black Maple (*Acer nigrum*) HF		Y	Y	Y	
Freeman Maple 'Autumn Blaze' Firefall™ (cross between silver and red maple)	Y	S		Y	
Red Maple (*A. rubrum*) 'Autumn Spire'; 'Northwood'	Y	S		Y	
Silver Maple (*A. saccharinum)*	Y	Y	I	Y	I(spray)
Sugar Maple (*A. saccharum) 'Green Mountain'*			I	Y	
White Fir (*Abies concolor*)		I	I		
Three-f owered Maple (*Acer triflorum*) 20-30' HF			I		I
Ohio Buckeye (*Aesculus glabra*) 'Autumn Splendor' HF	I	I	Y		Y
Black Alder (*Alnus glutinosa*)	Y		I	Y	Y
Serviceberry *(Amelanchier* spp.)20-25'	I				Y
Sweet Birch (*Betula lenta)* 25-50' HF			Y		
Yellow Birch (*Betula alleghaniensis*) HF			I		
River Birch (*B. nigra*)	Y			Y	
Paper Birch (*B. papyrifera*)	I		I	Y	I
Blue Beech (*Carpinus carolinianum)* 20-25'			S	Y	S
Bitternut Hickory (*Carya cordiformis*) zone 4 HF			I	Y	
Shagbark Hickory *(Carya ovata)* zone 4 HF			I	Y	
Northern Catalpa (*Catalpa speciosa*) zone 4	I	Y	Y	Y	
Common Hackberry (*Celtis occidentalis*)	Y	Y	Y	Y	
Redbud (*Cercis canadensis)* Minnesota strain 15'		I	Y	Y	
Turkish Filbert (*Corylus colurna*) zone 4 HF	I	Y	Y		
Cockspur Hawthorn (*Crataegus crusgalli*)	I	Y	Y	Y	
Downy Hawthorn (*C. mollis*)	I	Y	Y	Y	
Green Ash (*Fraxinus pennsylvanica*)	Y	Y	Y	Y	I
Ginkgo (*Ginkgo biloba*) zone 4		Y	Y	Y	Y
Honeylocust (*Gleditsia triacanthos inermis*) 30-60'	I	Y	Y	Y	Y
Kentucky Coffeetree (*Gymnocladus dioicus*) 'Stately Manor'		Y	Y	Y	I
Tamarack (*Larix laricina*)	Y			Y	Y
European Larch (*Larix decidua*)	I			Y	Y
Amur Maackia (*Maackia amurensis)* 'Summertime' 18' HF		Y	Y		
Crabapple (*Malus* spp.) 15-25'		Y	Y	Y	I(soil)
Ironwood (*Ostrya virginiana*)			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 (*Scientif c*) Name	Poor Drainage	Dry Soil	Alkaline	Compacted	Salt
Norway Spruce (*Picea abies*)			Y		
White Spruce (*Glauca*)	I		I	Y	
Black Hills Spruce (*Picea glauca densata*)	I	I	I		Y
Serbian Spruce (*P. omorika*) zone 4 HF			I		
Ponderosa Pine (*Pinus ponderosa*) HF		I	I		
Red Pine (*P. resinosa*)		Y			
White Pine (*P. strobus)*					
Jack Pine (*P. banksiana*) HF		Y			Y
Swiss Stone Pine (*P. cembra*) HF		Y	Y		Y
Austrian Pine (*P. nigra*)		Y			I
Bigtooth Aspen (*Populus grandidentata*)	I	I	I	Y	
White Oak (*Quercus alba*)		I			Y (soil)
Swamp White (*Bicolor*) Oak (*Q. bicolor*)	Y			Y	Y (soil)
Northern Pin Oak (*Q. ellipsoidalis*)		Y			
Bur Oak (*Q. macrocarpa*)	Y	Y	Y	Y	I (spray)
Eastern Pin Oak (*Q. palustris*) zone 4	Y	I		Y	
Red Oak (*Q. rubra*)					Y
Laurel Willow (*Salix pentandra)*	Y	Y	Y	Y	Y
Japanese Tree Lilac ***(Syringa paniculata)***		Y	Y	Y	Y
American Linden (*Tilia americana*)	I	I	Y	Y	
Littleleaf Linden (*Tilia cordata*)	I	I	Y	Y	
Canadian Hemlock *(Tsuga canadensis)*	Y				
American Elm (*Ulmus americana*)					
Resistant to Dutch Elm Disease:	Y	Y	Y	Y	I
'Princeton' or 'American Liberty'					
Accolade® Elm *(Ulmus japonica x wilsoniana)* 'Morton'	Y	Y	Y	Y	Y

Amur Maackia (Maackia amurensis) 'Summertime'

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

Ohio Buckeye (Aesculus glabra) 'Autumn Splendor'

Redbud (Cercis canadensis) Minnesota strain 15'

SELECT SMALL TREES IN YOUR HOME LANDSCAPE

Planting Trees in Your Neighborhood

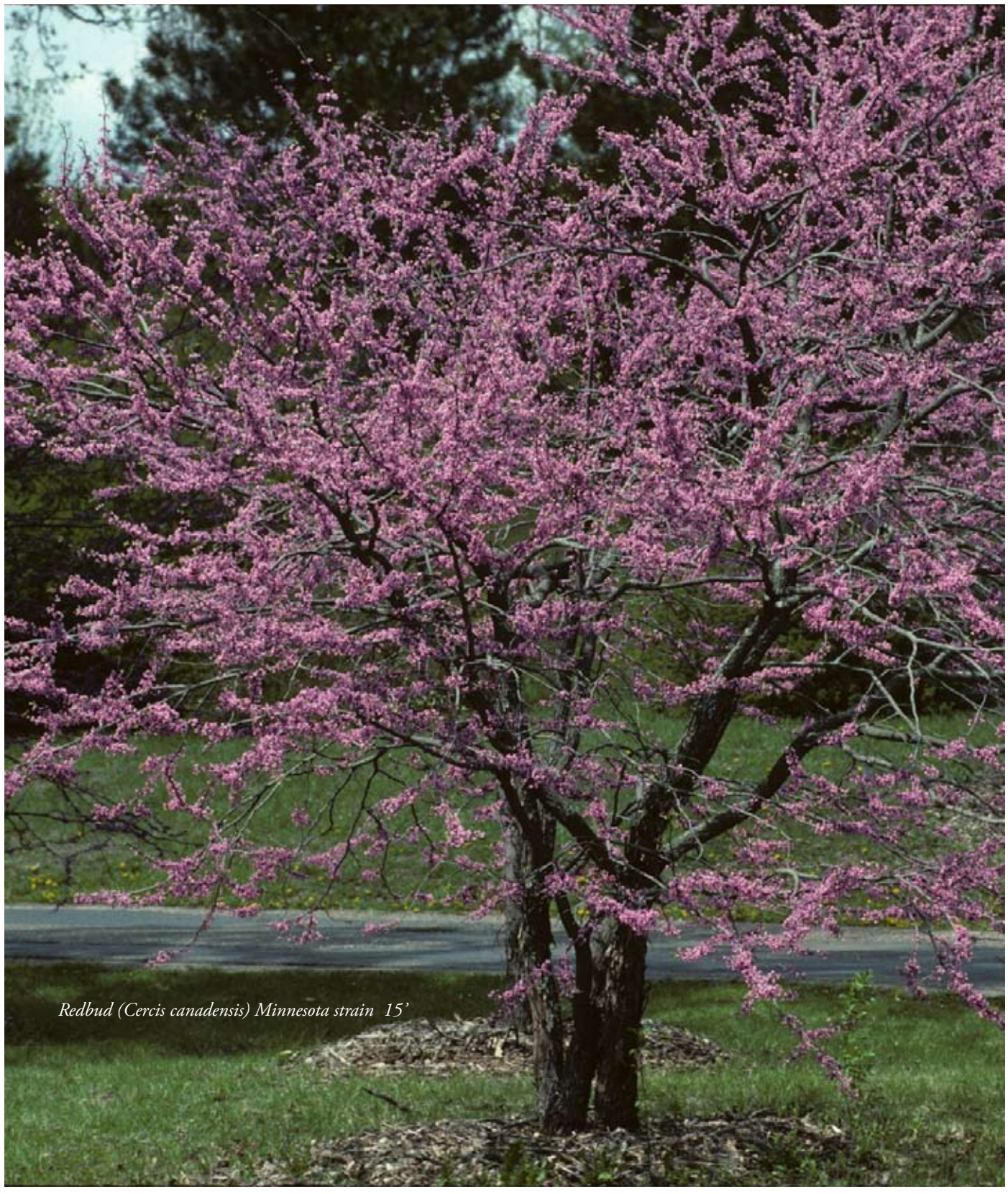
Small trees are an easy to grow, versatile and beautiful addition to our landscapes. Several hardy, decorative, disease resistant small trees are great for Minnesota climates. And small trees are the best size to use near power lines. If you have above ground power lines on your home property or along 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.

Xcel Energy®



Redbud (Cercis canadensis) Minnesota strain 15'

Photographer: David Hansen

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.

Minnesota Landscape ARBORETUM

TAKE A VACATION AT THE ARBORETUM

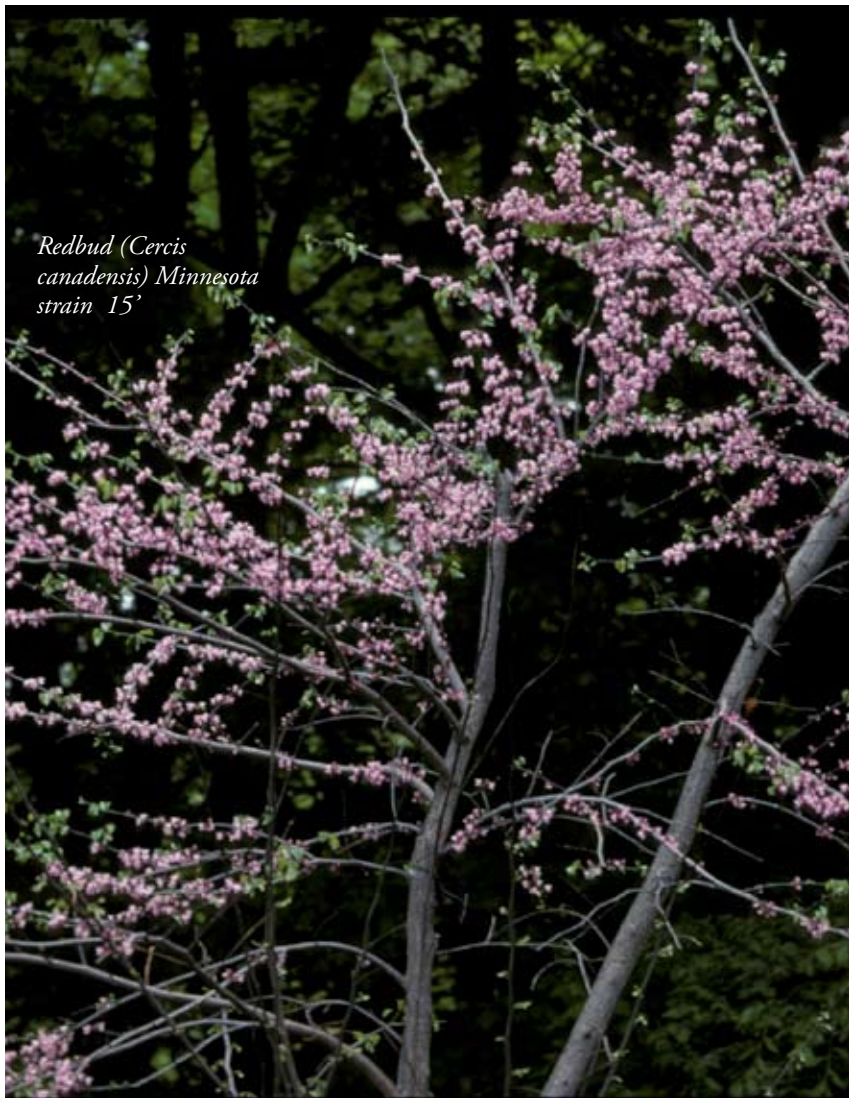
Visit free this summer*

*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 of ce 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 of ces 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