

# Putting Down Roots

Landscape guidelines for the selection, care, and maintenance of trees in central Oklahoma



The City of  
OKLAHOMA CITY

2nd edition

Beauty can be defined in many ways. For Margaret Annis Boys, a longtime Oklahoma City educator, beauty was found in the native trees, flowers and landscapes of her beloved Oklahoma. Thanks to an endowment established through a bequest from her estate following her death in 1990, many area public parks, medians, neighborhoods and schools have benefited from beautification projects funded through the Margaret Annis Boys Trust at the Oklahoma City Community Foundation. Miss Boys would have celebrated her 100th birthday in 2009. In recognition of the impact that her “gift of beauty” has had and will continue to have on our community, this publication is dedicated to Margaret Annis Boys.

For more information on the Margaret Annis Boys Trust, please visit [www.occf.org](http://www.occf.org).



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## INTRODUCTION

In 1991, Oklahoma City Beautiful and the Oklahoma City Planning Department published a booklet entitled *Trees for Oklahoma City* as a free guide on viable trees for Oklahoma City. This publication was reprinted several times and was used by citizens for many years. Long after the last copy of this book was given away, the Planning Department started working with the community to update the City's comprehensive plan. Citizen surveys and recommendations for the comprehensive plan showed our citizen's desire for more (and better quality) landscaping, the development of a tree master plan, and general improvements to the aesthetics of the city.

In 1999, a devastating F-5 tornado razed Oklahoma's landscape, and severely damaged or destroyed all trees within its path. City planners recognized that an expanded guide, building on the success of *Trees for Oklahoma City*, was necessary to help address the immediate needs of a growing and recovering community. When I began working for the Planning Department in 2000, I was asked to take on this project, which was suited to my background in Landscape Architecture. Our goal was to fund and distribute a free resource guide to help citizens, developers, and property owners make informed decisions on tree selection, landscape design, and maintenance procedures. We knew of no other publication that combined these elements into one resource that was specific to central Oklahoma.

Thanks to an Urban and Community Forestry grant from the Oklahoma Department of Agriculture, Food, and Forestry, we were able to fund this educational resource to promote urban reforestation. We convened a committee of local professionals, including Urban Foresters, Landscape Architects, and Horticulturalists to consult on the structure and content of the book throughout its two year development.

In 2003, we printed 4,600 copies of the resulting product of our work - the original *Putting Down Roots*. We organized volunteers to distribute these books to libraries, community centers, non-profits, and other agencies throughout central Oklahoma as a free resource to the community. The release of *Putting Down Roots* came at a time when the community sorely needed it. That same year, another tornado tore across the same path of the F-5 in central Oklahoma four years earlier. *Putting Down Roots* was targeted as a helpful tool in reforestation efforts,

and was adopted by The Tree Bank Foundation and OSU Extension Service as an educational resource supporting their "Tornado Releaf" project.

In 2004, the publication received Keep Oklahoma Beautiful's Environmental Excellence award for education and promotion. Then in 2007, trees in Oklahoma were hit by natural disaster again as flooding, wind, and ice claimed the landscape. Our state received national disaster declarations eight times within that year. It was estimated that the ice storm in December 2007 alone claimed over ten million dollars in tree loss. By this time, the original 4,600 *Putting Down Roots* books were long gone, and as citizens prepared to replant what they had lost, requests for more books were steadily coming in to the Planning Department's office.

In 2009, the Oklahoma Department of Agriculture, Food, and Forestry once again awarded the Planning Department a grant to update and reprint *Putting Down Roots*. The City of Oklahoma City and the Oklahoma City Community Foundation provided the required match. Many of the original committee members (plus other brilliant tree experts) were re-enlisted to collaborate on this second edition of *Putting Down Roots*. Through the process of updating the book, I was humbled and honored that our region's best resources came together on this endeavor. I can't thank them enough for the valuable contribution of their time and expertise.

I hope you will find this edition useful as you select a tree to replace one you lost from storm damage, as you care for a maturing and changing landscape, or as you design landscaping for a new home. With the knowledge you gain on proper selection, care, and maintenance of trees, you will aid in the beautification of our community, serve as a good steward of our environment, and enhance our quality of life by "putting down roots."

*Aubrey*

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Senior Planner, Oklahoma City Planning Department



## ABOUT THIS BOOK

This book is designed to guide you through the process of choosing the right tree for your site, deciding where it should go in your landscape, and then properly planting and caring for your tree. The first chapters, “Know Your Site” and “Design Your Site,” outline important things you should consider before you choose a tree to plant, or the location to plant it.

In the “Choose Your Tree” chapter, trees are classified as either deciduous (seasonally drops its leaves) or evergreen (stays green all year), and are divided into sections by the average size they may reach in our region. In this book, trees classified as *large* may reach over 50 feet in height; *medium* trees may reach between 25 and 50 feet; and *small* trees may remain under 25 feet tall at maturity. This classification system will help you look for trees of a certain size and character. If you are searching for a good tree to plant in a location with specific conditions, such as a shady parking lot without irrigation and compacted soil, you may reference the “Plants at a Glance” matrix on page 26. In addition, if you are searching for trees that bloom during a certain time of year, you may reference the bloom schedule on page 31.

You will see some trees in this book have an “Oklahoma Proven!” symbol in the corner. This symbol is borrowed from Oklahoma State University’s educational program to highlight species of trees, shrubs, perennials, and annuals that are best suited to Oklahoma.



Each year, “Oklahoma Proven!” promotes a superior plant from each of these categories. This edition of *Putting Down Roots* has noted trees selected as “Oklahoma Proven” between 1999 and 2010. You can keep up to date with new plant selections at [www.oklahomaproven.okstate.edu](http://www.oklahomaproven.okstate.edu).

All trees in this book were selected because of their suitability to the central Oklahoma region. The extremes and variability of our climate limits the species that can perform well here. Our trees must be able to withstand hot and humid summers, consistent winds, periods of drought, cold winter months, and severe weather events, such as ice storms and tornadoes. But, be advised that not all of the trees in this book are suitable for every site in central Oklahoma. Within the central Oklahoma region itself are many “micro-climates,” or smaller zones where the climate differs enough to influence whether a certain species of tree will thrive or struggle to survive. Therefore, it’s important to know the conditions of your site and select a tree that will tolerate the unique conditions of that site.

Although we have noted some trees in this book as superior selections, keep in mind that no tree is perfect. They are living organisms that change over time and need care to remain healthy in the urban environment. Trees can be messy, shedding leaves, twigs, needles, or fruit. Their fruits may attract birds or other wildlife, which could be considered either a positive or negative aspect, depending on your needs or point of view. All of these variables should be considered when you choose to plant a tree, which may live beyond your lifetime in the spot you’ve chosen.

Proper selection and care is vital to the health and longevity of trees in the urban environment. In turn, a healthy, diverse urban forest offers aesthetic, social, economic, and environmental benefits to our communities. Trees can increase property values, bolster economic reinvestment, improve air quality, help conserve energy, provide shelter and food for wildlife, enhance the visual image of our community, and heighten social well-being. Thank you for contributing to all of these positive impacts to our community by planting the right tree in the right place.







**Know Your Site**

## PLANT HARDINESS ZONES

Before selecting plant material, it is important to know our region's basic climatic parameters. The USDA Plant Hardiness Zone Map for the entire United States helps classify the winter hardiness of plant material so that we may select species of plants that will thrive in our unique environment. Oklahoma City falls within Zone 7a, meaning that plants classified 1 to 7a should tolerate our average annual low temperatures. Figure 1 illustrates the average annual minimum temperatures for the Midwest United States. Plants that are classified 7b to 10 are not likely to be cold hardy, and may act as annuals in Oklahoma City's environment.

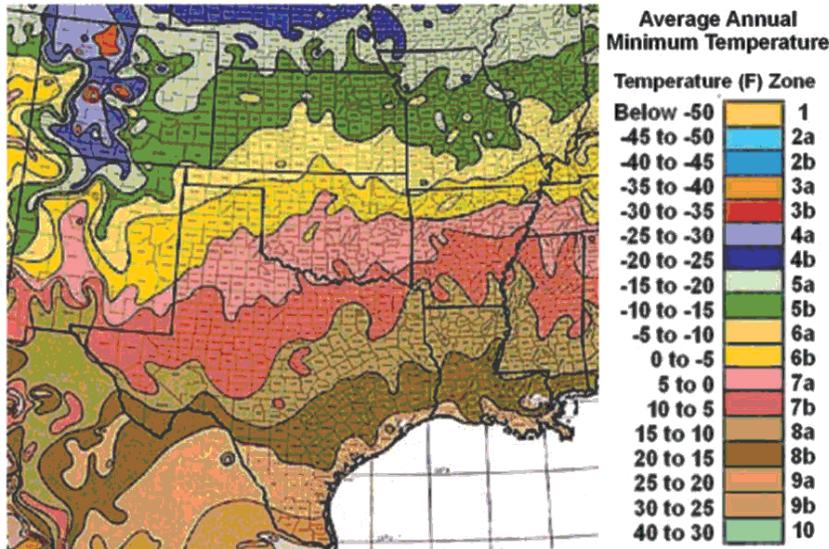


Figure 1: USDA Miscellaneous Publication No. 1475, Issued Jan. 1990

## AVERAGE TEMPERATURES

Not only is it important to know the cold hardiness of plants, but also how well they fare in the extreme temperature ranges that we experience in Oklahoma. The average temperature in the Oklahoma City area is between 58-60 degrees Fahrenheit; however, the extremes may soar over 100° and fall below 0°. Although most plants will tolerate short periods of extreme temperatures, prolonged periods of heat or cold may affect the viability of plants on the edges of their

zone classification. Also to be noted are the dates of the first and last hard freeze. This can be especially helpful when planning activities such as pruning, planting annuals and perennials, and sowing grass seed.

Mean Monthly Temperature in degrees Fahrenheit for Oklahoma County			
January	36.7	July	82.0
February	42.3	August	81.2
March	51.0	September	73.2
April	59.7	October	62.0
May	68.4	November	48.9
June	76.8	December	38.5

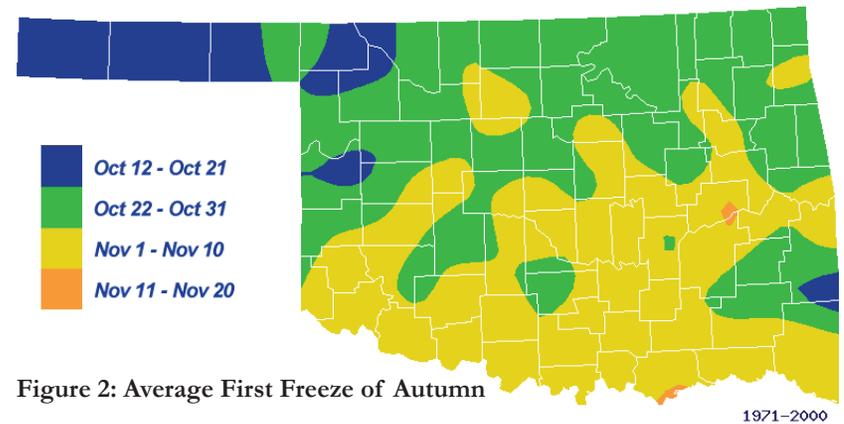


Figure 2: Average First Freeze of Autumn

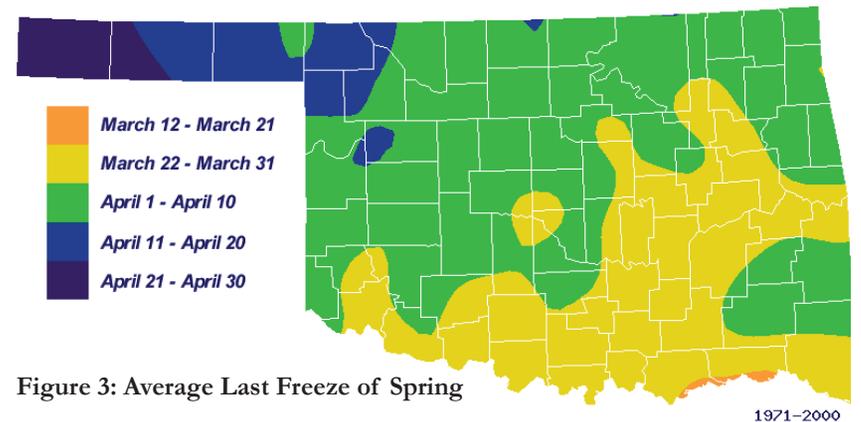


Figure 3: Average Last Freeze of Spring

## PRECIPITATION RATE

Along with average temperatures, we must consider the area's precipitation rate to make appropriate plant selections. The normal precipitation rate for the Oklahoma City area is between 32" and 36" annually; however, Oklahoma has been known to experience periods of drought, and often a lack of snow and rain in the winter will result in a winter drought.<sup>1</sup>

Mean Monthly Precipitation in inches for Oklahoma County			
January	1.3	July	2.9
February	1.6	August	2.5
March	2.9	September	4.0
April	3.0	October	3.6
May	5.4	November	2.1
June	4.6	December	1.9

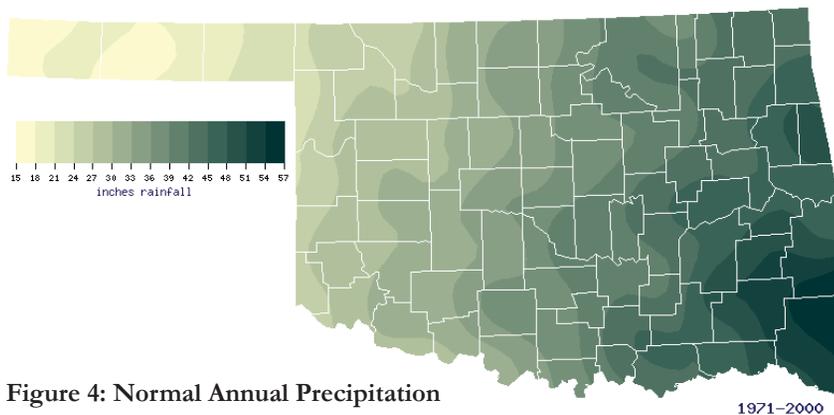


Figure 4: Normal Annual Precipitation

1971-2000

<sup>1</sup> Figures 2-4: These maps are provided by the Oklahoma Climatological Survey. They were created using daily reports from National Weather Service Cooperative Observers, volunteer weather observers who provide data for the climatological record of Oklahoma and the United States.

## SOIL CHARACTERISTICS

Soil is the basis of plant health, providing anchorage, access to minerals, nutrients, and moisture. Factors such as soil texture, structure and depth can affect a plant's ability to access water, nutrients, and oxygen. It is important to have a well-balanced soil type that will provide the right mixture of air, water, and nutrients for optimal plant health. Soil particles range in size from large rocks and gravel to sand, silt, and clay. In combination with one another, these particles form the soil type, which can be classified using a Soil Textural Triangle.

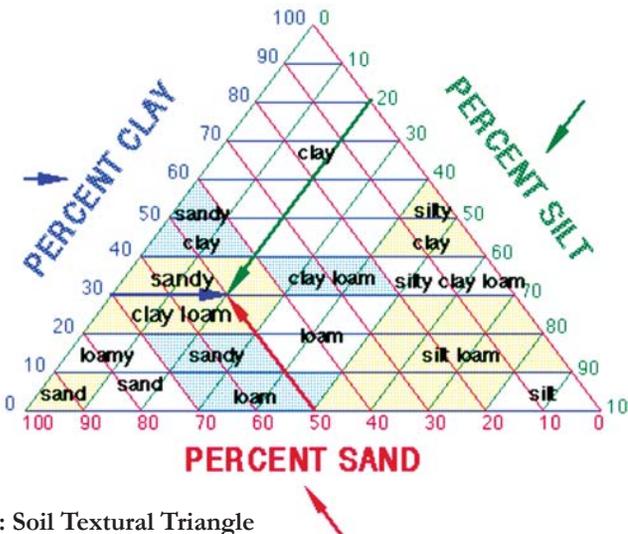


Figure 5: Soil Textural Triangle

The arrangement of the particles in the soil creates pores where air and water can travel. These pockets also provide spaces for the migration of roots. Compaction of the soil causes this delicate soil structure to collapse, restricting air and water circulation and healthy root development. Native Oklahoma soils are often rich in clay, which is a heavy, easily compacted soil type. Techniques, such as amending soils to help create a better balance of the soil structure, will provide plants better access to water and minerals. Soil tests can provide us with critical information on availability of nutrients and mineral deficiencies, and offer suggestions for amending the soil.

Within the soil, chemical and electrical bonds hold soil particles together, sometimes affecting a plant's ability to absorb certain minerals and nutrients. Soils with high alkalinity (a pH greater than 7.0), like ours in central Oklahoma, cause certain nutrients to bind, making them unavailable for roots to absorb. Phosphorous, Manganese, Iron, and other micronutrients are particularly affected by the pH of the soil.<sup>2</sup> Supplementing these minerals with chemical fertilizers is not the only remedy. Amending the soil with organic matter, along with specifying plants that will tolerate alkaline soils, may help reduce the need to fertilize.

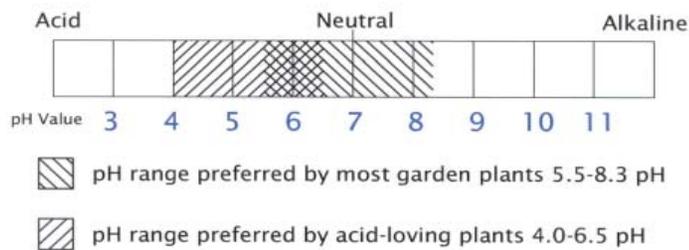


Figure 6: pH Scale

Also influencing the health and longevity of plants is the depth of the soil in which they are planted. More water and nutrients become available when the soil has sufficient depth, and roots will grow deeper to reach them. Deep-rooted plants have a better chance of surviving drought, have better access to varying minerals and nutrients, and can resist strong wind forces due to better anchorage in the ground. Layers of rock, clay, or other impermeable materials can create a barrier through which roots cannot penetrate. This results in flat, often shallow, root formation and does not allow proper drainage. Poor drainage can be just as detrimental to a plant's health as a lack of water. In this case, preparing the bed or planting area prior to the installation of plant material may require some excavation and backfilling with an appropriate blend of soil and organic material.

<sup>2</sup> Harris, Richard W. *Arboriculture: Care of Trees, Shrubs and Vines in the Landscape*, Planting Site: Soil.

In general, soils have a delicate balance of air, water, minerals, nutrients, and living organisms. In the right combination, these components can be the perfect medium for your healthy plants. To maintain the integrity of your soil, protect it from compaction and chemical contamination.

## TREES IN THE URBAN ENVIRONMENT

Trees contribute many benefits to the urban environment by providing:

- shade that helps cool the environment by reducing radiant heat from paved surfaces;
- increased humidity through transpiration;
- habitat for wildlife; and
- pleasing aesthetics to surroundings.

Unfortunately, harsh conditions in urban settings often limit our choice of tree species that may perform well. We must carefully select trees that are adapted to the stresses of the urban environment, which include some or all of the following:

- Limited water availability
- Excessive salts
- Restricted root zones
- Soil compaction
- High soil alkalinity due to leaching from cement
- Low soil fertility
- Poor soil structure
- Pollution from fertilizers and pesticides
- Vandalism
- High winds created by clusters of tall buildings
- Radiant heat and artificial light
- General disturbances and stresses from humans

Measures to help ensure the success of trees in the urban setting are:

1. Plan for tree growth and maintenance in the design of all building projects;
2. Provide adequate space and quality of soils in root zones of street and parking lot trees. This will improve tree growth, and reduce maintenance and irrigation;
3. Provide adequate water to a tree during its establishment period of the first two to three years after planting; and
4. Select tree species or cultivars that are tolerant of stressful conditions and are appropriate for their location.

## **CONSERVATION OF NATURAL RESOURCES**

Our most precious natural resource is water. Water conservation is becoming a crucial factor in planning for future growth as our population increases and the demand for water soars. Moreover, the quality of water is vital for future prosperity. As water becomes greater in demand, our society will have to adopt new practices toward the irrigation of landscaping to help conserve water for other important uses. During times of drought, water rationing may be implemented, adversely affecting plant health. The need for irrigation systems and supplemental watering may be reduced or eliminated by planting drought-tolerant species in the landscape. These plants, once established, maintain a balance that should enable them to survive normal drought conditions.

Over-watering can also affect the availability of nutrients in the soil and can suffocate roots. Excessive watering may leech nutrients into sub-soils, where the roots cannot reach, requiring the application of additional chemical fertilizers. As the same watering practice is continued, these chemicals migrate into groundwater supplies or are washed away in runoff. Fertilizers and herbicides that leech into the water supply are carried by runoff into streams and lakes, affecting water quality and causing toxins to accumulate in the environment. Pollutants in the water supply, adversely affecting the health of plants and animals, impact bio-diversity within the environment.

Many factors are attributed to runoff in urban areas. Inefficient sprinkler systems, improper use of landscape irrigation, expanses of impermeable surfaces, improper grading, and inadequate groundcover or vegetation all contribute to runoff in the urban environment. All of these factors may be addressed with careful consideration of landscape design and selection of appropriate plant material.

## **Designing for Water Conservation**

In time, our society may be induced to begin a tradition of using more drought-tolerant landscaping, especially if landscape professionals take the lead and use Oklahoma tolerant plants effectively in their urban designs. If we emphasize through education and example the beauty of these plants, along with the benefit of protecting our environment, homeowners may eventually compete to have the most natural-looking landscaping on the block.

Xeriscaping is a practice of planning gardens around tight water budgets. Often mistaken for gardens of rocks, sand, and cacti, xeriscape gardens are as diverse as the native plant palette of a region. Water conservation through xeriscaping is accomplished by implementing the following seven principles:

1. Planning and Design
2. Soil Analysis
3. Practical Turf Areas
4. Appropriate Plant Selection
5. Efficient Irrigation
6. Use of Mulches
7. Appropriate Maintenance

Other maintenance practices that save money, time, and natural resources are as easy as the application of a thick layer of mulch to planting areas as necessary. Mulched soils retain moisture, limit evaporation, regulate soil temperature, reduce erosion, and prevent the establishment of weed seeds. Together, all of these practices will decrease time spent maintaining the landscape, preserve natural resources, and help protect the environment.

## IRRIGATION

Many landscapes require supplemental water through irrigation systems. However, irrigation systems are often inefficient and contribute to over-watering and runoff. When designed, installed, and used properly, irrigation systems are efficient tools. Proper system zoning and careful placement of sprinkler heads that avoid over-spray onto impermeable surfaces can reduce runoff. This runoff, which often contains dissolved pollutants from fertilizer or pesticides, enters storm drains and is not treated when it empties into the nearest creek, river, or lake. Drip irrigation is a more efficient alternative to an underground spray irrigation system. Drip lines waste less water from evaporation and are less expensive. Watering in the morning versus in the heat of the day further reduces loss of water from evaporation. Finally, plant selection that does not require supplemental watering eliminates the necessity for irrigation systems all together.

Irrigation systems affect the health and development of plants. It is important to know the water requirements of trees and other plant materials and use them in conjunction with plants that share the same requirements. Irrigation timers are often set to water for a short period of time on a regular basis. The key to irrigating established plants is to watch for signs of wilting, and then water as needed. Thorough, infrequent watering will establish deep, well-rooted plants that are more water-efficient.

There are situations where supplemental irrigation is needed. During the establishment period for trees, frequent watering is required to allow the root system to develop. This establishment period may take up to two to three years. Past this point, watering during times of drought, or at the first signs of wilting, should suffice to maintain a healthy tree.

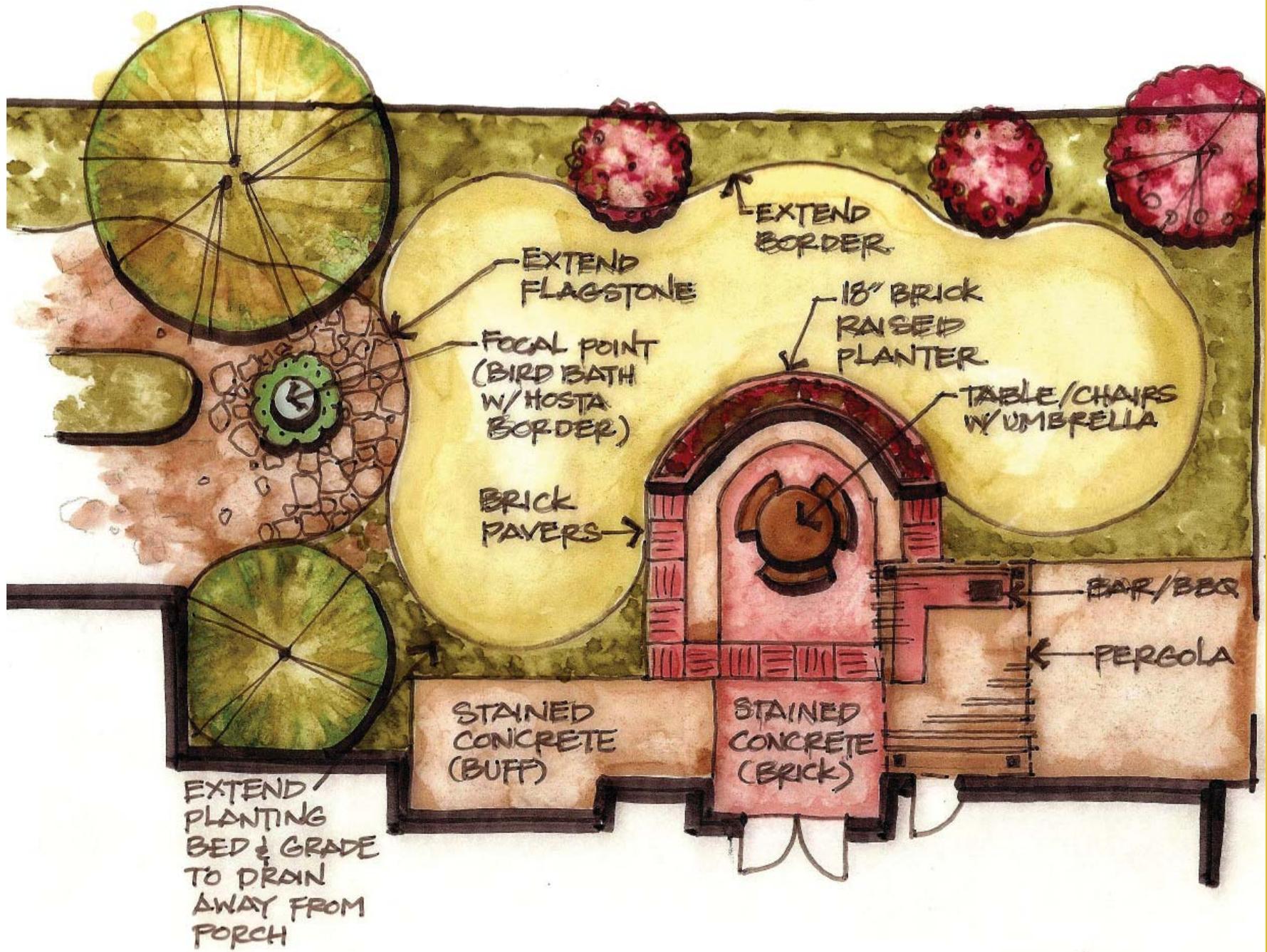
Irrigation during drought periods is essential to maintain plant health. Winter desiccation due to lack of moisture is very common in Oklahoma. Plants need moisture throughout the winter and should be watered every few weeks if no natural moisture occurs. This is

the same recommendation for summer droughts to reduce summer stress. Trees recharge during the night, and if soil moisture is not available to all of the root system responsible for water uptake, the tree begins to function in a deficit situation, resulting in the loss of leaves. Some plants may go into a short dormancy period until cooler temperatures and rainfall occurs. Other plants simply die.

Finally, over-watering can be just as detrimental to trees as under-watering. Certain trees are sensitive to the amount of water held around their roots. Many cannot tolerate what is known as “wet feet.” Most plants prefer to be well watered with a period in between waterings to dry out.

Natural wet/dry cycles are beneficial to plant health for several reasons:

1. Spaces for air form in soils as they dry, providing oxygen to the plant. Constant moisture in the soil, like that which is produced by the over-use of automatic irrigation systems, may reduce soil aeration.
2. Proper soil aeration stimulates root activity, which directly relates to the production of healthy foliage. Waterlogged soils restrict root functions in most plants, leading to low energy levels and less foliage growth.
3. Soil retains strength and firmness from drying periods, allowing it to retain its structure. Moist or wet soils compact more easily than moderate or dry soils. Over time, this constant compaction (even from foot traffic) will destroy air pockets in the soil, contributing to suffocation of the roots.
4. Constant moisture in the soil causes environmental conditions conducive to disease-producing organisms.
5. Lastly, moderate moisture stress causes the plant to rapidly build energy reserves instead of expending the energy toward new growth. This reserve is then triggered by a natural wet cycle and produces an abundance of healthy foliage and blooms.



## SITE SELECTION CHECKLIST

This checklist is a helpful tool in selecting a tree most suited to your site, and a successful location to plant your tree. Targeting any site constraints, opportunities, or liabilities of your site, it is designed to be used for quick reference as you research and select appropriate species of trees for your design. Use the checklist to make sure you are addressing each of the items listed in relation to the tree that you are considering.

### Environmental conditions:

- Sunny
- Shady
- Dry
- Wet
- Exposed to hot / drying winds
- Poor air circulation

### Soil conditions:

- Severely disturbed / building rubble
- Shallow soil to bedrock
- Sandy
- Rocky
- Clay
- Silt / loam

### Describe the site:

- Underground utilities
- Overhead utility wires
- Near heavy traffic (exhaust, heat, etc.)
- Near winter salted roads
- Near walkway, driveway, or sidewalk
- Near structures

### Where will you plant your tree?

- Public land
- Private land
- Lawn
- Rooftop
- By patio
- Garden
- Along street
- Park
- Parking lot
- Municipal building
- Golf course

## SELECTING A LOCATION

- Be aware of all utilities, including overhead wires, pipes, drains, sewers, or septic tanks and avoid planting in easements. Call the OKIE line locate service at 1-800-CALL-OKIE during your design and planning phase, and again before you dig. Do not block or obstruct sight lines for pedestrian or vehicular movement at the junctions of driveways, sidewalks, or intersections. Contact your local municipality for planting distance requirements or guidelines.
- Large-maturing trees should not be planted close to sidewalks or other similar type structures. When trees are young, they typically do not cause problems with adjacent structures. However, as trees mature, roots at the surface will grow in diameter just as branches do. This can cause nearby structures, such as sidewalks, to crack and heave. An alternative is to plant smaller maturing trees that, because of their smaller size, will not damage adjacent structures.
- Avoid planting large-maturing trees in areas with restricted root spaces, such as above-ground planters or in-ground planter boxes. If a very small area is all that is available, ensure the type of tree selected is suitable for planting in those conditions.

- Visualize the amount of shade anticipated (present or future) over lawns, shrubs, flower beds, and structures. Plant material may require adjustments as shade increases.
- Determine the growth rate of trees to avoid locating where access to paths, windows, doors, mailboxes, and lighting are blocked.
- Allow for future growth near buildings or other plantings. Also, consider the overhead clearance the canopy will provide when placing trees in an area where pedestrians or vehicles will be traveling underneath.

## PLANTING TREES NEAR NATURAL AREAS

Natural areas such as prairies, woodlands, wetlands, and creek systems often border the manicured lawn areas of our homes, residential communities, and business districts. When healthy, these natural areas are typically composed of a diversity of native plants. This health can be greatly diminished by the invasion of aggressive plants. Natural areas can become dominated by invasive plant species, which can form dense stands and significantly impair the condition of the plant and animal community.

The trees identified as invasive in this publication can spread rapidly, resulting in natural area degradation and potentially high costs to remove and/or control the invading trees in the future. Therefore, they should be planted with discretion. Be creative and plant responsibly. There are many non-invasive species of trees to choose from which are compatible with adjacent natural areas.

## COST AND MAINTENANCE

An important consideration when selecting plant material is maintenance. Time and money are spent maintaining our landscapes, and everyone welcomes a chance to reduce these costs. With proper planning, landscapes can be designed to increase efficiency in watering and maintenance. The location, size, and design of planting beds can aid in reducing evaporation and runoff, as well as yielding healthier plants requiring less maintenance and care. The proper

selection and site location of trees can reduce the costly replacement of sick or dead plants.

- Bare areas in the landscape (under trees) must be covered with groundcover, grass, or mulch to reduce erosion. Using two to three inches of mulch, such as shredded bark, pecan hulls, or compost keeps the soil temperature cooler and reduces weed competition.
- All plants need sunlight to grow. In areas shaded by trees, the removal of a few branches allows more sunlight to penetrate through the canopy for understory plants.
- One should select understory plants that have similar moisture requirements as the established tree to avoid overwatering the tree. For example, fescue grass requires up to two inches of water each week during the growing season. For many established trees, this may be too much water and may cause the tree's health to decline.
- Choosing trees adapted to our climate and soil conditions will reduce time and resources spent on landscape maintenance. Non-native trees may not be adapted to our soil conditions or our extreme moisture and temperature variations. Struggling with these conditions weakens their defense mechanisms and increases susceptibility to pest attack.

## LAWNS IN THE LANDSCAPE

The type of turfgrass can increase or greatly reduce time and money spent maintaining a manicured lawn. A benefit of using native turfgrass is the significant reduction in the number of times mowing and trimming equipment must be used. Allow all grasses to grow to their recommended height for optimal root growth. As roots grow deeper, grasses are able to access more ground water, in turn enabling them to better withstand drought conditions. Less supplemental irrigation is then required. Some grasses, such as Bermuda, have a tendency to overtake other plants and weaker grasses (weeds). This is a desirable characteristic in turf areas, but can be a serious problem in planting beds and walkways.

## TREE SPACING

Once the size of the area is established, choose a tree that complements the site. Trees should be scaled to the building or site. The landscape will not only be pleasing to the eye, but will reduce windstorm problems. During Oklahoma's high winds, large trees in urban settings are more likely to be damaged and require extensive pruning or expensive removal. This in turn creates additional waste that is often taken to the landfill. Trees less than 30 feet are recommended for home landscapes. Trees over 30 feet are best for commercial or public areas.

Tree shape and width influences the amount of trees required in a planting. Plant upright trees close together. Globular trees require more distance between them than columnar species. To determine spacing requirements, know the width at maturity. For example, if the tree will be 10 feet wide at maturity, plant the tree a minimum of five feet next to a structure or other tree. Add a few extra feet for clearance.

Finally, maintenance must be considered when placing plants next to buildings. Provide enough distance between trees and buildings to reduce the overhang of branches. If branches eventually encroach on a building, prune these branches away from the structure to help to reduce pest access. Trees placed near structures also pose a risk for structural damage to the building due to broken limbs.

### Tree spacing guidelines

These are general guidelines to follow based on a tree's growing habit and size.

Tree Size	Minimum Distance Between Trees
Large trees (over 50' height)	40-50 ft.
Medium trees (25'-50' height)	30-40 ft.
Small trees (less than 25' height)	20-30 ft.

## BASIC LANDSCAPE DESIGN

### Elements of landscape design

When preparing to develop a landscape plan, the following basic design elements should be recognized. Together, these visual elements are used in achieving specific goals, which should be determined before the design process is initiated. Combining these elements in a deliberate fashion may produce an infinite number of design solutions, all of which may be successful, providing the individual elements support the project goals.

#### **Line**

The basic element of art and design that defines an edge, or may form a narrow path in the landscape. Creating visual lines with landscape material, be they plants or hardscape elements, can help draw the eye to points of interest, emphasize architectural lines, or reinforce lines existing in nature.

#### **Color**

The palette of color that exists in nature may be the most prominent element in landscape design. The color of plant materials may help emphasize, complement, contrast, or disguise architectural features, as well as unify elements in the built environment.

#### **Space**

Pertaining to the real or illusory three-dimensional expanse in which natural or synthetic components exist, space or the illusion of space can be manipulated by the strategic placement and selection of plants in the landscape. For example, a space can appear to be larger when using small, fine-textured plants with cool or dark coloration. In contrast, the same space would appear smaller with the use of large, coarse-textured plants with warm or bright coloration.

### **Shape**

The element of shape is formed or set off by one or more of the other elements of visual design. Shapes in the landscape can be created from the lines of planting beds, shrub massings, or groupings of trees. Shapes are formed in the voids that plant materials define, providing opportunities for enframement or accent in the landscape.

### **Texture**

The element that pertains to the feel and appearance of a surface that is defined by a visual assessment from rough to smooth, coarse to fine. Texture can create subtle or dramatic changes in the landscape by providing contrast or connection to the objects in the surrounding landscape.

### **Value**

Defined by the degree of lightness and darkness attributed to color, this element affects the perception of other design components. Value can be employed to highlight, mask, or provide contrast in the landscape.

### **Tone**

Tone is defined by the effect of the lightness and darkness creating a shade of a color, affecting the intensity of the color. In landscape design, the tone of plant materials may either complement or contrast with the tones of the surrounding elements in nature or the built environment.

## **Principles of design**

After each element of design is analyzed in respect to your site, they can be applied to one or more of the following principles of design. A successful landscape design will achieve your project goals by the effective application of one or more of the following principles:

### **Balance**

The arrangement of elements so that they appear symmetrical or asymmetrical in design and proportion.

### **Contrast**

Arranging one or more elements in opposition, as to show their differences, produces contrast.

### **Emphasis**

Making one or more elements stand out in such a way as to appear more important or significant.

### **Harmony**

Blending elements to create a pleasing effect, balance, symmetry, and a composed appearance.

### **Movement**

Creating a distinctive structure that creates a feeling of action, guiding a viewer's eye through the design.

### **Pattern**

Repeating one or more elements using a planned grid creates a pattern in the landscape.

### **Repetition**

Repeating a pattern or sequence of one or more elements in the landscape.

### **Rhythm**

Repeated movement in the succession of elements to make a work seem active or to suggest repetition.

### **Unity**

Arranging elements to create a coherence of parts and a feeling of completeness or wholeness.

## **Safe and smart design**

Elements within the man-made environment must be considered when creating a landscape plan to ensure a safe and functional design. As trees reach their mature size, they may encroach on, or structurally damage, structures, sidewalks, fences and streets, or interfere with sight lines of motorists and pedestrians. Smart design practices can produce a functional, cost-effective, and safe environment as landscaping matures, as well as provide immediate enhancement of the environment.

**Structural damage**

Tree roots can provide enough force over time to crack or buckle concrete as they grow under sidewalks or building foundations. Some species that are noted for roots that surface are sycamore, sweetgum, baldcypress, mulberry, mimosa, and silver maple. If trees are located too close to plumbing lines, their roots may find their way into lines, clogging or damaging them. Limbs or trunks of trees planted too close to fences, retaining walls, or building facades may eventually encroach on those structures and cause structural damage. One should avoid planting species of trees that have tendencies to contribute to these problems, but the best practice to avoid structural damage is to place any tree at least the recommended distance away from structures and utilities.

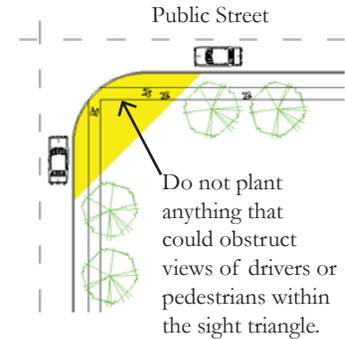
**Placement of trees**

Maintenance must be considered when placing plants next to buildings. Some pests such as spiders or squirrels may enter homes and offices via overhanging tree limbs. Squirrels can cause significant damage to wiring. Pruning these branches away from buildings will help to reduce pest access. Proper pruning inside tree canopies eliminates weak branches. It is important to remove weak branches, which can lead to structural damage during wind and ice storms. Providing the proper distance between trees and structures also reduces these problems. Account for the mature size of trees and their proximity to all other elements surrounding them. The following lists recommendations for minimum planting distances:

Plant trees away from	Recommended Distance
Street intersections	25 ft.
Light poles	15 ft.
Private approaches	10 ft.
Hydrants & manholes	10 ft.

**Sight lines**

Street intersections must maintain a clear sight triangle to provide safe navigation for motorists and pedestrians. Trees should not be planted within 25 feet (minimum distance) of a street intersection.



The canopies of trees over sidewalks should be pruned high enough to maintain adequate clearance for pedestrians and bicyclists. Pedestrian and bicycle circulation patterns can be hindered by blind spots created by overgrown or poorly sited trees and shrubs. In addition, safety standards for many public places require landscapes free of hedges or screens that could serve as places to conceal a person with intent to commit a crime.

**USES IN LANDSCAPE DESIGN**

**Architectural uses**

**Screening**

The use of trees and hedges placed in rows or masses may provide screening of undesirable views, architectural features, equipment, or aid in controlling views of desirable elements within the landscape. The use of plants as a screen is a cost-effective, living, growing, and changing feature, while providing visual relief, softening harsh lines, or introducing vertical elements in the landscape.

**Privacy control**

Although privacy control is achieved through screening, there is a difference between the two. Screening allows free access to areas while inhibiting views, whereas privacy control secludes and differentiates areas for special use. This method of defining private outdoor areas, such as courtyards, terraces, or patios,

provides a cost-effective alternative to traditional construction materials.

### **Progressive realization**

Also known as “concealment and revealment,” this technique uses plant materials to create views of the landscape that promote wayfinding, enhance interest, and reveal changes in the natural or built environment in a progressive manner. This technique employs the elements of screening, enframing, and emphasis in the landscape.

### **Emphasis**

Plant materials may be used to signify special importance or significance of a location, a function, or a structure. Strategically placed plants or trees may add emphasis on an entranceway, delineate a path, or enhance the architectural elements of a building.

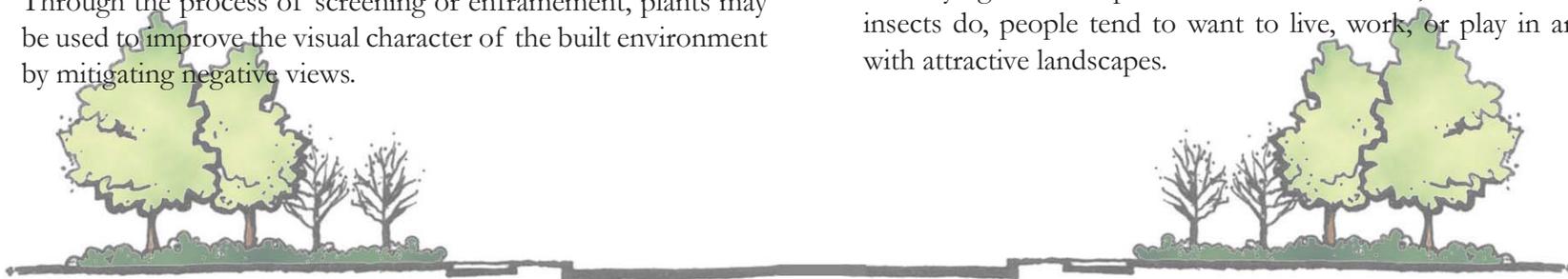
### **Enframing**

Views may be controlled through the placement of plant material to isolate or enhance elements within the landscape seen from afar or viewed within close proximity. As one moves through the landscape, trees and shrubs may be used to screen a view, until a significant or special view is revealed through an opening. These plants provide a foreground in which the view is framed. To illustrate an example on a smaller scale, a change of color, size, or texture of plants may call attention to a particular architectural feature, such as an entrance or a sign.

## **Aesthetic uses**

### **Improve unattractive views**

Through the process of screening or enframing, plants may be used to improve the visual character of the built environment by mitigating negative views.



### **Add texture, color, dimension**

Landscape design provides a transition from the colors, lines, and forms found in the built environment to the natural landscape. Plants and trees enhance the exterior of buildings, provide scenic relief along travel routes, and accent open areas with their natural beauty.

### **Control views**

The built environment often has undesirable views, from seas of cars in expansive parking lots to utilities assembled on the backsides of buildings. Landscaping helps to control these negative views and may contribute to enhancing positive views in the urban setting.

### **Complement architecture**

Carefully selected plants may reinforce the architectural design of a structure, helping to bring the design out into the landscape, while creating a transition from the built environment to the natural one. Individual architectural elements also may be enhanced by enframing or emphasizing the feature using color, line, texture, and size of plant materials.

### **Attract attention**

Landscaping may be used to attract attention to or away from elements, helping to control views, and emphasize important relationships or functions within the built environment. Colorful plantings, for example, may be used at the base of a sign to draw the eye to it.

### **Attract wildlife, butterflies, people**

Animals, insects, and humans alike are instinctively drawn to lushly landscaped areas, such as parks and gardens. Although not relying on these plants for shelter or food, as animals and insects do, people tend to want to live, work, or play in areas with attractive landscapes.

### **Unify elements of the built environment**

Trees, shrubs, and flowers may help establish visual links from one building, street, or neighborhood to another. Utilizing the principles of pattern, repetition, or rhythm, landscaping may hint at a relationship between elements, and provide a sense of continuity within the built environment.

### **Engineering uses**

#### **Soil erosion**

Roots from trees and plants help stabilize soils and reduce erosion, run-off, and flooding. Trees and shrubs provide barriers that deflect or hinder wind from eroding soils, preserving valuable topsoil in addition to minimizing dust or other particulates in the air.

#### **Acoustical control**

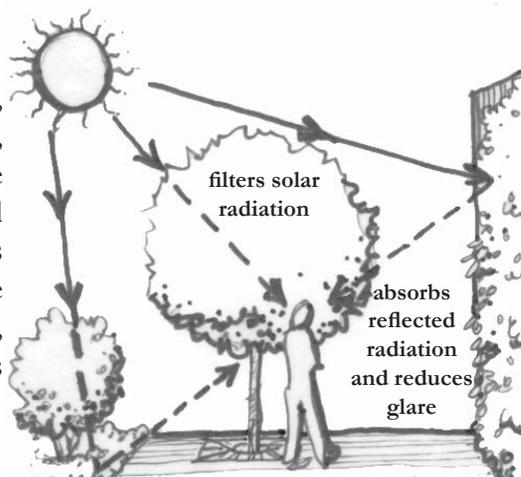
A buffer of plant materials may mask the perception of noise from traffic, wind, or other factors.

#### **Traffic control**

By considering predictable pedestrian and vehicular movement (cars, transit, bicycles, etc.) through the environment, circulation patterns can be planned for the creation of effective and aesthetic walks, drives, and other traffic ways. Landscape design helps provide visual indicators to direct people through the landscape, while also contributing to the visual appeal of the area.

#### **Glare and reflection control**

Based on height, density and location, trees can provide effective glare and reflection control as they screen or shade reflective surfaces, such as paved areas or building facades.



### **Climatological and ecological uses**

#### **Ecological**

Trees and landscaping provide habitat, food, and shelter for many species of animals, which in turn promote a healthy and balanced ecosystem.

#### **Atmospheric purification**

Trees remove pollutants from the air, such as ozone, chlorine, fluorine, sulphur dioxide, carbon, peroxyacetylnitrate (a component of smog), and other gasses. Through photosynthesis, plants use carbon dioxide and convert it into oxygen. As a result, approximately six kilograms of CO<sub>2</sub> is removed from the atmosphere for each city tree. In urban areas, where air pollutants are at their peak, trees are five to 15 times more beneficial than trees in rural areas for reducing air pollution. Trees also filter air-borne particulates, such as dust, pollen, and other particles that may cause health problems for people with allergies.

#### **Solar radiation control**

Trees, shrubs, and groundcovers absorb solar radiation by intercepting reflected radiation or shading direct radiation. A single tree or a grouping of plants may effectively reduce radiated heat from the sun in an economical and beneficial manner.



Trees provide shade and help keep structures cool in the summer

#### **Interception of solar radiation**

Trees may block or filter the sun's rays, depending on the foliage density, or layering of multi-storied trees. Street trees and parking lot trees help to absorb solar radiation, reducing heat from paved surfaces. When strategically placed around structures, trees can provide



Trees allow the sun's rays to warm structures in the winter

enough shade in the summer to significantly reduce cooling costs.

### **Reflection reduction**

Solar radiation that bounces off of reflective surfaces may be broken down as the rays filter through vegetation, thus decreasing the intensity of heat and light that is reflected.

### **Wind control**

Plants help to control prevailing summer and winter winds and reduce wind speed. The manner in which plants are placed or massed and the density of the vegetation can achieve different effects through obstruction, guidance, deflection, and filtration of the winds.

### **Precipitation control**

Moisture in the form of rain, fog, dew, etc. is intercepted by vegetation, which gathers, holds, and filters precipitation. In turn, temperatures and humidity levels are modified around vegetation.

## **Socioeconomic uses**

### **Economic**

The number, size, and species of plants can increase property values, in some cases by as much as 20 percent. On average, landscaping adds five to seven percent to the value of an average lot. Neighborhoods can boost their property values as a whole by planting street trees in each residential lot. Street tree planting will more than pay for itself in increased property values, particularly when done on a neighborhood-wide basis. Trees and other landscaping may help reduce energy costs associated with heating and cooling our buildings, as they provide shade from summer sun and insulate structures from winds in the winter. Fuel savings may reach 20 percent or more through the strategic placement of shade trees and evergreen barriers around buildings.

### **Psychological**

Trees, landscaping, and flowers improve the aesthetics of our environment, and therefore become positive contributions to human health and well-being. Hospitals, retirement facilities, and prisons are finding additional benefits from providing landscaping in courtyards in that recovery and rehabilitation rates increase where people can enjoy nature. Finally, pride in ownership, brought forth by pleasing surroundings, fosters a better social attitude and stewardship of the environment.

## **Educational uses**

### **Habitats for wildlife**

Landscaping provides natural settings that attract birds, insects, and a host of other wildlife. These places may be preserved or protected and serve as places to observe or study wildlife.

### **Biological principles**

Within the urban setting, highly landscaped areas can provide suitable areas for the observation of basic principles of biology, such as cell biology, principles of heredity, evolution, biological diversity, and ecology. These places are ideal for field trips and other educational opportunities.

### **Plant identification and horticultural practices**

Arboretums, parks, campuses, and nurseries provide wonderful opportunities to teach plant identification and horticultural practices to students and the public, providing public awareness and education about plants in the urban environment.

## **STREET TREES & SIDEWALKS**

### **Benefits of street trees in the urban environment**

The placement of trees along a street can significantly change the character of a location. From the driver's seat, street trees can help emphasize points of entry and frame or filter views along the street. The strategic placement of street trees can reduce the visual impact of large buildings, enhance smaller buildings, and help visually connect structures with each other. From a pedestrian's perspective, street

trees help soften the visual and audible impacts of cars, and provide physical separation between pedestrian and vehicular activity. This separation between a sidewalk and street gives a pedestrian a sense of comfort and safety, and the canopy of trees provides shade and protection from the elements.

Street trees can help an area develop a unique character based on the size, species, and spacing of trees. For example, canopies created by the arching branches of large trees help to frame a residential street and add beauty and charm to the streetscape year round. When trees are mirrored on the opposite side of the sidewalk, another canopy is created over a pedestrian's path. An effective streetscape can be achieved by planting trees at an appropriate distance based on the mature size of the species.



### **Sidewalks and trees in the urban environment**

Sidewalks are an integral part of the urban infrastructure that offer a necessary means for safe pedestrian circulation. It is important to promote their use by creating a comfortable and enjoyable route for their users. Trees planted next to sidewalks provide shade for pedestrians and habitat for wildlife while enhancing the urban environment. The aesthetic and environmental benefits of planting trees near sidewalks are clear, but one must consider the long-term care of the tree and maintenance of the sidewalk.

As trees mature and sidewalks age, the positive correlation between the two declines to a sometimes costly maintenance challenge. Tree roots that grow under sidewalks can crack, raise, or displace sections of sidewalk, creating possible tripping hazards. Several methods can be employed to repair this type of damage. If displacement is minor, the concrete can be ground flush with the existing sidewalk. However, this does not prevent new root growth from further raising the sidewalk. Another option would be cutting the roots and installing root barriers to prevent roots from growing back underneath the sidewalk. This option could only be successful if it ensured no risk to the health of the tree. The best practice for preventing sidewalk damage and maintaining a lush streetscape is to install root barriers at the time of tree planting.

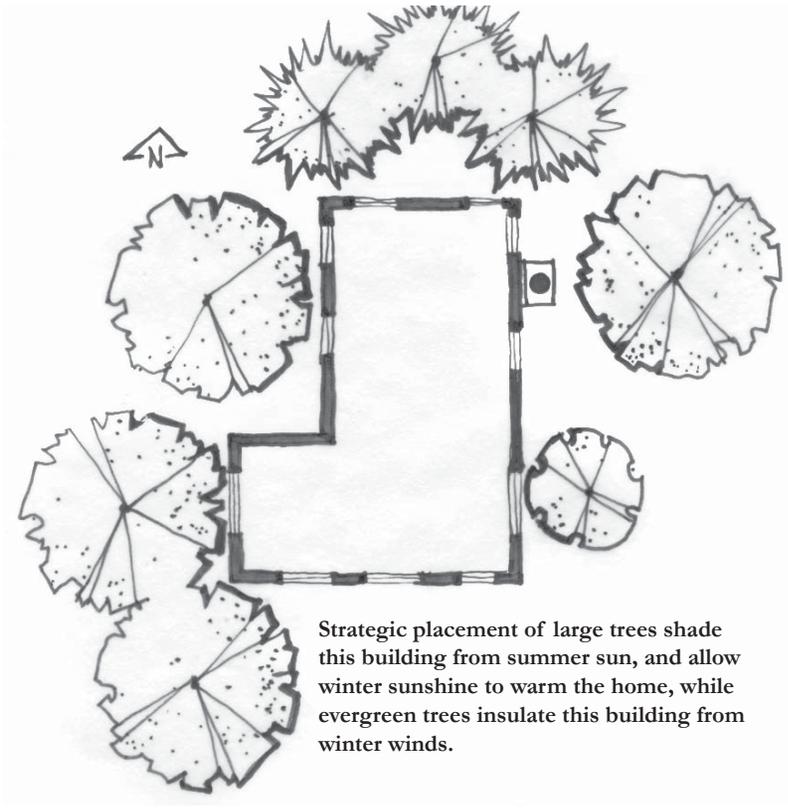
## **RESIDENTIAL LANDSCAPING**

There is no argument that attractive landscaping is one of the most valuable assets to the exterior of a home. Good landscaping has been credited with increasing property and resale values, and adds to the charm and character of a home, and in turn, the neighborhood. Conversely, poorly planned or implemented landscaping can negatively affect a home and cost the homeowner time and money.

### **Keys to smart design**

- Consider the shape of adjoining lawn areas resulting from the design of planting beds. Avoid creating acute angles in the lawn, curves that are too small for the turning radius of lawnmowers, and small segments that would be hard to mow and maintain.
- Place trees inside mulched garden beds wherever possible, and locate shrubs within a mulched planting bed. This will make mowing easier and contribute to the long-term health of the plant.
- Provide an edge for all garden beds with a barrier that keeps grass out and mulch in.
- Strategically place plantings around homes to help reduce heating and cooling costs. Deciduous trees planted on the west

side of homes help shade hot summer sun, while allowing winter sunlight to penetrate through the defoliated branches. Dense evergreen plantings act as a wind barrier and screen, protecting a home from the cooling effects of north winter winds and ice.



Strategic placement of large trees shade this building from summer sun, and allow winter sunshine to warm the home, while evergreen trees insulate this building from winter winds.

### Keys to smart planting

- Always purchase good quality and locally proven plants from a reputable source. Plants should be healthy and free of disease or defect.
- Select disease-resistant species to avoid using costly chemical applications.

- Locate plants with similar tolerances together to assist in care and maintenance regimens.
- Do not plant lawns in areas with heavy shade. Turf grass is hard to maintain in areas that receive less than four hours of sunlight per day. A low-maintenance groundcover that is tolerant of shade would be the most economical and practical design solution.
- Plant groundcovers instead of turf in areas with excessive slopes to reduce runoff and erosion.
- Plant exposed bed areas with dense groundcovers and mulch heavily to suppress weed growth.

### Keys to smart irrigation

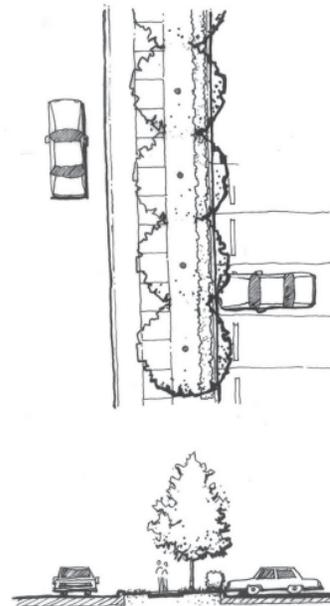
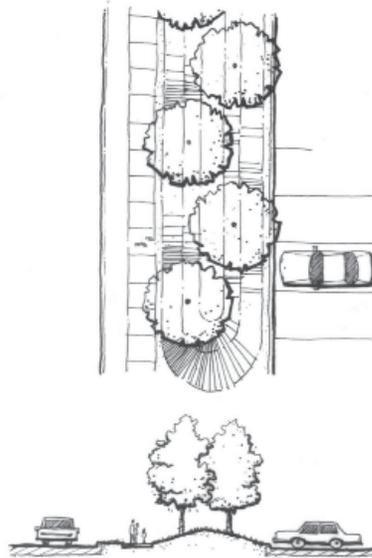
- Select drought-tolerant and low-water species to save time and money spent irrigating plants.
- Reduce mowing and fertilizer applications that stimulate growth and necessitate more irrigation.
- Concentrate any water-demanding plants to small focus areas.
- Install drip irrigation where possible.
- Do not over-design an in-ground irrigation system. Have a professional evaluate the landscape design to install the most efficient system possible.
- If an automatic irrigation system is in place, designate appropriate irrigation zones for the different water needs of turf areas and garden beds.
- Adjust all spray heads to minimize overspray on sidewalks, drives, and streets.
- Irrigate at appropriate times of the day. To reduce evaporation, avoid watering in the heat of the day or in high winds.

## COMMERCIAL & PARKING LOT LANDSCAPING

Commercial development and parking lots are a substantial and critical part of the urban fabric. However, large expanses of impervious materials, such as concrete and asphalt, have negative impacts on the environment; the creation of heat islands, the increase of stormwater runoff, and pollution of surface runoff. Therefore, it is beneficial for environmental and aesthetic reasons to employ smart and innovative design practices in conjunction with bringing nature back into the built environment.

### Planning better parking

The installation of plant materials in a parking lot involves a commitment to maintain a living and constantly evolving landscape. Unfortunately, parking lots are not an ideal place for trees and plants to thrive. Keeping plants hydrated and healthy can be a challenge, so the appropriate selection of low-maintenance and low-water plants is critical. Select a tree that does not have heavy fruit or seed production, does not have shallow roots or weak wood, and above all is drought and heat tolerant. Well-designed parking lots, planned in an environmentally friendly, economical, and functional manner, can achieve maximum commercial impact and minimal environmental disruption.



The long-term success of these parking lots can be assured by design elements that address the following:

### Tree cover

Providing adequate tree cover in parking lots

- reduces radiated and reflected heat;
- counters the creation of “heat islands;”
- provides shade that reduces temperatures in the interior of cars, and protects cars from damaging elements of the environment;
- reduces surface runoff;
- improves air quality; and
- visually breaks up the expanse of concrete.

### Creative parking lot design

#### *Parking groves*

Used in natural settings, such as parks, golf courses, and some sports complexes, this concept uses a grid of trees guarded by parking bollards to delineate parking stalls. Pockets of parking can be created within the grove of trees, which provides shade for cars. In turn, when cars are not present, it is not the image of an empty parking lot that is seen, but an attractively landscaped open space.

#### *Hybrid parking lots*

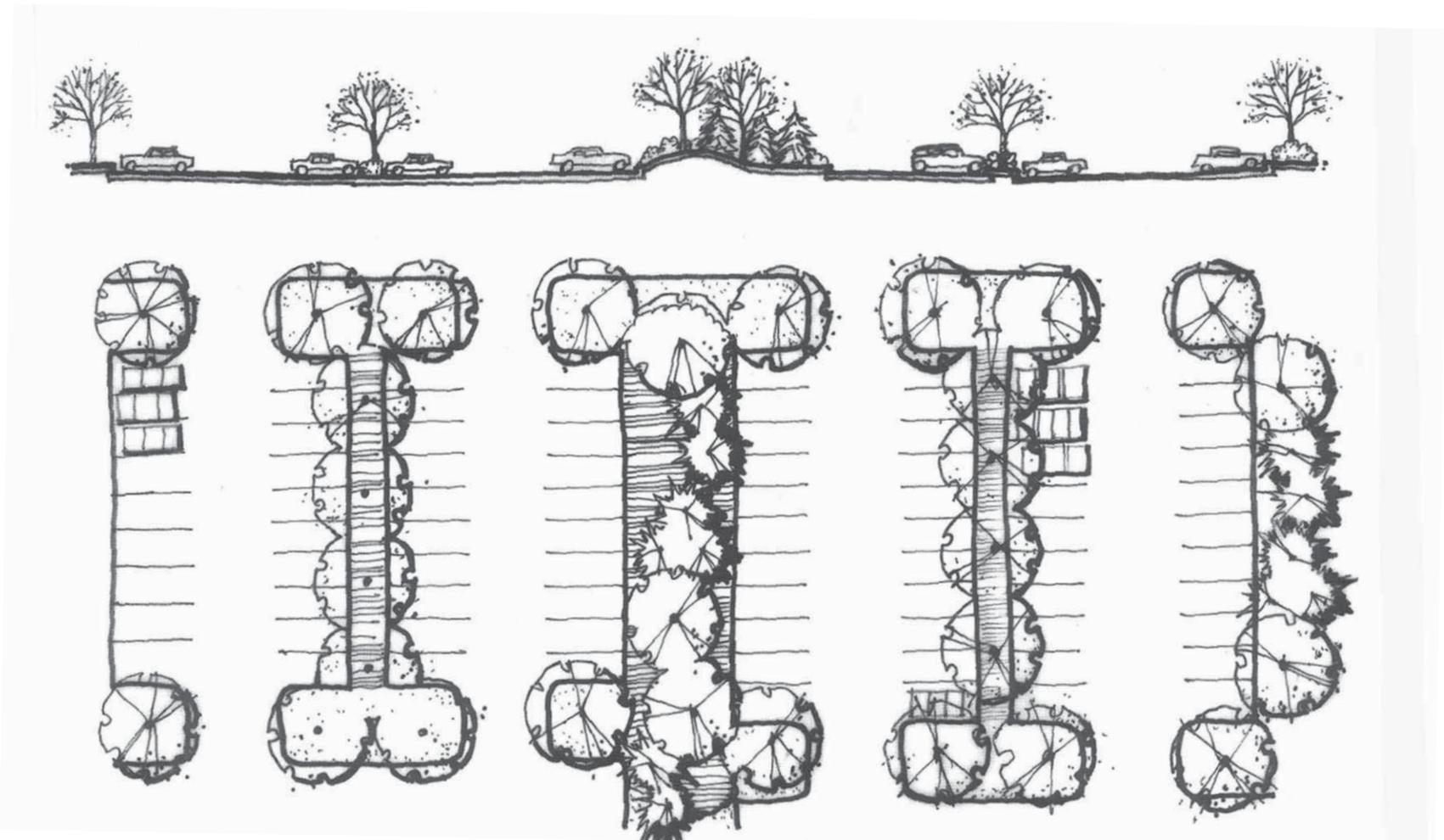
Combining two types of pavement to help reduce surface runoff, a hybrid parking lot uses permeable paving materials in parking stalls and impervious paving in parking aisles. This concept is beneficial in allowing water to percolate through the permeable paving in parking stalls into soils surrounding trees planted in parking islands and peninsulas. Depending on the amount of rainfall received, irrigation for parking lot plantings could be reduced or eliminated.

### **Overflow parking**

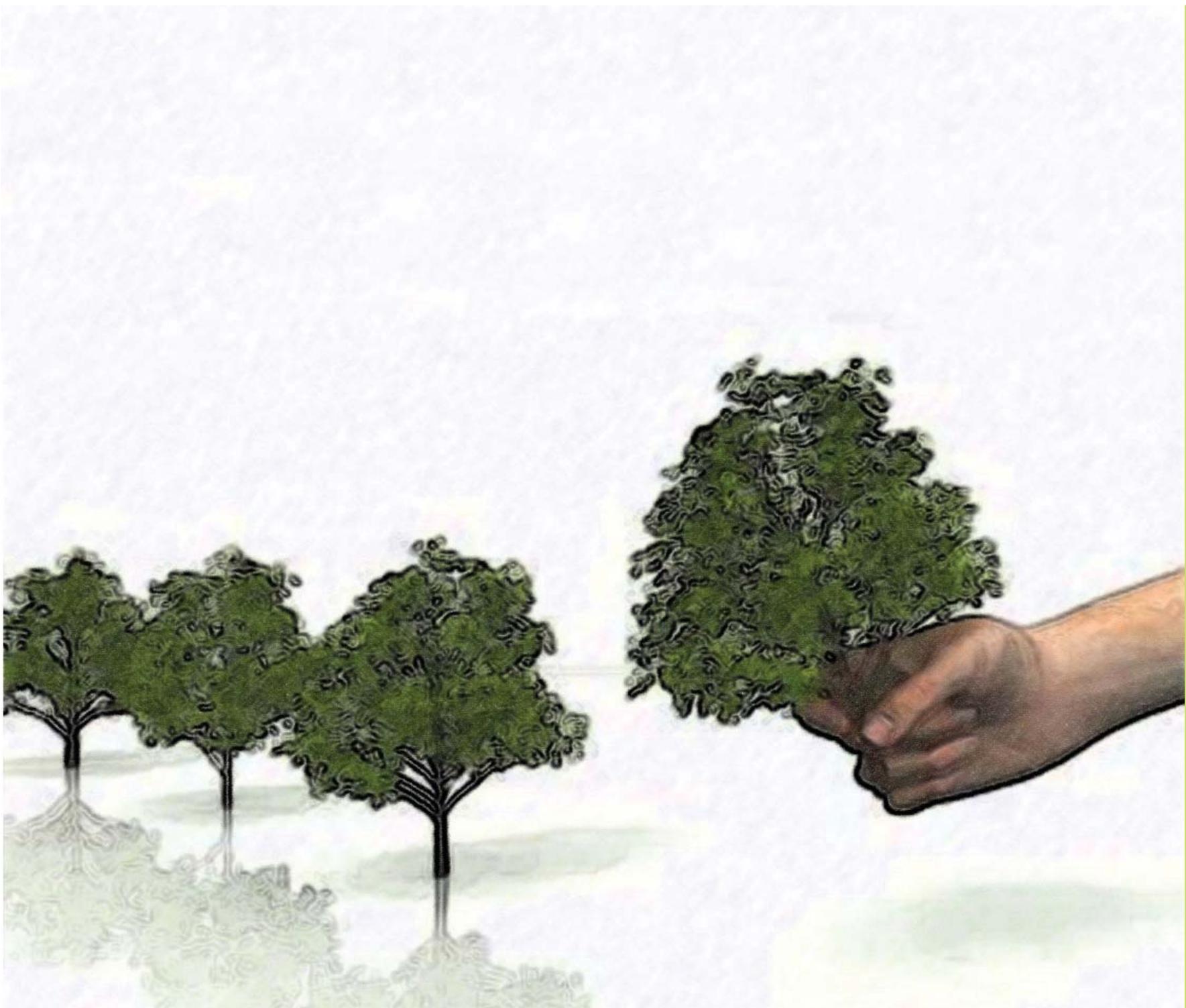
Typically, parking is constructed to accommodate peak demand. In most situations, peak parking is an infrequent occurrence, happening seasonally or only during special events. As parking use declines, the wear and tear of the lot declines. Therefore, different materials could be used to pave overflow parking, such as permeable materials to aid water conservation and produce greater aesthetic appeal. For example, turf block provides a firm foundation to park, yet allows grass to grow through, producing the look of a green lawn when cars are absent. In combination with trees planted throughout the turf block paved parking area, the lot could appear as attractive open space when not in use.

### **Vegetated swales**

Conventionally paved parking lots can incorporate smart stormwater management practices easily into their design. Vegetated swales are a very effective and low-maintenance strategy in large lots, and these pathways can be located along the perimeter of the lot, as well as within internal parking islands. The vegetation within them serves many purposes. It serves as a filter to trap pollutants that would otherwise wash into storm drains, slows runoff velocities, and reduces runoff volume. These pathways may also be designed as safe places for pedestrians to navigate through a parking area and provide space for trees to be planted.







**Choose Your Tree**

## PLANTS AT A GLANCE

This matrix will help you determine a suitable tree based on your site's conditions and the characteristics you are looking for in a tree. Trees that are suitable to the conditions listed in the top row are identified with a dot in the matrix. The top row lists those variables, and the column on the left lists trees alphabetically by their scientific name. The second column, Tree Type, references the tree's size, if it is deciduous or evergreen, and page number where it can be found.

### Tree Type Legend

- LD = Large Deciduous
- MD = Medium Deciduous
- SD = Small Deciduous
- LE = Large Evergreen
- ME = Medium Evergreen
- SE = Small Evergreen

TREE NAME Scientific (Common)	TREE TYPE (Page #)	CULTURAL CONDITIONS						EXPOSURE		PROBLEMS		DESIGN USE						COLOR		
		Light Shade	Poor soils	Alkaline Soils	Drought	Moist Sites	Excessive Heat	Sheltered	Exposed	Pests / Disease	Litter	Street Tree	Parking Lot	Shade Tree	Ornamental	Residential	Rural	Showy Blooms	Showy Foliage	Fall Color
<i>Acer campestre</i> (Hedge Maple)	MD (50)	•				•			•			•		•	•	•	•			•
<i>Acer saccharum</i> 'Caddo' (Caddo Maple)	MD (51)				•				•			•	•	•		•	•			•
<i>Acer tataricum</i> ssp. <i>ginnala</i> (Amur Maple)	SD (66)	•	•	•	•								•		•					•
<i>Acer truncatum</i> (Shantung Maple)	MD (52)					•						•		•		•	•			•
<i>Alnus maritima</i> (Seaside Alder)	SD (67)		•			•									•					
<i>Amelanchier arborea</i> (Serviceberry)	SD (68)	•				•		•							•	•		•	•	•
<i>Asimina triloba</i> (Pawpaw)	SD (69)	•				•		•			•			•	•		•	•	•	•
<i>Betula nigra</i> (River Birch)	MD (53)	•				•						•		•	•		•			•
<i>Bumelia lanuginosa</i> (Chittamwood)	MD (54)		•	•	•									•		•				
<i>Calocedrus decurrens</i> (Incense Cedar)	LE (88)		•	•	•				•								•			
<i>Castanea mollissima</i> (Chinese Chestnut)	MD (55)		•	•	•	•	•		•		•		•			•		•	•	•
<i>Cedrus atlantica</i> (Atlas Cedar)	LE (89)		•	•	•		•		•			•		•		•		•	•	
<i>Cedrus deodara</i> (Deodar Cedar)	LE (90)		•	•	•	•			•			•	•		•	•		•	•	

TREE NAME Scientific (Common)	TREE TYPE (Page #)	CULTURAL CONDITIONS						EXPOSURE		PROBLEMS		DESIGN USE						COLOR		
		Light Shade	Poor soils	Alkaline Soils	Drought	Moist Sites	Excessive Heat	Sheltered	Exposed	Pests / Disease	Litter	Street Tree	Parking Lot	Shade Tree	Ornamental	Residential	Rural	Showy Blooms	Showy Foliage	Fall Color
<i>Cedrus libani</i> (Cedar of Lebanon)	LE (91)		●	●	●			●								●				
<i>Celtis occidentalis</i> (Hackberry)	LD (34)		●	●	●	●		●				●				●				
<i>Cercis canadensis</i> (Redbud)	SD (70)	●	●		●	●		●						●	●		●			
<i>Chilopsis linearis</i> (Desert Willow)	SD (71)		●	●	●				●						●		●			
<b>X</b> <i>Chitalpa tashkentensis</i> (Chitalpa)	SD (72)		●	●	●				●		●		●	●	●	●	●	●	●	
<i>Cotinus coggygria</i> (Smoketree)	SD (73)		●	●	●									●			●	●	●	
<i>Crataegus crus-galli</i> var. <b>Inermis</b> (Thornless Cockspur Hawthorn)	SD (74)		●	●	●	●				●				●	●		●			
<i>Crataegus phaenopyrum</i> (Washington Hawthorn)	SD (75)	●	●	●	●	●		●		●	●			●	●		●			
<i>Cupressus arizonica</i> (Arizona Cypress)	ME (98)		●	●	●				●			●		●		●		●		
<i>Diospyros kaki</i> (Oriental Persimmon)	SD (76)		●	●	●	●	●				●				●				●	
<i>Elaeagnus angustifolia</i> (Russian Olive)	SD (77)		●	●	●				●					●	●	●		●		
<i>Euonymus bungeana</i> (Winterberry Euonymus)	SD (78)		●	●	●				●					●	●				●	
<i>Ginkgo biloba</i> (Ginkgo)	LD (35)				●	●			●			●	●		●				●	
<i>Gleditsia triacanthos</i> (Thornless Honeylocust)	LD (36)	●	●	●	●				●		●		●			●				
<i>Gymnocladus dioica</i> (Kentucky Coffeetree)	LD (37)		●	●	●				●		●					●				
<i>Ilex decidua</i> (Deciduous Holly)	SD (79)	●	●	●	●	●				●				●	●				●	

# Choose Your Tree

TREE NAME Scientific (Common)	TREE TYPE (Page #)	CULTURAL CONDITIONS						EXPOSURE		PROBLEMS		DESIGN USE						COLOR		
		Light Shade	Poor soils	Alkaline Soils	Drought	Moist Sites	Excessive Heat	Sheltered	Exposed	Pests / Disease	Litter	Street Tree	Parking Lot	Shade Tree	Ornamental	Residential	Rural	Showy Blooms	Showy Foliage	Fall Color
<i>Ilex vomitoria</i> (Yaupon Holly)	SE (101)	●	●		●	●								●	●					
<i>Ilex x attenuata</i> (Foster Holly)	SE (102)	●												●	●					
<i>Ilex x Nellie R. Stevens</i> (Nellie R. Stevens Holly)	SE (103)	●	●	●	●	●	●	●	●			●	●	●	●	●				
<i>Juniperus chinensis</i> 'Torulosa' (Hollywood Juniper)	SE (104)		●	●	●		●		●	●				●	●					
<i>Juniperus virginiana</i> (Eastern Redcedar)	ME (99)		●		●		●		●						●	●				
<i>Koelreuteria paniculata</i> (Panicked Golden Raintree)	MD (56)		●	●	●				●	●		●		●	●		●		●	
<i>Lagerstroemia indica</i> (Crapemyrtle)	SD (80)		●	●	●									●	●		●		●	
<i>Liquidambar styraciflua</i> (Sweetgum)	LD (38)					●			●		●		●		●	●			●	
<i>Maclura pomifera</i> (Osage Orange)	LD (39)		●	●	●				●		●		●			●			●	
<i>Magnolia grandiflora</i> 'Little Gem' (Little Gem Magnolia)	SE (105)	●				●		●			●			●	●		●	●		
<i>Magnolia x soulangiana</i> (Saucer Magnolia)	SD (82)	●				●		●			●			●	●		●			
<i>Malus spp.</i> (Flowering Crabapple)	SD (83)								●	●				●	●		●		●	
<i>Morus alba</i> 'Fruitless' (Fruitless Mulberry)	MD (57)		●	●	●	●			●		●		●			●				
<i>Parrotia persica</i> (Parrotia)	MD (58)	●			●		●		●			●	●	●	●			●	●	
<i>Pinus bungeana</i> (Lacebark Pine)	ME (100)							●		●	●		●	●	●					
<i>Pinus elliottii</i> (Slash Pine)	LE (92)	●	●		●	●				●	●		●		●	●				

TREE NAME Scientific (Common)	TREE TYPE (Page #)	CULTURAL CONDITIONS						EXPOSURE		PROBLEMS		DESIGN USE						COLOR		
		Light Shade	Poor soils	Alkaline Soils	Drought	Moist Sites	Excessive Heat	Sheltered	Exposed	Pests / Disease	Litter	Street Tree	Parking Lot	Shade Tree	Ornamental	Residential	Rural	Showy Blooms	Showy Foliage	Fall Color
<i>Pinus ponderosa</i> (Ponderosa Pine)	LE (93)		●		●			●	●	●						●				
<i>Pinus taeda</i> (Loblolly Pine)	LE (94)		●		●			●	●	●					●	●				
<i>Pinus thunbergii</i> (Japanese Black Pine)	LE (95)		●		●			●	●	●					●	●				
<i>Pistacia chinensis</i> (Chinese Pistache)	LD (40)		●			●		●			●	●	●		●					
<i>Platanus x acerifolia</i> (London Planetree)	LD (41)	●	●	●	●	●		●		●	●	●				●				
<i>Populus deltoides</i> (Cottonwood)	LD (42)		●	●	●	●		●					●			●			●	
<i>Prunus caroliniana</i> (Cherry Laurel)	SE (106)	●	●	●	●	●				●	●	●	●	●	●	●	●			
<i>Prunus cerasifera</i> (Purpleleaf Plum)	SD (84)			●				●		●				●	●		●	●		
<i>Prunus x cistena</i> (Purpleleaf Sand Cherry)	SD (85)		●		●	●				●	●			●	●		●	●	●	
<i>Pyrus calleryana</i> (Callery Pear)	MD (59)		●	●	●			●				●		●	●		●		●	
<i>Quercus acutissima</i> (Sawtooth Oak)	MD (60)		●		●			●			●		●		●	●			●	
<i>Quercus macrocarpa</i> (Bur Oak)	LD (43)		●	●	●			●				●				●				
<i>Quercus muehlenbergii</i> (Chinkapin Oak)	LD (44)		●	●	●			●				●			●	●			●	
<i>Quercus nigra</i> (Water Oak)	LD (45)		●					●				●	●			●				
<i>Quercus shumardii</i> (Shumard Oak)	LD (46)	●	●		●			●				●	●			●			●	
<i>Quercus virginiana</i> (Live Oak)	LE (96)	●	●		●		●					●			●	●				
<i>Sapindus drummondii</i> (Western Soapberry)	MD (61)		●	●	●			●				●	●			●			●	

# Choose Your Tree

TREE NAME Scientific (Common)	TREE TYPE (Page #)	CULTURAL CONDITIONS						EXPOSURE		PROBLEMS		DESIGN USE						COLOR		
		Light Shade	Poor soils	Alkaline Soils	Drought	Moist Sites	Excessive Heat	Sheltered	Exposed	Pests / Disease	Litter	Street Tree	Parking Lot	Shade Tree	Ornamental	Residential	Rural	Showy Blooms	Showy Foliage	Fall Color
<i>Styphnolobium japonicum</i> (Japanese Pagoda Tree)	MD (62)							•				•			•					
<i>Taxodium distichum</i> (Baldcypress)	LD (47)				•	•			•			•		•		•				•
<i>Thuja occidentalis</i> (Eastern Arborvitae)	SE (107)	•			•	•	•	•		•				•	•					
<i>Tilia cordata</i> 'Greenspire' (Greenspire Linden)	MD (63)					•		•				•		•	•					
<i>Ulmus crassifolia</i> (Cedar Elm)	MD (64)	•	•	•	•	•	•		•			•	•	•	•	•				
<i>Ulmus parvifolia</i> (Lacebark Elm)	LD (48)		•	•	•	•	•		•				•	•	•					
<i>Viburnum rufidulum</i> (Rusty Blackhaw)	SD (86)	•	•	•	•		•	•	•			•	•	•	•	•	•	•	•	•
<i>Zelkova serrata</i> (Japanese Zelkova)	LD (49)	•	•			•			•			•		•	•					
<i>Zizyphus zizyphus</i> (Jujube)	MD (65)	•	•	•	•		•	•	•	•	•			•		•				•

# BLOOM SCHEDULE

## Flowering and Ornamental Trees

Scientific Name (Common Name)	SPRING March 20 - June 20				SUMMER June 21 - September 21				FALL September 22 - December 20			
	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
<i>Amelanchier arborea</i> (Serviceberry)												
<i>Asimina triloba</i> (Pawpaw)												
<i>Cercis canadensis</i> (Redbud)												
<i>Chilopsis linearis</i> (Desert Willow)												
X <i>Chitalpa tashkentensis</i> (Chitalpa)												
<i>Cotinus coggygria</i> (Smoketree)												
<i>Crataegus crus-galli</i> var. <i>Inermis</i> (Thornless Cockspear Hawthorn)												
<i>Crataegus phaenopyrum</i> (Washington Hawthorn)												
<i>Koelreuteria paniculata</i> (Panicled Golden Raintree)												
<i>Lagerstroemia indica</i> (Crapemyrtle)												
<i>Magnolia grandiflora</i> 'Little Gem' (Little Gem Magnolia)												
<i>Magnolia x soulangiana</i> (Saucer Magnolia)												
<i>Malus spp.</i> (Flowering Crabapple)												
<i>Prunus caroliniana</i> (Cherry Laurel)												
<i>Prunus cerasifera</i> (Purpleleaf Plum)												
<i>Prunus x cistena</i> (Purple Sand Cherry)												
<i>Pyrus calleryana</i> (Callery Pear)												
<i>Viburnum rufidulum</i> (Rusty Blackhaw Viburnum)												

Choose Your Tree



## DECIDUOUS TREES

Deciduous trees, also referred to as “hardwoods,” shed their leaves during part of the year, usually the cold or dry season, and produce new leaves in the next growing season. The characteristics that make deciduous trees so remarkable are their wide range of sizes, coloration, and shape (form). Leaf color of deciduous trees can range across the spectrum of greens, yellows, oranges, reds, purples, and browns. The size of deciduous trees may vary from 15 feet at maturity to well over 100 feet tall. This chapter provides an array of deciduous trees to consider within three categories based on the average height they may be expected to reach at maturity:

- Large = over 50’ in height
- Medium = between 25’ and 50’
- Small = below 25’

The title of each page contains the scientific name in italics, and the common name of the tree below. Sometimes we recommend a special variety, or “cultivar,” of a tree. Cultivars are shown at the end of the scientific name in single quotes. The tree’s basic characteristics are described at the top of each page, and some trees include a list of special cultivars to consider. You can read in more detail about each tree in the text that follows.

Maples and oaks are two common types of deciduous trees that have several species from which to choose.

You can read more about them on the following pages:

### Maples

Amur maple.....	66
Caddo maple .....	51
Hedge maple .....	50
Shantung maple .....	52

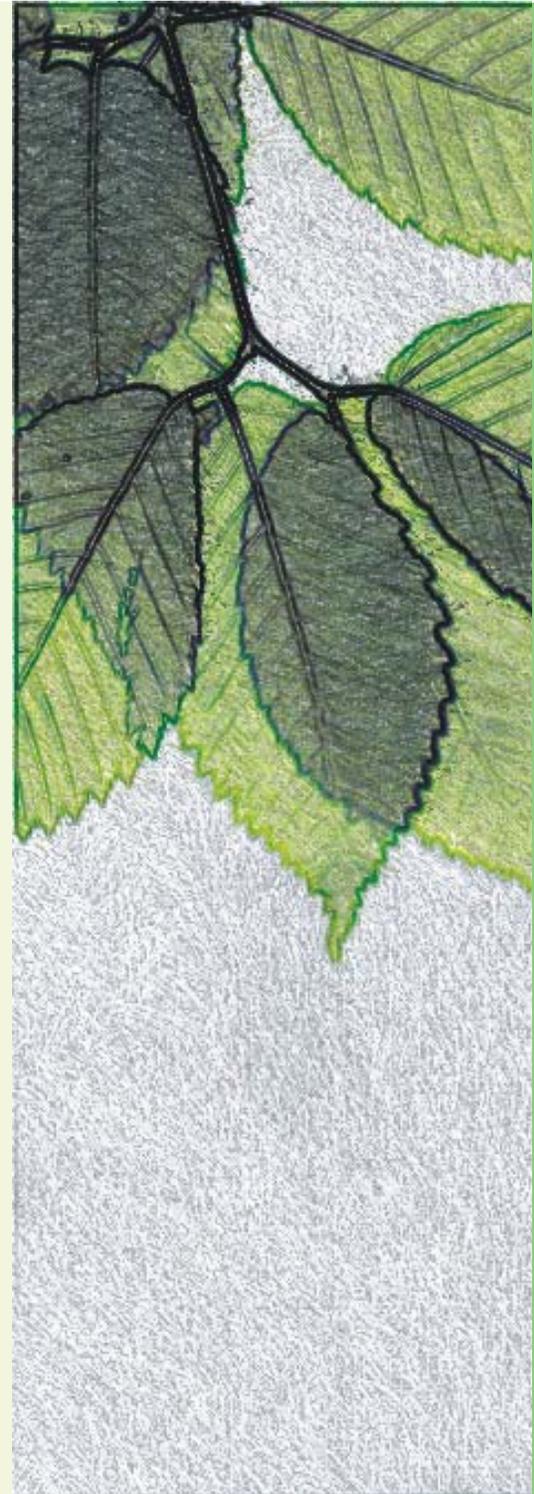
### Oaks

Bur oak.....	43
Chinkapin oak.....	44
Sawtooth oak.....	60
Shumard oak .....	46
Water oak.....	45

*Scientific name ‘Cultivar’*

Common Name

Mature Height  
Spread  
Growth Rate  
Exposure  
Flower  
Fruit  
Color  
Cultivars





## *Celtis occidentalis* Hackberry

<b>Mature Height (ft.):</b>	<b>40 to 90</b>
<b>Spread (ft.):</b>	<b>30 to 40</b>
<b>Growth Rate:</b>	<b>Moderate</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Male and female on same tree (not showy)</b>
<b>Fruit:</b>	<b>Small purple-black berries in summer</b>
<b>Color:</b>	<b>Medium to dark green, pale yellow in fall</b>
<b>Cultivars:</b>	<b>'Magnifica'; 'Prairie Pride'</b>

Of considerable merit for its endurance and tolerance to a wide range of conditions, this tree is a good selection for general planting. It is tolerant of wind, drought, and moisture extremes. Hackberry is a durable, low-maintenance tree that provides abundant shade. This is one of the last trees to leaf out in the spring, and one of the first trees to defoliate in the fall. Fruits can be messy when dropped on pavement or sidewalks. Volunteer trees can also be a problem, so be sure to select a location that will maximize this hardy tree's impact while minimizing maintenance. A close relative to hackberry is sugarberry, which is thought to be a superior tree. There is arguably no tougher tree to survive Oklahoma's drought or extreme temperature fluctuations than hackberry.

A notable characteristic of the tree is the unusual, coarse texture of its mature bark, often covered with numerous warty knots. Also adding to the character of the tree is its tendency to develop leaf gall (small protrusions caused by tiny insects) and "Witches Broom," a pest that causes young branches to grow in clusters. Neither of these pests adversely affects the health of the tree, but some consider the tree's response to them unattractive. Fortunately, the 'Prairie Pride' cultivar, which is resistant to "Witches Broom," is available.

# *Ginkgo biloba*

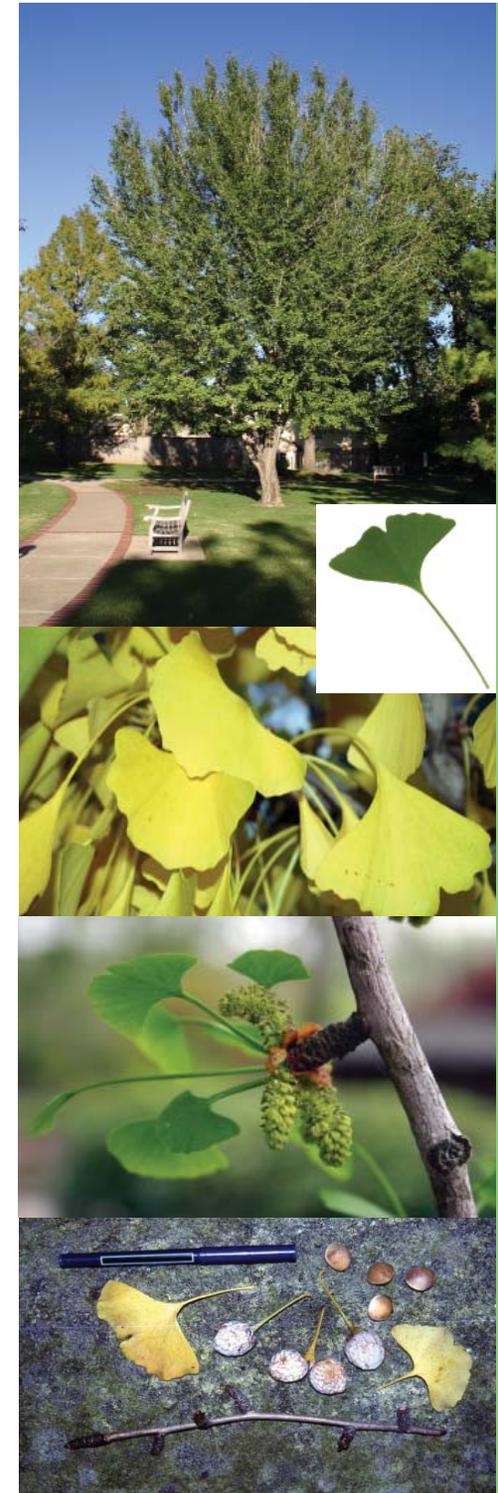
## Ginkgo

<b>Mature Height (ft.):</b>	<b>80 to 100</b>
<b>Spread (ft.):</b>	<b>Variable</b>
<b>Growth Rate:</b>	<b>Slow</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Male and female on separate trees (not showy)</b>
<b>Fruit:</b>	<b>One inch diameter, foul smelling fruits (female trees should be avoided)</b>
<b>Color:</b>	<b>Medium green, golden yellow in fall</b>
<b>Male Cultivars:</b>	<b>'Princeton Gold'; 'Princeton Sentry'; 'Autumn Gold'; 'Pendula'</b>

*Ginkgo biloba* is one of the oldest living tree species. Individual ginkgo trees have been documented to live for over 1,000 years. In China, extracts of ginkgo tree have been used for over 5,000 years as a remedy for various ailments, and have recently come to be used widely in the west. Apart from its merit as a medicinal tree, ginkgo is not for general use. Its slow growth rate is often a deterrent when selecting a large tree for the urban setting. Due to the messy nature and disagreeable smell of the fruits produced by females, male trees are recommended. However, males are grafted in a nursery, often increasing the cost of this tree.

Ginkgo is unique; not only for the distinct fan-shape of its leaves or incredible lifespan, but also in its classification. Although more like a conifer than a broadleaf deciduous tree, ginkgo is neither. In recent years, it has been placed in a separate group of its own.

Because ginkgo tolerates a wide range of urban conditions, including ozone and sulphur dioxide pollution, elevated levels of carbon dioxide, fire, smoke, heat, and confined root systems, theoretically it is an ideal street tree. Its durable wood is resistant to breakage from ice and harsh winds. It is particularly resistant to insect pests as well as fungal and bacterial diseases, therefore it rarely requires spraying. However, this tree may show signs of chlorosis in high pH soils and suffers in areas where moisture is limited. It may be used for planting as a shade tree in parks, and it establishes well in gardens. When planted in the proper environment, it is a stately and remarkable tree.



Large Deciduous

Choose Your Tree



## *Gleditsia triacanthos* Honeylocust

<b>Mature Height (ft.):</b>	60 to 80
<b>Spread (ft.):</b>	30 to 50
<b>Growth Rate:</b>	Moderate to fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	Male and female on separate trees (not showy)
<b>Fruit:</b>	Long, flat seedpods (female trees should be avoided)
<b>Color:</b>	Medium green, yellow in fall
<b>Cultivars:</b>	'Inermis'; 'Moriane'; 'Sunburst'; 'Ruby Lace'

Although honeylocust is native to rich streambeds in the eastern U.S., it is extremely versatile, adapting to extreme conditions from drought to moisture, alkaline to acid soils. Although it may be one of the more adaptable native trees, it has not proven to be an extremely long-lived tree, only surviving up to 30 years in the urban environment. It may suffer from many insect problems along with canker and root rot. Honeylocust is often used in shelterbelts and windbreaks due to this tolerance of very poor soils and harsh environments.

There are aesthetic merits to this tree, such as its lacy-textured leaves and peeling bark. Because the feathery compound leaves cast filtered shade, shrubs and turf may be grown beneath honeylocust's canopy. After the display of yellow fall color, the leaves decompose rapidly after falling. To be noted, the female honeylocust produces large flat seedpods that add to the tree's bad reputation for litter. In addition, the wood of this tree may be brittle and weak, causing it to be somewhat messy. Improved species of honeylocust exist that should be used over the parent plant. 'Skyline' and 'Shademaster' are two cultivars that are both thornless and male.

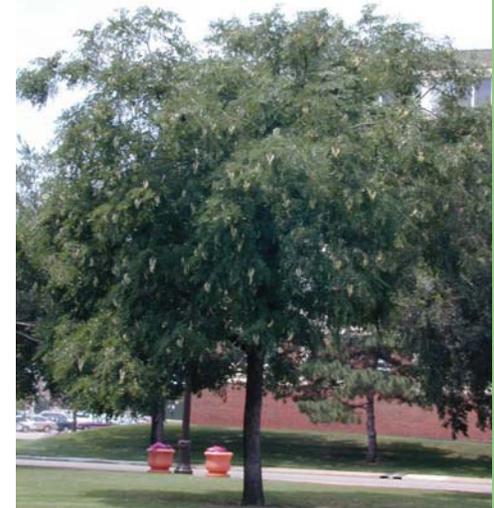


## *Gymnocladus dioica* Kentucky Coffeetree

<b>Mature Height (ft.):</b>	60 to 80
<b>Spread (ft.):</b>	30 to 50
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	Male and female on separate trees (not showy)
<b>Fruit:</b>	Large seedpods, remaining on tree into winter, seeds and pulp slightly poisonous (recommend male trees)
<b>Color:</b>	Medium gray-green, yellow in fall
<b>Cultivars:</b>	'Espresso'; Prairie Titan® ('J.C. McDaniel'); 'Stately Manor'; 'Variegatus'

The Kentucky coffeetree is a durable, rugged tree with a beautiful, delicate appearance. This tree grows native in the rich soils of the bottomlands of the Midwest, yet also tolerates the poorest soil conditions. This tree is not easily transplanted. The compound leaf and small leaflets cast a loose, filtered shade, making the understory of this tree an ideal place for shrubs and turf.

Further merits of this tree include durable wood, attractive form, picturesque winter silhouette, and unusual color and texture. This tree is notably resistant to disease and pests. Female trees produce large seedpods that remain on the tree into the winter months. The seeds and pith of the fruits can be poisonous, and have been known to leech toxins into sources of water from which livestock or other animals may drink. Therefore, male trees, such as 'Espresso,' are recommended in areas near livestock.



Large Deciduous

Choose Your Tree



## *Liquidambar styraciflua* Sweetgum

<b>Mature Height (ft.):</b>	<b>80 to 100</b>
<b>Spread (ft.):</b>	<b>40 to 60</b>
<b>Growth Rate:</b>	<b>Moderate to fast</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Male and female on same tree (not showy)</b>
<b>Fruit:</b>	<b>Round spiny seed encasement, 1½ inches in diameter on fruiting trees (recommend fruitless varieties)</b>
<b>Color:</b>	<b>Deep green, yellow/orange/red/purple in fall</b>

An excellent tree for its outstanding fall color, the sweetgum is a moderately fast-growing tree with moderately durable wood and a dignified pyramidal form. Unfortunately, this tree is not for every site. This species requires a good soil quality with considerable moisture, and does not tolerate periods of drought. This is not a suitable tree for tight clay soils, compacted soils, or disturbed sites. It is a good specimen to be planted around water features, along streams and other areas of considerable moisture, but does not perform well in urban areas. Often found in the wild along with the sweetgum is the blackgum (*Nyssa sylvatica*), also known as the sourgum. Also preferring moist soils, blackgum provides better fall color than sweetgum, but is slightly harder to grow.

Sweetgum's wood is moderate in strength and may break under the strain of ice or from intense winds. The dense shade cast by this tree may impede the growth of grass and understory plantings. In conjunction with the difficulty of maintaining turf under the canopy of the tree, roots of sweetgum may surface, which may pose maintenance and safety concerns. The fruiting sweetgum will produce a hard, spiny fruit that is painful to step on barefooted, and can quickly dull or damage lawnmower blades. For this reason, the fruitless variety is recommended. Proper site selection is key to ensuring the health and vitality of the tree, and providing satisfaction to its owner.

## *Maclura pomifera* Osage Orange

<b>Mature Height (ft.):</b>	40 to 60
<b>Spread (ft.):</b>	40 to 50
<b>Growth Rate:</b>	Fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	Male and female on separate tree (not showy)
<b>Fruit:</b>	Large green ball (four to five inch diameter) dropping in fall (recommend planting male trees only)
<b>Color:</b>	Dark glossy green, bright yellow in fall
<b>Cultivars:</b>	'Chetopa'; 'Double O' var. <i>inermis</i> ; 'Park'; 'Pawhuska'; 'White Shield'; 'Wichita'

The Osage orange is widely adaptable to different planting conditions, and will tolerate the poorest of soils and drought. Its wood is extremely strong and durable and is resistant to pests, wind, ice, and decay. A factor to consider in locating this tree in the landscape or urban setting is the fact that its roots grow shallow, often competing with turf and other plants. Because this tree will tolerate harsh conditions, a thornless male Osage orange could be used as a street tree or planted in a location where turf will not be adversely affected.

Often overlooked as a viable tree selection for urban areas because of its enormous fruits, Osage orange is a beautiful, hearty specimen. Also known as “hedge apple,” “horse apple,” or “Bois d’Arc,” the female Osage orange produces messy, green sap-filled fruits that resemble a large orange in size and texture. Thorns are another deterrent for using this tree in public areas. Fruitless and thornless cultivars, such as ‘Pawhuska’ and ‘Chetopa’ are available, and should be considered for the urban environment. Another thornless male cultivar, named ‘Park’ may develop small thorns in its adolescence that will disappear with age.



Large Deciduous

Choose Your Tree



## *Pistacia chinensis* Chinese Pistache

<b>Mature Height (ft.):</b>	40 to 60
<b>Spread (ft.):</b>	40 to 50
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	Male and female on separate trees (not showy)
<b>Fruit:</b>	Small red drupe turning blue-purple in late fall
<b>Color:</b>	Medium to dark green, orange / red in fall



Noted for its seasonal color, Chinese pistache displays fall colors of orange, red, and crimson rivaling the sugar maple. Its medium-textured foliage casts heavy shade that may inhibit growth of turf beneath the canopy. At maturity, its beautifully rounded crown grows very dense and may screen objects from view. Proper pruning of young trees will improve both form and long term health of the tree. It is a long-lived, winter hardy shade tree with extremely hard, durable wood. This characteristic helps protect the tree from decay, wind, ice, and vandal injury.

Like most trees, Chinese pistache does best in moist, well-drained soils; additionally, it is remarkably heat and drought resistant and will tolerate a wide range of conditions - even rocky, highly alkaline, and horribly abused soils. Regarded as one of the most beautiful pest and maintenance-free shade trees for the southwest, Chinese pistache has unlimited potential. It is an exceptional large ornamental tree that is suitable for residential, commercial, and municipal properties as well as campuses, golf courses, and as a street tree. When considering if Chinese pistache is right for your site, be sure to keep in mind that seeds disbursed by wildlife may produce unwanted seedlings in extensive shrub and groundcover areas.

# *Plantanus x acerifolia*

## London Planetree

<b>Mature Height (ft.):</b>	80 to 100
<b>Spread (ft.):</b>	100 to 125
<b>Growth Rate:</b>	Fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	Male and female on same tree (not showy)
<b>Fruit:</b>	Conglomerate of cottony seeds in 1½ inch balls, two or more on a single stem, dropping in late spring
<b>Color:</b>	Medium green, coppery fall color
<b>Cultivars:</b>	'Bloodgood'; 'Columbia'; 'Liberty'; 'Mirkovec'; 'Saratoga 86-336-C'; 'Yarwood'

Often mistaken for sycamore, the London planetree is a hybrid between the American planetree and the Oriental planetree. This species is resistant to a common disease of sycamores called Anthracnose. Similar in appearance and adaptability to sycamore, London planetree is slightly smaller, has a smoother leaf surface, and often has two fruits per stem in comparison to one. The fruits of London planetrees can be rather messy, as can the large leaves and peeling bark, which do not disintegrate easily. Ironically, these features of the tree contribute to its appeal.

Massive in size and reach, the mature London planetree develops multi-colored peeling bark, revealing tones of green, silver, and brown. The sizeable leaves fragment light into a sun-dappled shade that is ideal for shade-loving plants. As long as this tree is planted in a location with ample moisture at the roots, it will tolerate moderately poor soils and drying winds. This tree is not for every site, and it should be planted in areas where there is sufficient space to accommodate its enormous stature. This tree is not suitable for planting on small lots.



Large Deciduous

Choose Your Tree



## ***Populus deltoides* ‘Cottonless’ Cottonwood**

<b>Mature Height (ft.):</b>	<b>80 to 100</b>
<b>Spread (ft.):</b>	<b>40 to 60</b>
<b>Growth Rate:</b>	<b>Fast</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Male and female on separate trees (not showy)</b>
<b>Fruit:</b>	<b>Female trees produce cotton-like mass containing many small seeds (recommend male trees)</b>
<b>Color:</b>	<b>Deep green, bright yellow in fall</b>
<b>Other Cultivars:</b>	<b>‘McHenry’; ‘Souixland’</b>

Cottonwood trees are native to areas of considerable moisture, such as stream banks and river bottoms. Although they are not drought resistant, they will tolerate dry conditions for a short period. Cottonwood is a majestic, massive tree with aesthetic appeal. Its leaves are attached on long, limber stems that allow them to flutter in the wind, creating an audible effect.

The rapid growth rate of this tree lends itself to the propagation of soft, weak wood, which can be a host to borers and other organisms. The tree’s rapid growth is accompanied by a massive fibrous root system. These voracious roots may plug or damage drains, and interfere with turf development. The female cottonwood releases masses of cottony seeds that can become a maintenance problem. To ensure a cottonless cottonwood, a male tree must be specified.

This tree is not suitable for the average residential lot, but is a splendid choice in open areas where a short-lived, grand specimen is desired. Will not tolerate tight clay soils, or compacted soils, or disturbed sites common to urban areas.

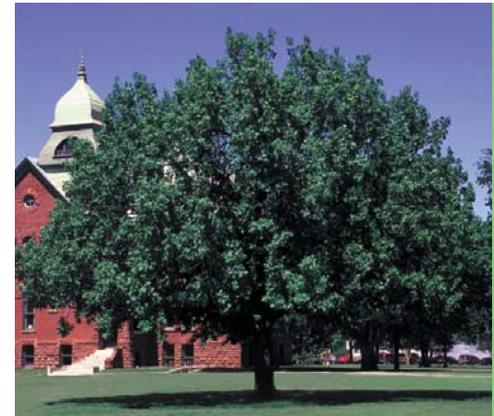


## *Quercus macrocarpa* Bur Oak

<b>Mature Height (ft.):</b>	<b>60 to 80</b>
<b>Spread (ft.):</b>	<b>30 to 50</b>
<b>Growth Rate:</b>	<b>Slow to moderate</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Male and female on same tree (not showy)</b>
<b>Fruit:</b>	<b>Large acorn up to two inches in diameter</b>
<b>Color:</b>	<b>Deep green, dull yellow-brown in fall</b>

Bur oak is one of the most tolerant of its species to the unpredictable and sometimes harsh climate in central Oklahoma. Requiring more care in its youth, once established, bur oak develops into a strong, durable tree that can tolerate dry, poor soils and periods of drought. Its coarse texture and immense scale can create a challenge in finding the right location for this tree in the urban environment. This is not a suitable tree for small lots, tight clay soils, compacted soils, or disturbed sites common to the urban environment.

The acorns produced by this species are quite textured and rather large - slightly smaller than a golf ball. This tree would not be suitable for pedestrian areas, where the fruits could be a nuisance. As with many dense shade trees, it can be a challenge to maintain plantings beneath their canopies. Proper maintenance, care, and pruning should be provided throughout the life of the tree to ensure health of the tree and its surrounding landscape.



Large Deciduous

Choose Your Tree



## *Quercus muehlenbergii* Chinkapin Oak

<b>Mature Height (ft.):</b>	30 to 60
<b>Spread (ft.):</b>	20 to 40
<b>Growth Rate:</b>	Slow to moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	Male and female on same tree
<b>Fruit:</b>	Small acorn, about ½ inch diameter
<b>Color:</b>	Deep green, deep red / orange-yellow / brown in fall

Belonging to the white oak group, chinkapin oak (also seen spelled “chinquapin”) has an unusually shaped leaf - dark glossy green on the surface, and silvery white beneath. Unlike a typical oak leaf, this leaf has a distinct saw-tooth margin, which makes it easy to distinguish from other oak species. Its distinct low-branching form and heavily cracked, fissured bark add to its unique character. Spring brings about the display of the male catkin, a delicate pendulous spike of flowers.

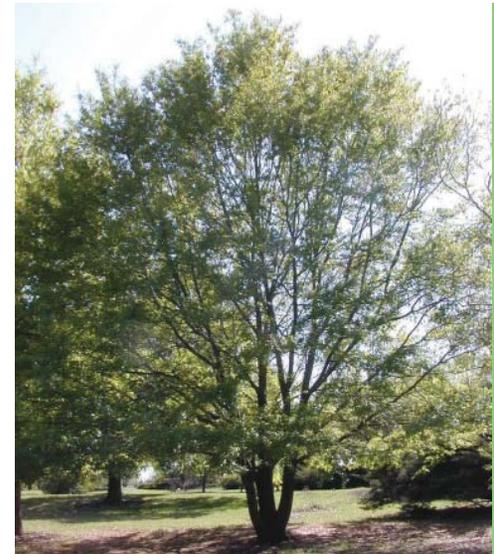
Although it tolerates drought and harsh exposure, this species of oak prefers well-drained soils, unlike the heavy native clay soils in parts of central Oklahoma. It is recommended that a soil test be performed before planting this tree to ensure the soil meets the tree’s requirements. If the site is suitable, chinkapin oak adds texture and character to the landscape, and produces a good-quality marble-sized acorn that is highly sought after by wildlife.

## *Quercus nigra* Water Oak

<b>Mature Height (ft.):</b>	<b>60 to 100</b>
<b>Spread (ft.):</b>	<b>50 to 60</b>
<b>Growth Rate:</b>	<b>Fast</b>
<b>Exposure:</b>	<b>Sun to part shade</b>
<b>Flower:</b>	<b>Male and female on same tree (not showy)</b>
<b>Fruit:</b>	<b>Small acorn, about ½ inch diameter, dropping in fall</b>
<b>Color:</b>	<b>Deep green, green fall color, brown leaves remain on tree in winter</b>

Sometimes called possum oak or spotted oak, the water oak is another oak species with a distinct leaf. The typical leaf is a smooth-margined club shape with a glossy green surface, but leaf shape is variable. In more temperate regions, the leaves maintain coloration through the winter whereas in our region, they turn a dull brown in the fall. This rapid-growing specimen is often planted widely as a street and shade tree in southern communities; however, the water oak is highly susceptible to air pollution and is often seen in a chlorotic condition from high pH.

Indigenous to southeastern watercourses and lowlands, the water oak tolerates wet conditions as well as compacted soils. However, when planted on low flats with poorly drained clay soils, tree form and quality are poor. In an excessively wet environment, the tree develops weak wood and a spindly form due to a rapid growth rate. Stronger wood and a more rounded crown are developed from a slower growth rate when this tree is planted in moderate soils, such as those found in the lower Great Plains states. It has proven fairly easy to grow, but difficult to transplant. Overall, this broad-canopied tree can be grown in a wide range of sites and should be planted more, providing growing conditions are favorable.



Large Deciduous

Choose Your Tree



## *Quercus shumardii* Shumard Oak



<b>Mature Height (ft.):</b>	60 to 80
<b>Spread (ft.):</b>	50 to 60
<b>Growth Rate:</b>	Moderate to fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	Male and female on same tree (not showy)
<b>Fruit:</b>	Acorn about one inch long, ½ to one inch in diameter, maturing in second season
<b>Color:</b>	Dark green, red / orange in fall

Similar to the northern red oak in form and detail, Shumard is a wonderful substitution for pin oak because it tolerates a wider range of conditions. This tree is accustomed to wet environments, and will tolerate heavy, clay soils and restricted root systems better than most oaks. Not only is this species tolerant of urban conditions and drought, it can tolerate a wide range of soil pH.

These characteristics make this tree an excellent street tree, shade tree, or specimen plant, but it should be noted that the litter from the acorns can be a nuisance in pedestrian areas on sidewalks. It grows rapidly to a large, long-lived, wide-spreading shade tree with durable wood and brilliant orange to red fall color.



## *Taxodium distichum* Baldcypress

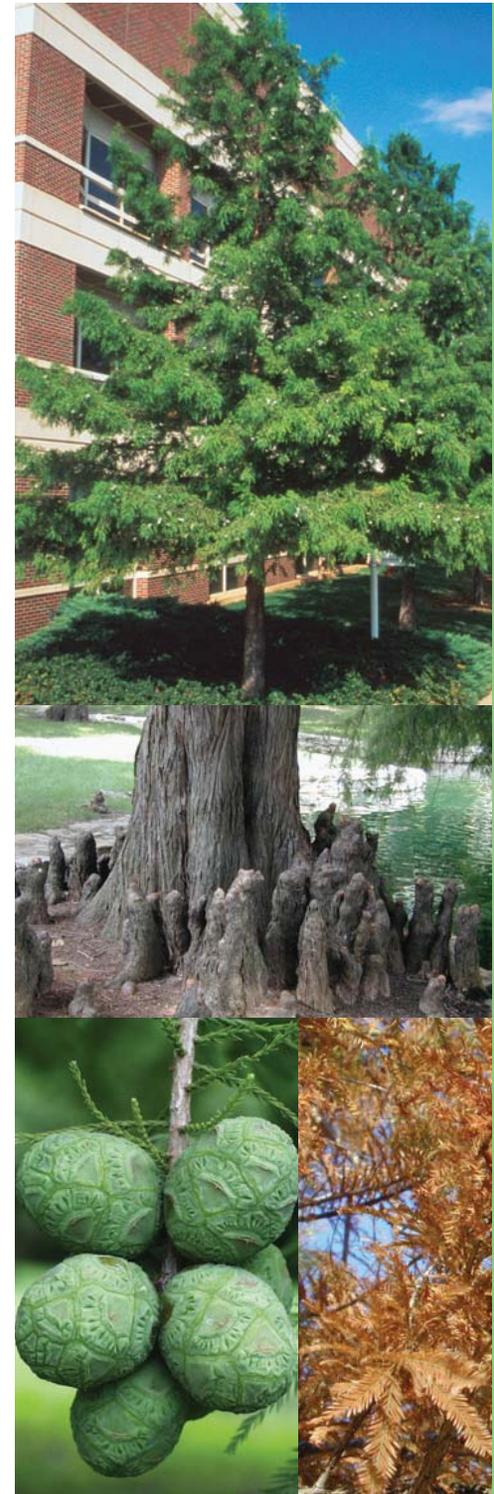
<b>Mature Height (ft.):</b>	<b>60 to 100</b>
<b>Spread (ft.):</b>	<b>Variable</b>
<b>Growth Rate:</b>	<b>Moderate to fast</b>
<b>Exposure:</b>	<b>Full sun only</b>
<b>Flower:</b>	<b>Male and female on same tree (not showy)</b>
<b>Fruit:</b>	<b>Round woody cone, about 1½ inch diameter</b>
<b>Color:</b>	<b>Medium green, bronze in fall</b>
<b>Cultivars:</b>	<b>'Prairie Sentinel'; 'Shawnee Brave'; 'Frio'</b>

Unique in its appearance, the baldcypress is a model of grace and endurance. Along with its massive size, other considerations should be made before choosing the proper location for this special tree. Although baldcypress is native to swamplands, it will tolerate a wide range of conditions, and will even tolerate short periods of drought. In response to long periods of drought, it will completely defoliate. In addition, this tree is amazingly resilient, and will leaf out when adequate moisture returns. Since baldcypress is so adaptable to growing in conditions ranging from excessive moisture to drought, our tight clay soils are not a challenge.

This unique tree has special adaptations to living in wet environments - knobby projections called "knees." Knees may form at the base of the tree, or even some distance from the trunk. These formations often occur when the tree is planted in or near water, but can occur anywhere that moisture is ample or in heavy compacted soils. Some say the knees add to the distinctive character of this tree. Although this tree is compatible with and allows turf to grow beneath the canopy, surfacing knees may pose problems with intensively maintained lawns. Baldcypress is often planted around water, as a street tree, or in a park setting.

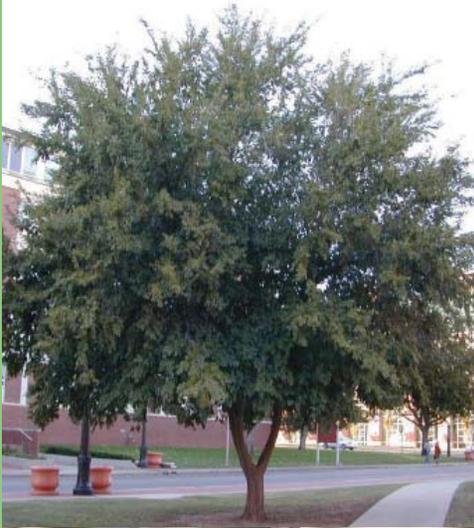
A highlight in the landscape, this tree has a pyramidal form and feathery leaves that add to its appeal. It is one of the few coniferous trees that is deciduous. After turning bronze in the fall, the lacy leaves will drop and cover the ground with a rust-color carpet in the winter and then decompose quickly. The fruits also break down rather quickly upon drying.

Baldcypress is very seedling variable, meaning offspring may not necessarily perform in the same manner as the parent. A close relative to the baldcypress is pondcypress (*Taxodium ascendans*), which is similar in character, except pondcypress reaches 50 to 60 feet in height and has a narrower crown.



Large Deciduous

Choose Your Tree



## *Ulmus parvifolia*

### Lacebark Elm

<b>Mature Height (ft.):</b>	40 to 60
<b>Spread (ft.):</b>	40 to 60
<b>Growth Rate:</b>	Moderate to fast
<b>Exposure:</b>	Sun to part shade
<b>Flower:</b>	Clusters at base of leaf in fall (not showy)
<b>Fruit:</b>	Green clusters among leaves, turning dark red when mature
<b>Color:</b>	Medium to dark green, light yellow in fall
<b>Cultivars:</b>	Allee® ('Emer II', Emerald Vase'); Athena® ('Emer I', 'Emerald Isle'); Bosque™ ('UPMTF'); 'Golden Ray'; 'Pathfinder'; 'Everclear'

The most characteristic trait of the mature lacebark elm is the highly ornamental bark. Noticeable after about ten years, this mottled, fine-textured bark reveals gray, green, orange, and brown tones as it flakes irregularly about the trunk. With visual interest throughout the seasons, lacebark elm has attractive fall color and showy bark that maintains interest in the winter months.

Its resistance to pests and disease and adaptability to a wide range of soil pH make this tree suitable for the urban environment. Extremely tolerant of harsh conditions such as poor soil, confined roots, heat, drought, and wind, this tree is an ideal choice for a street tree or use in parking lots. As with most trees, proper pruning of young trees will improve form as well as long term health of this tree. Although this species will perform well in some of the more challenging environments in Oklahoma City, it will grow best in moist, well-drained, fertile soils. It should be noted that seeds might germinate in gardens; therefore, some maintenance may be required. Hardy throughout Oklahoma, overall this is an excellent disease-resistant substitute for the American elm.

## *Zelkova serrata* Japanese Zelkova

<b>Mature Height (ft.):</b>	40 to 60
<b>Spread (ft.):</b>	30 to 40
<b>Growth Rate:</b>	Moderate to fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	Small blooms in spring (not showy)
<b>Fruit:</b>	¼ inch twin seed, hinged in middle (similar to Elm seeds)
<b>Color:</b>	Medium green, yellow / light red in fall
<b>Cultivars:</b>	‘Aurea’; ‘Autumn Glow’; ‘Goblin’; ‘Green Veil’; ‘Low Weeper’; ‘Parkview’

Good for landscape and street tree use, Japanese zelkova is tolerant of wind, moderate drought, a wide range of soil pH, and pollution once established. Its durable wood and attractive bark maintain winter interest. Japanese zelkova typically produces narrow branch angles as the tree matures; therefore, proper pruning of young trees is necessary to improve form. This tree may be used in urban areas preferably with well-drained, moist, deep, fertile soil, as a lawn tree or in parks. Because of its soil requirements, it is recommended that a soil test be performed before deciding on Japanese zelkova. This species is only moderately drought tolerant; therefore, supplemental water may be required, especially during the establishment period.

Sometimes planted as a substitution to elms, cultivars of the Japanese zelkova are resistant to most elm pests, including Dutch elm disease and beetles. Cultivars of merit include ‘Green Vase’ and ‘Village Green,’ both of which need room to develop a wide crown. ‘Green Vase’ is a fast-growing vase-shaped specimen with upward arching branches. Its fall color is bronze-red. ‘Village Green’ is a hardy selection, which has a wide and dense canopy with dark green leaves, turning red in the fall. Both cultivars maintain good disease and insect resistance, as well as cold hardiness.



Large Deciduous

Choose Your Tree



## ***Acer campestre*** **Hedge Maple**

<b>Mature Height (ft.):</b>	<b>30 to 50</b>
<b>Spread (ft.):</b>	<b>20 to 30</b>
<b>Growth Rate:</b>	<b>Moderate</b>
<b>Exposure:</b>	<b>Sun to part shade</b>
<b>Flower:</b>	<b>Not showy</b>
<b>Fruit:</b>	<b>Small winged seed</b>
<b>Color:</b>	<b>Deep dark green, yellow to yellow-brown</b>
<b>Cultivars:</b>	<b>'Compactum' (a dwarf variety); 'Eastleigh Weeping'; 'Fastigiatum'; 'Postelense' (bright golden fall color); 'Pulverulentum' (variegated foliage); 'Queen Elizabeth'<sup>TM</sup></b>

One of the best maples to plant in dry, alkaline soils, the hedge maple is a tough, adaptable tree with merit in the urban environment. Also tolerating soil compaction and air pollution, this is an excellent tree to plant in parking lots and as a street tree. Contributing to its value as a street and parking lot tree, the small winged fruits are not problematic and are easily maintained. Hedge maples can be allowed to retain foliage to the ground, acting as the name implies, as a hedge. It is often limbed up; however, to allow foot traffic beneath, it can be grown as a single-stemmed or multi-stemmed specimen.

Comparatively speaking, the hedge maple has a relatively short service life of 30 years. Supplemental watering may be required during periods of drought, and unfortunately, this species may be difficult to find in nurseries. On the whole, this species has its place in Oklahoma's urban landscape and should be given strong consideration despite its limited availability.



## *Acer saccharum* 'Caddo' Caddo Maple

<b>Mature Height (ft.):</b>	40 to 50
<b>Spread (ft.):</b>	40 to 50
<b>Growth Rate:</b>	Slow to moderate
<b>Exposure:</b>	Sun to part shade
<b>Flower:</b>	Inconspicuous
<b>Fruit:</b>	Winged seeds, developing in the spring
<b>Color:</b>	Dark green, turning brilliant red/orange / yellow in the fall

Sugar maples are excellent shade trees that produce spectacular fall color; however, they are sensitive to heat, drought, over-watering, and pollution. These maples require rich, well-drained soils, and respond poorly to soil compaction and salt. Fortunately for Oklahoma, a subspecies of the sugar maple (believed to be an ecotype) was discovered in the southwest part of the state that is specifically adapted to our hot summers and drying winds. This maple was named after its county of origin, the "Caddo maple." It is unique in that it can tolerate what most other maples cannot, but unlike most trees, Caddo will respond negatively when overly maintained or irrigated.

Maples in general are noted for their spectacular fall foliage color, and Caddo is no exception. This slow-growing large tree requires ample room to grow and would best be suited to rural areas, golf courses, parks, and estates. Along with its beautiful rounded shape and impressive seasonal color, its dense canopy provides ample shade, and its durable wood and small fruits make the Caddo maple a wonderful addition to the Oklahoma landscape.



Medium Deciduous

Choose Your Tree



## *Acer truncatum* Shantung Maple

<b>Mature Height (ft.):</b>	30 to 40
<b>Spread (ft.):</b>	20 to 35
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	Bright yellow blooms in early spring
<b>Fruit:</b>	Winged seed ripening in early summer
<b>Color:</b>	Lustrous dark green, yellow-orange / red in fall
<b>Cultivars:</b>	Pacific Sunset®; Fire Dragon®

Shantung maple, also called “purpleblow” maple, is an outstanding medium tree with glossy, dark green star shaped foliage that remains in good condition throughout the growing season. With attractive coloration, bark, and fruit, this tree is a low-maintenance specimen that is worthy of strong consideration for use in the urban landscape. New stem growth emerges with a purplish cast, unlike those of the Norway maple, which is often confused for this Chinese maple. Its dense canopy makes Shantung an excellent shade tree for a residential site. The fall color ranges from clear yellow to reddish purple.

Drought and reasonably cold tolerant, this tree is adaptable to most sites, providing there is proper soil drainage. It is becoming more commonly used in the Midwest because of its resistance to drought, heat, and leaf scorch. It is also resistant to disease and pests. It has been observed growing well in compacted, dry soils, and is considered a versatile and hardy maple. Its quality and adaptability make it an excellent tree in the urban setting as a shade tree on small lawns or as a street tree.



## ***Betula nigra*** **River Birch**

<b>Mature Height (ft.):</b>	<b>40 to 50</b>
<b>Spread (ft.):</b>	<b>20 to 30</b>
<b>Growth Rate:</b>	<b>Moderate to Fast</b>
<b>Exposure:</b>	<b>Sun to part shade</b>
<b>Flower:</b>	<b>Catkins in clusters (not especially showy)</b>
<b>Fruit:</b>	<b>Long, cylindrical catkins in early summer</b>
<b>Color:</b>	<b>Dark green, turning bright yellow in fall</b>
<b>Cultivars:</b>	<b>Dura-Heat™ ('BNMTF'); Fox Valley™ ('Little King'); Heritage®; Suwanee Tecumseh Compact™; Cityslicker®</b>

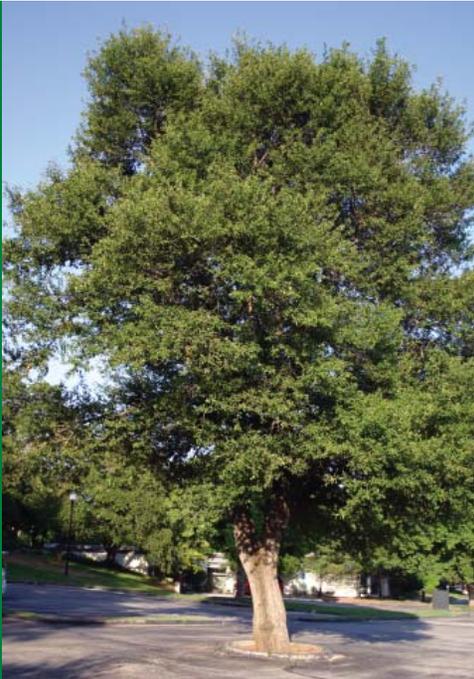
The most recognizable characteristic of the river birch is its two-toned peeling bark. The bark of the young tree appears to curl around the trunk like sheets of paper, becoming darker and more furrowed with age. This tree is often grown as a multiple-trunk specimen. Along with its attractive yellow fall foliage color and rapid growth, this tree is a wonderful selection for the urban environment. It will tolerate a wide array of environmental conditions, soil types, and exposure.

River birch is native to areas of the eastern U.S. where moisture is abundant; therefore, supplemental irrigation may be required in Oklahoma City's region if the tree is not planted in a moisture-rich location. This tree responds to drought stress by shedding leaves in the summer. Established trees produce an abundance of small winged seeds that may be somewhat of a nuisance around water features or paved outdoor areas. Also to be noted is its tendency to develop iron chlorosis when planted in heavy alkaline soils. Proper site selection is important to ensure the vitality and longevity of this exceptional tree.



Medium Deciduous

Choose Your Tree



## *Bumelia lanuginosa* Chittamwood

<b>Mature Height (ft.):</b>	20 to 40
<b>Spread (ft.):</b>	20 to 25
<b>Growth Rate:</b>	Slow
<b>Exposure:</b>	Sun to part shade
<b>Flower:</b>	Small clusters in summer (fragrant but not showy)
<b>Fruit:</b>	Small black berries maturing in fall
<b>Color:</b>	Deep green, no fall color

Chittamwood, also spelled “Chittimwood,” is an outstanding small to medium-sized tree for the urban environment, but is not commonly planted. Native to difficult, rocky, dry sites with alkaline soils, this tree will grow remarkably well in poor conditions. It is tolerant of excessive heat and moderate drought, although growth is slow in these conditions. Chittamwood will thrive in a fair environment with moist, well-drained soils.

Strong wood and the presence of small thorns on the young branches of this tree lend to its wind and vandal resistance. As with most trees, proper pruning of young trees will improve form as well as the long term health of the tree. Adding to its appeal, chittamwood is resistant to disease and pests. Its small leaves and tidy fruits contribute to the easy maintenance of this tree and substantiate its use as a street tree.

## *Castanea mollissima* Chinese Chestnut

<b>Mature Height (ft.):</b>	<b>30 to 50</b>
<b>Spread (ft.):</b>	<b>40 to 60</b>
<b>Growth Rate:</b>	<b>Slow to Moderate (4 to 7 feet over a 3 to 4 year period)</b>
<b>Exposure:</b>	<b>Full Sun</b>
<b>Flower:</b>	<b>Pale yellow or cream (not showy)</b>
<b>Fruit:</b>	<b>Large, sweet edible nut in 2 to 3 inch seed husks</b>
<b>Color:</b>	<b>Medium to dark green, orange / red in fall</b>
<b>Cultivars:</b>	<b>‘Sleeping Giant’ (upright hybrid proven blight resistance); ‘Kelsey’ (smaller with spreading crown)</b>

Chinese chestnut is a handsome low-branched shade tree with a wide-spreading, rounded form that provides dense shade. The tree is highly valued for large sweet nuts that are attractive to both humans and wildlife; however, two or more trees are recommended to ensure pollination. Leaves emerge reddish and change to a lustrous dark green in summer. Fall color is yellow and bronze and leaves are somewhat persistent through the winter months.

Chinese chestnut is quite hardy and will survive fairly adverse conditions. Though it prefers acidic loamy soil that is well-drained, it will tolerate a variety of conditions including sandy soils, clay soils, and moist areas. It does very well in hot, dry climates, so requires relatively little attention once established.

The large seed husks and nuts fall over an extended period of time, which does not allow for quick, easy clean up. The nuts may be gathered quickly by squirrels and other wildlife, but the spiny, prickly husks are left behind to become a seasonal litter problem. This may limit the possibilities for use near paved surfaces frequented by pedestrian traffic. Additionally, the flowers of Chinese chestnut produce a distinct unpleasant odor, so carefully consider this tree’s placement in the landscape.

Though resistant to chestnut blight, the tree is not immune to this disease. Pests include twig canker, weevils, and chestnut gall wasp.



Medium Deciduous

Choose Your Tree



## *Koelreuteria paniculata* Panicked Golden Raintree

<b>Mature Height (ft.):</b>	25 to 30
<b>Spread (ft.):</b>	15 to 20
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	Bright yellow panicles cover tree in May-June (showy)
<b>Fruit:</b>	Papery yellow capsules, one to two inches long turning tan and persisting into winter
<b>Color:</b>	Deep green with bluish cast, yellow in fall
<b>Cultivars:</b>	'Fastigiata'; 'September'; 'Stadher's Hill'

With its rounded form and spreading branches, this tree is a beautiful medium-sized specimen that offers interest throughout the seasons. Reddish copper-colored foliage emerges in spring and matures to a lovely deep blue-green by summer, accompanied by a flush of spectacular yellow panicles. As the clusters of flowers evolve into papery seed capsules, often called “Japanese lanterns,” they transform from green to yellow to tan over the autumn months. It is one of the few yellow flowering trees and is desirable since it blooms in the summer when little else is flowering in the landscape.

In addition to its aesthetic appeal, panicked golden raintree is a very adaptable, tough tree for the urban environment. Withstanding drought, heat, wind, alkaline soils, and tolerating air pollution, this tree is often seen in the residential, municipal, and commercial landscape. It is an excellent tree for open areas, accent planting, parking lots, or as a street tree. Panicked golden raintree is relatively disease and pest-free, except for the red shouldered and boxelder bugs, which, in close proximity to houses or apartments become a nuisance, taking shelter inside garages, closets, pantries, etc. With the proper site selection, this tree can be a lovely, low-maintenance addition to the landscape.

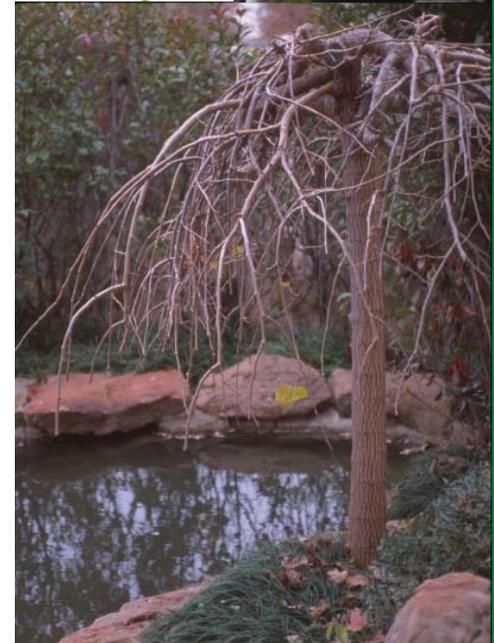
## ***Morus alba* 'Fruitless'** **Fruitless Mulberry**

<b>Mature Height (ft.):</b>	<b>30 to 40</b>
<b>Spread (ft.):</b>	<b>25 to 35</b>
<b>Growth Rate:</b>	<b>Fast</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Male and female on separate trees (not showy)</b>
<b>Fruit:</b>	<b>Female trees have small, edible fruits in summer that can be quite messy (recommend male fruitless variety)</b>
<b>Color:</b>	<b>Olive green, yellow in fall</b>
<b>Other Cultivars:</b>	<b>'Bellaire'; 'Chaparral'; 'Hempton'; 'Pyramidalis'; 'Stribling' var tatarica; 'Urban'</b>

Fruitless mulberry is a tough landscape tree that will tolerate many urban conditions, such as poor soils, drought, and pH variations; however, this tree is known to have a few liabilities and should be planted in locations to minimize these. This species is notorious for having invasive roots that surface, heave concrete, and compete with turf areas. Suckering at the base of the tree may also require additional pruning maintenance. Another concern is winter dieback, where anywhere from 25% to 50% of the ends of branches may die back in moderate to severe winters. This is especially prevalent in older trees.

The benefit of selecting the 'Fruitless' cultivar of white mulberry is to avoid messy fruits that may stain sidewalks or driveways and attract birds. The large, shiny leaves turn a lovely yellow in the fall, but tend to produce heavy leaf litter when dropped in the winter. Fruitless mulberry is often planted as a shade tree, or in rows as a screen because of its dense foliage. Because it produces heavy shade, turf grass is hard to grow under its canopy. This condition may result in exposed ground under the tree, which contributes to soil erosion.

Many cultivars of the white mulberry exist, including an ornamental form of weeping mulberry (shown right). Overall, fruitless mulberry needs careful consideration before choosing this tree for urban planting situations that require trees with highly ornamental features. The right site will allow this tree to achieve its full potential as an attractive yet rugged shade tree.



Medium Deciduous

Choose Your Tree



## *Parrotia persica*

### Parrotia

Mature Height (ft.):	20 to 40
Spread (ft.):	15 to 30
Growth Rate:	Slow to medium
Exposure:	Sun to part shade
Flower:	Before leaves in March (not showy)
Fruit:	Small light brown capsule
Color:	Reddish purple in spring, lustrous medium to dark green, then brilliant yellow, orange and scarlet fall color
Cultivars:	'Upright' (columnar habit); 'Pendula' (weeping habit); 'Vanessa'; 'Ruby Vase'; 'Biltmore'; 'Select'

Parrotia, also known as Persian ironwood, may be trained as a small single-trunk tree, but is more often seen as a large multi-trunk shrub with rounded form and ascending branches. Neither the flowers nor the fruit are showy or abundant, but it makes up for this lack of visual interest in other ways. In summer, it bears lustrous green foliage that turns vibrant yellow to orange and then scarlet in the fall. It has attractive peeling bark that ranges in color including grey, green, white, and brown.

Parrotia prefers well-drained, loamy soil that is slightly acidic and grows more quickly when provided with adequate water and nutrients. Once established, it is tolerant of drought, wind, and cold.

This tree requires little pruning to develop a strong structure and is fairly resistant to breakage. Though the bark is fairly thin and can be easily damaged by impact, the tree is relatively pest free. It is an interesting addition to the landscape that contributes color interest throughout the year. Parrotia is an excellent choice as a small specimen tree or for use as a patio or container tree.

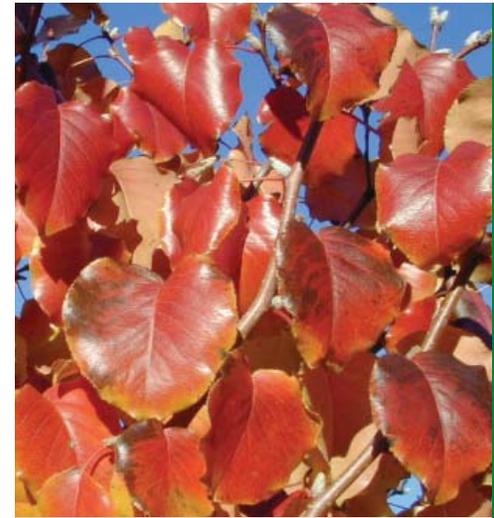


## *Pyrus calleryana* Callery Pear

<b>Mature Height (ft.):</b>	25 to 50
<b>Spread (ft.):</b>	25 to 35
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	White blooms in early spring (quite showy)
<b>Fruit:</b>	Many will not produce fruit
<b>Color:</b>	Deep green, gold-orange-red-purple fall color, depending on cultivar (very showy)
<b>Cultivars:</b>	'Aristocrat' (pyramidal form, strong branch structure); 'Autumn Blaze'; 'Capital' (columnar form, red-purple fall color); 'Chanticleer' (pyramidal form, red-purple fall color, heavy bloomer); 'Cleveland Select' (disease resistant, cone shaped form, red-purple-orange fall color); 'Redspire' (dense pyramidal form, hardy, profuse bloomer, gold-red fall color)

Originally used as breeding stock to improve the commercial fruiting pear, this ornamental tree has been developed in many forms, or cultivars, as a popular urban tree. Many desirable characteristics, such as attractive blooms, compact rounded form, fall coloration, and low maintenance are common in many of the cultivars available. No tree is perfect, however, and this tree's major drawback is the weak, densely branched limbs growing at acute angles, causing large branches or the whole structure of the tree to split apart after ten or more years of growth. This tree may become invasive in natural areas. In addition, this type of branch structure is a favorite to many nesting birds, which become a nuisance and maintenance problem when the tree is planted near sidewalks. Proper pruning of young trees will improve form as well as long-term performance. Also consider the distinct unpleasant odor that accompanies the abundant blooms when locating this tree in a public space.

The 'Bradford' cultivar has been the most commonly planted variety of callery pear, but all varieties provide showy white flowers in the spring and crimson red foliage in the fall. Because 'Bradford' pear has been widely overplanted, it is recommended we consider other cultivars of the ornamental pear. With proper placement, pruning, and care, many varieties of the callery pear will provide years of enjoyment and dynamic beauty through the seasons.



Medium Deciduous

Choose Your Tree



## *Quercus acutissima* Sawtooth Oak

<b>Mature Height (ft.):</b>	<b>40 to 50</b>
<b>Spread (ft.):</b>	<b>30 to 40</b>
<b>Growth Rate:</b>	<b>Moderate to fast</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Male and female on same tree (not showy)</b>
<b>Fruit:</b>	<b>Acorn, one inch in diameter, maturing in second season</b>
<b>Color:</b>	<b>Deep green, dull brown in fall</b>

Reminiscent of a Chinese chestnut, the leaves of sawtooth oak are unique for the oak family. These elongated leaves have a sawtooth margin, hence the name. One of the smaller maturing oaks, the leaves provide no significant fall foliage color and remain on the tree through a long portion of the winter before dropping. This tree is one of the faster growing of the oaks and is tolerant of a wide range of environmental factors. It is especially well-adapted to the high alkalinity central and western Oklahoma's soils.

Sawtooth oak produces significant amounts of litter, such as dropping of small branches and acorns on the ground. Its heavy fruit production limits the possibilities for the use of this oak near paved surfaces where heavy pedestrian traffic occurs; however, it would make a wonderful shade tree in a residential setting, park space, or other open areas.

## *Sapindus drummondii* Western Soapberry

<b>Mature Height (ft.):</b>	<b>30 to 40</b>
<b>Spread (ft.):</b>	<b>25 to 35</b>
<b>Growth Rate:</b>	<b>Moderate</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Small clusters of cream-colored blooms (not showy)</b>
<b>Fruit:</b>	<b>Round yellow fruits, ½ inch diameter, hanging in clusters at outer canopy (mildly poisonous)</b>
<b>Color:</b>	<b>Medium green to yellow-green, bright gold in fall</b>

An excellent tree with much merit, the western soapberry is an attractive yet durable tree for the urban environment. This species is found growing in a wide range of environments, from moisture rich areas such as riversides, dry watercourses, and streambeds, to areas with limited moisture, such as canyon embankments, foothills, uplands, pastures, and at the margins of woods. It will tolerate soils with high calcium, silt or clay content, as well as infertile soils with limited moisture.

With strong wood and a tall canopy, this tree makes an interesting specimen as a shade or patio tree. The fruits of this tree hang on the branches through the winter months and are attractive. Although these fruits are mildly poisonous, their bitter taste deters animals from eating them and should not discourage their use in the urban setting. However, if planted near garden beds, this tree has been known to germinate from seed, creating a maintenance issue.

Although western soapberry tree is virtually pest-free, it is susceptible to the red shouldered and boxelder bugs. Consider its beautiful golden fall color, attractive fruits, and umbrella-like form when selecting this tree. It should be planted more, but availability may be an issue. Overall, western soapberry is an attractive addition that will add character to the landscape while thriving in a harsh urban environment.



Medium Deciduous

Choose Your Tree



## *Styphnolobium japonicum* Japanese Pagoda Tree

<b>Mature Height (ft.):</b>	40 to 60
<b>Spread (ft.):</b>	20 to 40
<b>Growth Rate:</b>	Fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	White flowers in clusters 10 to 12 inches long (showy)
<b>Fruit:</b>	Yellow-green seedpod two to three inches long
<b>Color:</b>	Medium to dark green on top of leaf, lighter green underneath, yellow fall color

The Japanese pagoda tree, often called “Chinese scholar tree,” displays ornamental qualities throughout the seasons. The leaflets mature from bright green to a two-toned dark green, turning yellow in the fall. Pale yellow to creamy white pea-like fragrant flowers hang in long clusters in summer. Attractive fruits resemble a string of beads and persist into the early winter months.

Japanese pagoda will tolerate moderate drought, restricted root systems, and air pollution. This tree can also be grown in a wide range of moisture and atmospheric conditions, providing the soil quality is fair to good. Severe winter cold may cause injury to a young Japanese pagoda tree, or to the young twigs of a well-established tree. An appropriate selection as a lawn or street tree, this tree casts a light-textured shade that is also ideal for covering patios and outdoor recreation areas, but one must be mindful of the litter from the petals, fruit, and leaves.

## *Tilia cordata* 'Greenspire' Greenspire Linden

<b>Mature Height (ft.):</b>	40 to 80
<b>Spread (ft.):</b>	20 to 40
<b>Growth Rate:</b>	Fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	Fragrant yellow / white in clusters (not showy)
<b>Fruit:</b>	Small round gray-green fruits maturing in fall
<b>Color:</b>	Deep green, yellow in fall
<b>Other Cultivars:</b>	'Chancellor'; 'Fairview'; 'Glenleven'; 'June Bride'; 'Rancho'

A cultivar of the European littleleaf linden, this pyramidal tree is reminiscent of the pin oak in form and texture, but lacks the sensitivity to soil alkalinity. It is said that the 'Greenspire' variety of this species is tolerant to urban conditions and pollution in addition to poor soils. However, it doesn't react well to over-watering, and one must be careful not to plant this linden on disturbed sites or in tight clay soils or compacted soils that may retain too much moisture. As most trees, greenspire linden prefers well-drained soils.

If soil and moisture requirements are met, greenspire linden is a decent street tree. More often, this tree is planted as a shade tree in parks or other urban areas. The dense foliage provides ample shade and obtains a beautiful yellow color in the fall. Showy bracts produced in spring complement flowers and continue to provide interest through the summer and fall. This tree does not produce messy fruits, and the blooms exude a sweet fragrance in the summer, which often attracts bees, butterflies, and other nectar-loving insects. Although relatively maintenance free, occasional corrective pruning is required due to its rapid growth rate and soft, brittle wood.



Medium Deciduous

Choose Your Tree



## *Ulmus crassifolia* Cedar Elm

<b>Mature Height (ft.):</b>	<b>30 to 50</b>
<b>Spread (ft.):</b>	<b>25 to 35</b>
<b>Growth Rate:</b>	<b>Moderate</b>
<b>Exposure:</b>	<b>Full sun to partial shade</b>
<b>Flower:</b>	<b>Inconspicuous, appears in late September to early October</b>
<b>Fruit:</b>	<b>Small, winged seed; hairy, matures in fall</b>
<b>Color:</b>	<b>Dark to medium green, muted yellow to brown in fall</b>
<b>Bark:</b>	<b>Shallow ridges, and thin loose scales</b>
<b>Cultivars:</b>	<b>'Brazos Rim'</b>

Cedar elm is a large attractive elm with medium to dark green leaves, an oval to rounded crown, and slightly weeping branches. The leaves are particularly striking in the spring when lustrous new foliage emerges. This elm is distinguishable from most other elms by the rough texture of the leaves, small corky ridges or “wings” on the stems, and the production of fruit in the fall.

As most trees, cedar elm will perform best in well-drained, fertile soil with consistent moisture, but they are adapted to drought stricken, poorly drained, and infertile soils. This is particularly beneficial for the heavy, poorly drained clay soils common in Oklahoma. The tree is also moderately tolerant of soil compaction or disturbance of the root system, which commonly occurs in urban environments. Heavy air pollutants do not appear to affect the health of this tree, and it has a fairly high heat tolerance.

Cedar elm is fairly wind-resistant due to its moderately hard, heavy wood; however, the thin slightly drooping branches can be susceptible to breakage in ice or wind storms at connections to major limbs. Proper pruning of young trees will improve adult form as well as the long term health of the tree.

Cedar elm is considerably resistant to Dutch elm disease, but is still susceptible. Elm leaf beetles may cause limited damage to the tree's foliage. Overall, cedar elm is an attractive tree that is more disease resistant than several other native elms. This hardy elm may be a good alternative for the lacebark elm, *Ulmus parvifolia*, if a more upright, rounded mature form is desired. Tolerance of urban situations makes it an excellent choice for planting in parking lot islands or for use as a street tree.



## *Ziziphus zizyphus* Jujube or Chinese Date

<b>Mature Height (ft.):</b>	<b>30 to 40</b>
<b>Spread (ft.):</b>	<b>20 to 30</b>
<b>Growth Rate:</b>	<b>Moderate</b>
<b>Exposure:</b>	<b>Full sun to part shade</b>
<b>Flower:</b>	<b>Spring, yellow, not showy</b>
<b>Fruit:</b>	<b>Round to oval, red to black, sweet, attractive to mammals, showy, messy</b>
<b>Color:</b>	<b>Green; Showy yellow in fall</b>

Jujube, sometimes called Chinese or false date, has an upright growth habit with an irregular open, rounded form. Branches are interesting in that they are gnarled and spiny. It is most often seen as a multi-trunk shrub but can also be trained as a single-trunk tree. The two-inch leathery leaves are green with lighter undersides. Thorns may be present on young growth. The small flowers are fragrant, but hidden among the leaves, so not showy. Leaves often provide showy yellow fall color, but such displays are not dependable. The fruit of the tree is very sweet and attractive to humans, squirrels, and other mammals.

Jujube trees perform best in well-drained soil, and fruit quality is best with consistent moisture. It will tolerate clay, loam, sand, slightly alkaline, or acidic soils if adequate drainage is provided.

This tree requires early pruning to develop a strong structure and regular pruning for the long term health of the tree. Mature trees will produce large quantities of root suckers that need to be removed regularly by mowing or trimming. Additionally, cherry- to plum-sized fruit, twigs, and leaves require regular litter maintenance. Careful placement in the landscape may be required since thorns are not pedestrian friendly.



Medium Deciduous

Choose Your Tree



## *Acer tataricum* ssp. *ginnala* Amur Maple

<b>Mature Height (ft.):</b>	15 to 20
<b>Spread (ft.):</b>	15 to 18
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun to part shade
<b>Flower:</b>	Cream-colored somewhat fragrant blooms in spring
<b>Fruit:</b>	Winged seeds, turning red / orange (fairly showy)
<b>Color:</b>	Medium green, red / orange in fall
<b>Cultivars:</b>	'Embers' (bright red fruits and good red fall color); 'Emerald Elf'; 'Flame' (deep red fall foliage); 'Red Wing' (red fruits and red fall color); Red Rhapsody™; 'Summer Splendor'

An excellent tree for its many superior characteristics, amur maple is most commonly seen as a multiple trunk specimen, but is also available in a single-stemmed form. Trees with single trunks are preferable to the multi-trunk specimens for long-term health and performance. Amur maple can be used in above-ground planters, as a patio tree, a specimen plant, or a screen when planted in groupings or mass plantings.

Aesthetically, this tree provides interest in three of the four seasons. Spring brings a flush of red-stemmed new growth followed by the production of fragrant, yet inconspicuous, yellow flowers. Fruits of this tree can be very showy, maturing from green to red to brown in mid-summer. Fall brings the coloration of the maple leaves in tones ranging from yellow to deep red.

Although amur maple can be grown in partial shade, the best fall coloration develops only when planted in full sun. The mature tree is rounded and compact and adapts well to pruning. It will tolerate moderate drought and poor soil fertility; however, it prefers a well-drained soil. In addition, this species is sensitive to iron chlorosis in alkaline soils. Resistant to disease and pests, this tree is a relatively trouble-free and remarkable small tree.

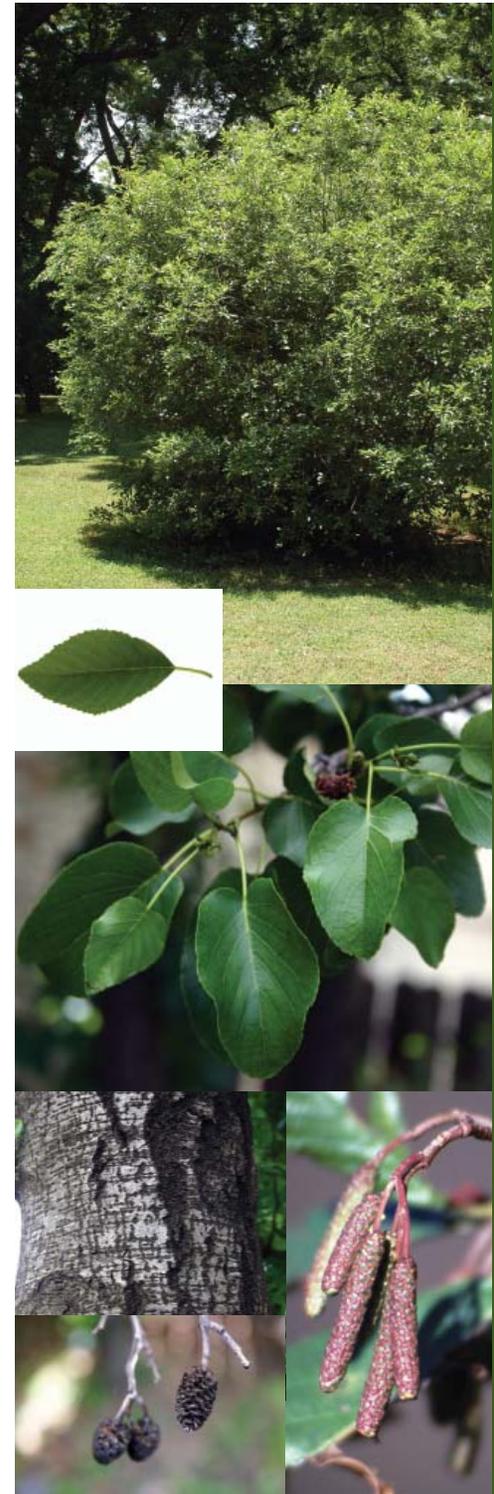
## *Alnus maritima* Alder or Seaside Alder

<b>Mature Height (ft.):</b>	Up to 20
<b>Spread (ft.):</b>	Up to 12
<b>Growth Rate:</b>	Slow
<b>Exposure:</b>	Full sun to part shade
<b>Flower:</b>	Not showy
<b>Fruit:</b>	Elliptical, hard, brown, and cone-like fruit remains in fall
<b>Color:</b>	Shiny dark green above, pale green below, with pale dots; little to no fall color. Bark, twigs and buds range from light brown and grey to dark red.

Seaside alder exists in its native environment as a large shrub or small tree primarily around streams and stream banks. It prefers to be kept moist, even during the winter dormancy period. This tree typically has a straight single trunk, but may sucker easily at the base, developing the form of a multiple trunk tree or shrub. If a shrub form is desired, older stems may be periodically removed and could be pruned into a hedge form.

A unique feature of this alder is that it blooms in the fall, whereas all other North American alders bloom in the spring. An even more interesting fact is that this alder is typically found in the eastern United States, but has an unexplained isolated native population in southeast Oklahoma. At one time, this tree was considered a threatened species, as it only existed in three locations in the United States. Although this tree is very easy to grow and propagate, it may not be commonly found in most nurseries.

Alder varieties are excellent for planting along stream banks, swampy or boggy areas, or along highways where water may stand. They do not appear to mind having submerged roots and are often seen in pure stands along waterways. Alders appear to do well in areas with poor infertile soil.



Small Deciduous

Choose Your Tree



## ***Amelanchier arborea*** **Serviceberry**

<b>Mature Height (ft.):</b>	<b>15 to 30</b>
<b>Spread (ft.):</b>	<b>Variable</b>
<b>Growth Rate:</b>	<b>Moderate to slow</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>White blooms in early spring (very showy)</b>
<b>Fruit:</b>	<b>Small edible berries, green turning red to purple in summer</b>
<b>Color:</b>	<b>Medium to dark green turning yellow, orange to red in fall</b>

A beautiful native tree in eastern Oklahoma, this tree provides seasonal beauty combined with exceptional adaptability and ease of maintenance. It is most often seen as a multi-stemmed large shrub or small tree with a graceful form and attractive bark. Showy white flowers hang in pendulous clusters from the branches and emerge in early spring along with the leaves. The chameleon leaves emerge as fuzzy and grayish (reminiscent of the pussy willow), but will grow smoother through the seasons as they transform from medium green, turning darker into the summer. During autumn, the leaves turn from their summer green to a range of yellow and apricot-orange to the dull, deep dusty red, displaying the best fall color for a small tree.

Favored by birds of all kinds, the small reddish-purple fruit, with a taste similar to blueberries, emerges in June. As it develops over a three to four week period, the fruit changes from green to red and finally to purplish black. As leaves drop early in fall, they reveal the ornamental bark in the thickly branched tree and create an elegant and attractive silhouette in the winter sky.

Although it withstands dry conditions, some leaf drop may occur, and growth will slow during times of drought. In areas with poor or acidic soils, growth has been noted as slow, and tree form may become dwarfed. Serviceberry prefers moist, well-drained soils and thrives in wet, but not waterlogged, sites. It will tolerate air pollution, but its brittle branches are prone to wind damage. Some potential pests may include borers and leaf-eating insects. Powdery mildew and fireblight may also occur when serviceberry is planted in areas with poor air circulation. Nevertheless, this low-maintenance, durable tree provides unique color and beauty in all four seasons of Oklahoma's climate.

## *Asimina triloba* Pawpaw

<b>Mature Height (ft.):</b>	<b>15 to 20</b>
<b>Spread (ft.):</b>	<b>15 to 20</b>
<b>Growth Rate:</b>	<b>Medium</b>
<b>Exposure:</b>	<b>Partial shade</b>
<b>Flower:</b>	<b>Before leaves in April, maroon, 1 inch across</b>
<b>Fruit:</b>	<b>3 to 5 inch, clustered, edible</b>
<b>Color:</b>	<b>Brown and gold in fall</b>

Pawpaw is a small understory tree or multi-trunk shrub with a short trunk and rounded, spreading top. Its large drooping leaves may grow up to a foot in length. It has edible fruit that is attractive to both humans and wildlife. The green fruit, maturing to 3 to 5 inches in length, grows in clusters and tastes like a mixture of banana and pineapple when ripe. Maroon flowers appear on previous year's growth before leaves appear in spring. The flowers of the pawpaw have a distinctly unpleasant fragrance which may limit where it is used.

Careful site selection is mandatory for vitality and long term performance, since this tree requires rich, deep, moist soil. Once established, the tree has a strong tendency to sucker or form large colonies from one plant. The resulting colony, called a "pawpaw patch" has few uses in the landscape, particularly since it does not assist in pollination and fruit production. A second tree is required for pollination and fruit production. Pawpaw can be used to naturalize along fertile stream banks. Otherwise, regular pruning is required to maintain single tree form.

No serious pests or diseases are known.



Small Deciduous

Choose Your Tree



## ***Cercis canadensis*** **Redbud**

<b>Mature Height (ft.)</b>	<b>20 to 25</b>
<b>Spread (ft.):</b>	<b>15 to 20</b>
<b>Growth Rate:</b>	<b>Moderate to slow</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Deep purple blooms in clusters along stems in early spring before the leaves develop (very showy)</b>
<b>Fruit:</b>	<b>Long, flat pod, two to three inches long, persists into winter</b>
<b>Color:</b>	<b>Shiny dark green, yellow in fall</b>

Oklahoma's state tree, the redbud is prized for its striking physical characteristics and adaptable nature. The shiny, heart-shaped leaves are attractive on the low-branching stems and emerge after the spectacular blooms of spring have faded. It can be seen as a multi-trunk specimen, or as a single trunk tree, but may require some early pruning to establish strong branch structure. Redbuds make wonderful trees for urban areas, due to their moderate size, broad-spreading canopies, and low maintenance requirements. However, this tree needs consistent care during its establishment period of at least the first three years.

The 'Oklahoma' redbud is an extremely adaptable variety of the eastern redbud that is able to tolerate poorer soils, hot temperatures and drying winds, full sun to partial shade as well as moist conditions. 'Oklahoma' redbud (*C. canadensis* var. *texasensis* 'Oklahoma') has deeper purple coloration of blooms than other varieties, more lustrous leaves, and better drought resistance. Because of the thick, leathery texture of the leaves, this form of redbud is more resistant to leaf rollers. Other cultivars of merit include the Texas whitebud (a hardy alternative to other white blooming trees) and the shade-loving 'Forest Pansy' redbud.

Unfortunately, the redbud tends to be relatively short-lived in the urban environment, but the years of contribution it makes to the landscape are well worth the investment. It is a hardy, widely adaptable native tree with a great tolerance of conditions across the country. Overall, this tree is well adapted to central Oklahoma, and is very useful for enhancing the landscape with early spring blooms and lovely fall color.



## *Chilopsis linearis* Desert Willow

<b>Mature Height (ft.):</b>	15 to 30
<b>Spread (ft.):</b>	15 to 25
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	White to dark lavender (depending on cultivar) bell-shaped flowers appear on new growth from early summer throughout the growing season
<b>Fruit:</b>	Slender seed pods, four to eight inches in length
<b>Color:</b>	Silvery gray-green foliage
<b>Cultivars:</b>	'Barronco' (upright form); 'Alba' (white blooms); 'Paradise' (makes a tree form easily with more flowers)

Desert willow is an attractive tree with unusually colored silvery-green foliage that provides subtle contrast in the landscape. With its long, slender leaves and weeping form, one might assume it is a member of the willow family, as the name implies. It is in the bignonia family, and its delicately colored orchid-like flowers are the distinguishing characteristic. These fragrant, funnel-shaped flowers with white-tipped petals and pink to purple throats normally bloom from April to August. The one inch blooms with a pleasant fragrance and tubular form are attractive to hummingbirds. The fruits, maturing in autumn, are long, brown, slender cigar-like pods. These pods contain numerous flat, tan-colored seeds and sometimes remain on the tree until spring.

Desert willow is resistant to most pests and disease; however, aphids may be a problem on new growth. This species is especially heat and drought tolerant, although is only moderately cold tolerant. A serious problem is winter dieback, which may affect the tree in moderate to severe winters. Desert willow may be grown as a large shrub, but is more commonly pruned as a single-trunk tree. It is also useful as a windbreak, screen, or erosion control plant. This tree is very seedling variable, so it is important to use named selections suitable for Oklahoma.



Small Deciduous

Choose Your Tree



## X *Chitalpa tashkentensis*

### Chitalpa

<b>Mature Height (ft.):</b>	20 to 35
<b>Spread (ft.):</b>	20 to 35
<b>Growth Rate:</b>	Fast (36 inches per season)
<b>Exposure:</b>	Sun
<b>Flower:</b>	Showy cluster of lavender pink, orchid like flowers; summer to fall
<b>Fruit:</b>	None (sterile)
<b>Color:</b>	Grey green turning to gold in fall
<b>Cultivars:</b>	'Pink Dawn'; 'White Cloud'

Chitalpa is a hybrid cross between catalpa (*Catalpa bignonioides*) and desert willow (*Chilopsis linearis*). Chitalpa may grow several feet more a year than *Chilopsis linearis* and has broader leaves, quickly providing shade to the landscape. Though this tree will tolerate some shade, it will become tall and leggy in reduced light conditions.

The form of this tree is a rounded umbrella or inverted vase with an interesting silhouette in winter. It is primarily multi-trunked, but can be found as a low-branching single-trunk specimen. The bark of the tree is scaly and light green to greyish white.

The main attraction of the tree is the unusual flowers, and these are produced best when the tree is planted in sandy loam with full sun and moderate moisture. Chitalpa flowers are produced mainly from late spring through mid summer, but may bloom sporadically until fall. Thus, flower clean up is required through an extended season. In return, the tree kindly drops all its leaves in a short period, making leaf clean up rather quick and easy.

Much like catalpa, chitalpa is very cold hardy. Chitalpa is a nice specimen tree or can be used for screening if left untrained. This tree can be particularly useful in native or riparian settings. An extensive taproot anchors this tree, so surfacing roots are not a problem near sidewalks or patios. Pests include aphids, root rot, and verticillium.

## *Cotinus coggygria* Smoketree

<b>Mature Height (ft.):</b>	12 to 18
<b>Spread (ft.):</b>	10 to 12
<b>Growth Rate:</b>	Moderate to fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	Small yellow flowers in profuse clusters at tips of new growth during May and June
<b>Fruit:</b>	Small pinkish berries at tips of feather-textured clusters in summer
<b>Color:</b>	Bright green to purple, red-orange to crimson in fall

The shrub-like smoketree, unique in its foliage, flowers, and bark, is a striking addition to the landscape. It can be used in masses, as a small grouping, a specimen tree, or a border plant. Depending on the cultivar, the round-leaved foliage can range from green to purple or maroon, turning red-orange to crimson in the fall. In summer, clusters of flowers that contain masses of silk-like hairs engulf the tree, giving the appearance of billowy smoke.

Special pruning procedures can create a wide variance in form, from a loose, multi-stemmed shrub to an upright small tree with a rounded crown. Virtually disease, pest, and maintenance-free, it is an extremely hardy plant that will grow in a variety of soil types, pH values, and environmental conditions. Smoketree is quite drought resistant and will withstand hot, drying winds. Although the wood is only moderately strong and can be broken rather easily, its small size protects it from most damage caused by forceful winds.



Small Deciduous

Choose Your Tree



## ***Crataegus crus-galli* var. *Inermis*** **Thornless Cockspur Hawthorn**

<b>Mature Height (ft.):</b>	<b>20 to 25</b>
<b>Spread (ft.):</b>	<b>15 to 20</b>
<b>Growth Rate:</b>	<b>Moderate</b>
<b>Exposure:</b>	<b>Sun to part shade</b>
<b>Flower:</b>	<b>Showy white blooms in clusters in mid-late spring</b>
<b>Fruit:</b>	<b>Apple-like dark red fruits about one inch in diameter (showy)</b>
<b>Color:</b>	<b>Dark shiny green above, lighter underneath, yellow to orange-red in fall</b>

Considered one of the best of the hawthorn trees, the thornless cockspur hawthorn possesses many benefits of the hardy *crataegus* family. As an added benefit, this tree lacks the wicked thorns of the parent plant. With attractive foliage, fall coloration, flowers, and fruit, this tree can ornament many urban settings; however, the disagreeable scent of its showy spring flowers is a disadvantage.

Its dark green, leathery leaves are attractive as well as resistant to heat and drought, making this tree an appropriate selection for central Oklahoma. In addition, thornless cockspur hawthorn is well adapted to a wide range of soil types, environmental, and growing conditions. It should be noted that although the thornless cultivar 'Inermis' is more resistant to the insect and disease problems associated with the species, cedar-apple rust might develop. This disease may cause unsightly blemishes on both the leaves and fruit.

# *Crataegus phaenopyrum* Washington Hawthorn

<b>Mature Height (ft.):</b>	10 to 20
<b>Spread (ft.):</b>	15 to 20
<b>Growth Rate:</b>	Slow to moderate
<b>Exposure:</b>	Sun to part shade
<b>Flower:</b>	Showy white flowers in clusters
<b>Fruit:</b>	Small red berries, maturing in fall, lasting into winter
<b>Color:</b>	Dark shiny green, orange / red in fall

Washington hawthorn is a highly ornamental tree. New leaves emerge reddish-colored, then mature to a dark, glossy green, and finally turn orange to red before dropping in the winter. In full sun, this tree develops a beautiful rounded form, blooms profusely in the spring, and bears colorful fruits in the late fall. As the fruits persist into the winter months, they provide food for birds. When planted in partial shade, the form tends to be more layered and open. Bloom and fruit production are also reduced.

Like most trees, Washington hawthorn prefers a well-drained moisture retentive loamy soil, but will tolerate chalk or heavy clay soils. If well established, it can withstand harsh conditions, such as excessive moisture, drought, and pollution. Due to the weakness of the wood, heavy ice, snow loads, and strong winds may damage this tree. Fortunately, Washington hawthorn is highly resistant to the most common pest problem of the hawthorn family, known as cedar-apple rust. Although resistant, this tree is not immune to the disease. Rust spots may develop on the leaves, and although somewhat unsightly, these spots do not pose a threat to the health of the tree or cause defoliation.

Thorns are common to the hawthorn family, and are no exception with this species - a possible liability in the urban environment; however, thorns do not grow back once pruned. This technique is beneficial for maintaining a lower trunk that is free from sharp thorns that could injure pedestrians. An attractive multi-trunk specimen or single-trunk patio tree, this tree can also be used as a screen border or can be pruned into a hedge. Used in the proper setting, this spectacular tree provides beauty and interest throughout the seasons.



Small Deciduous

Choose Your Tree



## *Diospyros kaki*

### Oriental Persimmon

<b>Mature Height (ft.):</b>	10 to 15
<b>Spread (ft.):</b>	8 to 10
<b>Growth Rate:</b>	Slow
<b>Exposure:</b>	Sun
<b>Flower:</b>	Spring, white, not showy
<b>Fruit:</b>	2 to 3 inch, edible
<b>Color:</b>	Red / orange in fall
<b>Cultivars:</b>	'Fuyo' (non-astringent); 'Haciya' (large oblong); 'Tamopan' (large 4 sided); 'Tanenashi' (medium prolific); 'Eureka' (medium prolific)

Oriental persimmon (sometimes called Japanese persimmon) is a small upright tree with a dense round canopy. Leaves are shiny and dark green above and lighter green below. The leaves turn orange and red in the fall, and fruit that ripens on the tree late in the growing season will persist after the leaves fall to provide an extended show of yellow to red color.

Oriental persimmon prefers moist, well-drained soil, and will not tolerate "wet feet." This tree can be difficult to transplant and is most easily established as container grown. The tree is moderately drought tolerant once established and requires little pruning to develop a strong structure. Young wood is fairly brittle and prone to break in ice or wind storms, but becomes stronger and resistant to breakage with age. The tree tends to leaf out late in spring after most other trees, and blooms appear even later minimizing the risk of frost damage.

This is a good fruit or specimen tree, as well as an attractive container or patio tree, as it tolerates confined root space well. It may be best appreciated if viewed at a distance, where its fleshy fall fruits do not become a litter issue. Additionally, leaves and twigs create a considerable amount of litter. The tree is relatively disease and pest free and exhibits no invasive qualities. However, careful consideration should be given to location due to heavy fruit production.

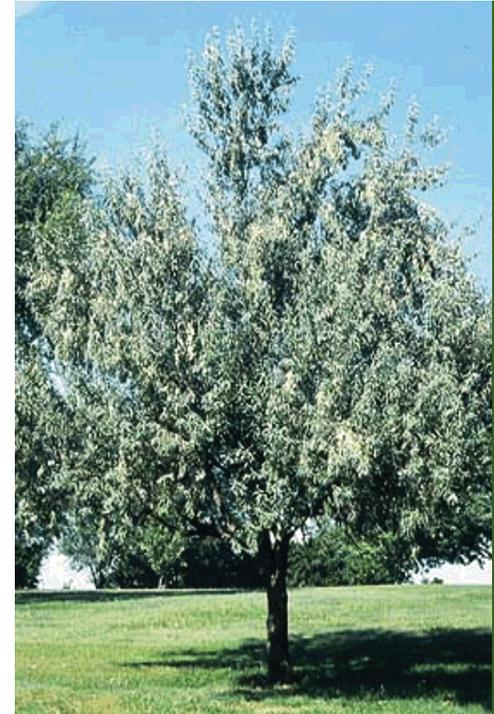
## *Elaeagnus angustifolia* Russian Olive

<b>Mature Height (ft.):</b>	15 to 20
<b>Spread (ft.):</b>	15 to 20
<b>Growth Rate:</b>	Moderate to fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	Fragrant, inconspicuous blooms in early summer
<b>Fruit:</b>	Hard, oval, silver-gray seedpods maturing in early fall
<b>Color:</b>	Light silvery-green, no fall color
<b>Cultivars:</b>	'Cardinal' (red fruit)

The silver-green, willow-like foliage of the Russian olive sets it apart from most plant material, and adds an unusual texture and color to the surrounding landscape. Along with the visual attributes of this tree, it also exudes a wonderful fragrance when blooming. More importantly, this small to medium sized tree is one of the most durable for central Oklahoma, withstanding extreme conditions with ease. Tolerating drying, forceful winds, salt, ice, drought, and poor soils, Russian olive can be successful in a wide range of growing conditions, as long as it receives plenty of sun. However, there are many weaknesses, so this tree is recommendation with some reservation.

Russian olive has a tendency to sprout suckers at the base, often developing a dense shrub-like form. Pruning is essential in establishing the desired form in addition to controlling thorns and suckering. Some consider these suckers a maintenance nightmare, but when these lower branches are allowed to remain, this tree makes an excellent hedge or screen. It is often planted along highways where soil is compacted and often dry.

This tree is very often short-lived, and is susceptible to multiple diseases; such as leaf spots, cankers, rusts, verticillium wilt, crown gall, aphids, and scale. In fact, some states and municipalities prohibit planting Russian olive, and some even consider it a “weed” tree. It is mentioned as an option when the most rugged tree for the harshest of conditions is needed. Autumn olive (*Elaeagnus umbellata*) is a close relative that also may be considered for harsh sites. When selecting this tree, give special consideration to its disease susceptibility, short lifespan, and maintenance requirements when considering its toughness and the color interest that it contributes to the landscape.



Small Deciduous

Choose Your Tree



## *Euonymus bungeana* Winterberry Euonymus

<b>Mature Height (ft.):</b>	20 to 40
<b>Spread (ft.):</b>	15 to 25
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	Yellow blooms in clusters (not showy)
<b>Fruit:</b>	Small yellow/white/pink fruits, opening to reveal orange seed coat, and remaining on the tree after the leaves have dropped
<b>Color:</b>	Medium yellow-green, pinkish red in fall
<b>Cultivars:</b>	'Kaleidoscope' (dark green foliage, great fall color)

Winterberry euonymus has few pest or disease problems and is tolerant of a wide range of environmental conditions. Especially adapted to poor soils and dry conditions, this plant is well suited for Oklahoma's proclivity toward drought and harsh exposure. It is extremely pH adaptable and is resistant to chlorosis. In addition, with moderately stout and durable wood, this tree can withstand forceful winds and bear the weight of ice and snow.

An interesting small tree with unusual coloration, winterberry euonymus has pink-tinted fall foliage, and orange and pink fruits that may clash with the usual palette of fall colors. Making up for the inconspicuous blooms, the unique fruit is a four-lobed capsule with reddish-pink skin. As the capsules ripen, they split open to reveal the red coat of the exposed seed within. This fruit persists on the tree through fall and early winter, providing food for wildlife and color in the landscape longer than many other deciduous trees, which have lost their leaves and fruit; however, the bloom has a fragrance that may be objectionable to some people. The form of the tree can be rounded or weeping, depending on age and cultivar.

This tree may be used in almost all settings, but it has a tendency to sucker and produce many seedlings, creating a significant maintenance challenge. But with the proper maintenance and placement, it may be used for its attractive habit as a patio tree, a specimen plant, shrub border, windbreak, foundation plant, or in groupings or mass plantings.



## *Ilex decidua* Deciduous Holly

<b>Mature Height (ft.):</b>	<b>20</b>
<b>Spread (ft.):</b>	<b>15</b>
<b>Growth Rate:</b>	<b>Moderate</b>
<b>Exposure:</b>	<b>Sun to partial shade</b>
<b>Flower:</b>	<b>Inconspicuous</b>
<b>Fruit:</b>	<b>Bright, glossy red berries, single or in clusters, persisting after leaves have dropped (quite showy)</b>
<b>Color:</b>	<b>Dark glossy green, purple-bronze in early winter</b>
<b>Cultivars:</b>	<b>'Cherry Berry' (largest fruit with early leaf drop); 'Byers Gold' (yellow fruit); 'Council Fire'; 'Red Escort' (Male)</b>

The deciduous holly, also called “possumhaw,” displays a lovely yellow fall color, then defoliates to reveal clusters of berries, colored from yellow to orange to red. The berries persist on the tree throughout the winter, which attract many different species of birds. Although this plant can grow in sun to partial shade, foliage growth is denser and fruit production is more abundant when it receives full sun. Berries are only produced on female trees; therefore, a male deciduous holly or male American holly should be planted as a pollinator. Pruning encourages the production of new branches and berries and can be performed successfully throughout the year, which is unlike many other ornamental plants that require specific pruning schedules.

Depending on the design intent for this tree, consistent pruning maintenance will be required to remove suckers from the base of the plant. When the suckers are allowed to remain, the deciduous holly may serve as a screen, hedge, border, or mass planting; however, it is most commonly grown as a small tree with multiple trunks, making it suitable as a patio tree, specimen, or foundation plant. In addition to outstanding disease and pest resistance, the deciduous holly is extremely adaptable and can be grown in almost any kind of soil - acid or alkaline, dry or damp. A recommended cultivar is ‘Warren’s Red’ which produces an abundance of attractive red fruits.

**Note:** This holly shouldn’t be confused with *Ilex verticillata*, which is another deciduous holly that is not suitable for Oklahoma’s climate.



Small Deciduous

Choose Your Tree



## *Lagerstroemia indica* Crapemyrtle

<b>Mature Height (ft.):</b>	15 to 25
<b>Spread (ft.):</b>	10 to 20
<b>Growth Rate:</b>	Moderate to fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	Profusion of white, pink, red, or purple (depending on cultivar) blooms in panicles appear in mid-summer and persist until frost (very showy)
<b>Fruit:</b>	Clusters of red-brown berries (showy)
<b>Color:</b>	Glossy, dark green foliage turns yellow, orange, and red in fall
<b>Cultivars:</b>	Siren Red® (darkest red); Burgandy Cotton® (white flowers, yellow stamens, wine foliage); Raspberry Sundae® (raspberry red flowers, with white margins); Tightwad® (dwarf red flowers); ‘Candycane’ (red blooms trimmed in white); Pink Velour® (pink blooms, burgundy spring foliage, purple tinted summer foliage)

The most striking characteristic of this versatile species is an abundance of brightly colored crepe-paper like flowers, which hang in clusters on the new growth. Blooms are typically produced from mid-June to almost frost. The form most commonly seen in central Oklahoma is a large, multi-trunk shrub, although crapemyrtle selections can range in scale from a dwarf shrub to a small tree. Many cultivars of the crapemyrtle exist with flower colors that range from white, pink, purple, to deep red. Since flowers are produced on new growth, prune in the winter to maximize flowering. Small clusters of seed pods form after the flowers have faded. One of the last plants to develop foliage in the spring, the small, glossy, dark green leaves finally appear, then often turn brilliant colors in the fall. With attractive brown to gray peeling bark, the mature crapemyrtle retains visual interest through the winter months.

Crapemyrtle can be grown as a deciduous tree or shrub, depending upon the cultivar, and is a very adaptable species that thrives in Oklahoma’s hot summer sun. Although this plant is very drought resistant, it prefers moist, well-drained soils with a pH no higher than 7.3. Soils that are excessively high in alkalinity may cause chlorosis or a yellowing of the leaves. The presence of hot, drying winds may also cause leaves to scorch.

As our hardiness zone is the limit for crapemyrtle’s cold tolerance, occasionally a harsh winter may kill the plant back to the roots. These cycles of deep-freezing winter temperatures dictate if crapemyrtles

## *Lagerstroemia indica* Crapemyrtle, cont'd

live long enough to develop into substantial trees with the characteristic peeling bark. With careful site selection in a protected area, they can and do achieve maturity in Central Oklahoma. Fortunately, cold hardy species, such as *Lagerstroemia faurei*, have been introduced.

Powdery mildew can attack leaves of non-resistant varieties in cool, damp or shady locations; however, many mildew-resistant cultivars are available. Certain varieties of the crapemyrtle may also be susceptible to many problems in addition to powdery mildew, such as black spot, tip blight, leaf spot, aphids, root rot, and Florida wax scale.



The 'Pink Velour' crapemyrtle, *Lagerstroemia indica* 'Pink Velour', was developed in Oklahoma by Carl Whitcomb, and is an "Oklahoma Proven" selection. It has burgundy-colored leaves in the spring, turning dark green with a purple cast in the summer. The profusion of pink blooms last from early July until frost. The 'Pink Velour' crapemyrtle grows to a height of ten feet and is resistant to drought and powdery mildew.

Overall, crapemyrtle is useful as an accent plant or as part of a larger grouping. Suggested uses for this plant include a border or specimen plant. Spacing six feet apart will produce an informal row or screen.



Small Deciduous

Choose Your Tree



## *Magnolia x soulangiana* Saucer Magnolia

<b>Mature Height (ft.):</b>	20 to 25
<b>Spread (ft.):</b>	20 to 30
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun to part shade
<b>Flower:</b>	White fading to lavender on edges with a purple center in early spring before the leaves (very showy)
<b>Fruit:</b>	Inconspicuous
<b>Color:</b>	Light to medium green, little fall color
<b>Cultivars:</b>	'Alexandria' (purple-pink blooms); 'Amabilis' (white blooms); 'Liliputian' (pink blooms, shrub-like form)

Covering the silver-gray branches before the leaves emerge, the purplish pink flowers of the saucer magnolia produce a spectacular display that announces the coming of spring. Planted mainly for this ornamental characteristic, this plant does not contribute significantly to the landscape during the rest of the season. In addition, Saucer magnolia requires careful site selection. To prolong retention of its delicate blooms, the tree should be located in a site protected from winds. Late freezes will often damage or destroy the showy fragrant blooms, but any show that may be obtained is worthy of introducing this tree into the landscape. Also an important consideration in selecting this spring bloomer is the quality and type of soils in which the tree is planted.

Like most magnolias, Saucer magnolia prefers a rich, well-drained soil with adequate moisture. It does not tolerate drought or poor, dry soils, such as those native to many parts of central Oklahoma. It can be planted in sun to part shade and may be allowed to develop a low-branching canopy. It is best used as a small accent tree in a carefully selected site. With the proper care and devotion, this tree will reward its owner every spring with its colorful show of flowers.

## Malus spp.

### Flowering Crabapple

<b>Mature Height (ft.):</b>	15 to 30
<b>Spread (ft.):</b>	15 to 35
<b>Growth Rate:</b>	Moderate to fast
<b>Exposure:</b>	Sun
<b>Flower:</b>	White, pink, or red, one to two inch blooms appearing in early spring and persisting into late spring (very showy)
<b>Fruit:</b>	Small apple-like fruit (edible), green turning yellow / orange / red when mature in late summer and fall (very showy)
<b>Color:</b>	Green, red, or purple depending on cultivar, variable fall color
<b>Disease Resistant Cultivars:</b>	'Donald Wyman' (pink buds and white flower, red fruit); 'Robinson' (red flowers and fruit); 'Dolgo' (white flowers, yellow fruit); 'Prairifire' (pink buds, red fruit); 'Tina' (red white flowers red fruit)

There are some 20 to 30 crabapple species and hundreds of cultivars of varying size, form, flower, and fruit. Crabapples provide visual impact during all four seasons. In early spring, emerging leaves and buds display an array of colors, followed by blooms that slowly reveal varying shades as they open. By mid-spring, the crabapple is a spectacular floral display. After flowers have faded, the tree retains rich foliage, which grows more vibrant with the onset of autumn. Not all crabapples retain fruit through the winter months, but those with small fruits provide desirable food for birds.

Crabapples have small, attractive leaves, bear flowers in early to mid spring, and set fruit in late summer to early fall. The varieties range in height from eight to 40 feet and come in a number of growth habits. Tree shapes consist of weeping (pendulous), rounded, spreading (horizontal), upright (columnar), vase-shaped, and pyramidal. Crabapples require regular pruning of dead, diseased, damaged, and crossing branches, as well as removal of watersprouts and suckers. Pruning should take place when flowers fade. Later pruning will reduce floral display and fruiting for the following year. Blossom colors range from pearly white, through delicate pinks, to a deep red. Fruit colors range from dark-reddish purple through the reds and oranges to golden yellow and even some green. On certain selections, the fruit can remain attractive well into the late winter.

They are adaptable to varying soil conditions, but do best in a heavy loam that is well-drained, moist, and acidic. Regardless of soil type, good drainage is a requirement for tree health, and particular care in the selection of a variety of crabapple with exceptional resistance to cold and disease is imperative. Common diseases and insect pests include fireblight, cedar apple rust, apple scab, powdery mildew, canker, scale, borers, and aphids. Many new flowering crabapples are disease resistant or tolerant. Unfortunately, few crabapples possess all desirable characteristics of exquisite flowers, fruit, foliage, growth habit, and disease resistance. Many crabapples are slightly susceptible to certain diseases and yet have great merit. By accepting and understanding their limitations, these plants are perfectly acceptable in many landscape situations.



Small Deciduous

Choose Your Tree



## *Prunus cerasifera* Purpleleaf Plum

Mature Height (ft.):	15 to 25
Spread (ft.):	10 to 12
Growth Rate:	Moderate
Exposure:	Sun
Flower:	Pink-white blooms in spring (quite showy)
Fruit:	Small plum, about one inch long maturing in fall, edible but not tasty (fairly showy)
Color:	Purple to red-purple
Cultivars:	'Atropurpurea' (large purple leaves, pink blooms, wine-red fruit); 'Krauters Vesuvius' (dark red leaves, pink blooms); 'Newport' (bluish-pink flowers, bright purple foliage); 'Thundercloud' (deep purple foliage, single pink flower, upright form, good street tree)

Valued for its departure from the standard landscape palette of green foliage, purpleleaf plum displays shades of pink and purple in its foliage, blooms, and bark. Small, pinkish-white blooms appear in early spring, as the reddish-purple flush of new leaves emerge. The richest coloration of leaves and best production of blooms occurs when this tree receives full sun.

Purpleleaf plum requires good soils with ample moisture and drainage. Compacted soils, such as the clay soils native to central Oklahoma, may stress the tree, making it more susceptible to pests and disease. Often used as an accent tree, purpleleaf plum can be used in lawn areas, courtyards, patio areas, or planters.

When used in mass, the vivid color may dominate other plantings and may be perceived as distracting. Because of this, careful consideration should be made when locating this tree. Overall, this small tree can make a large impact, but it is particularly short lived in the urban environment, and even in optimum conditions may only live up to 15 years.

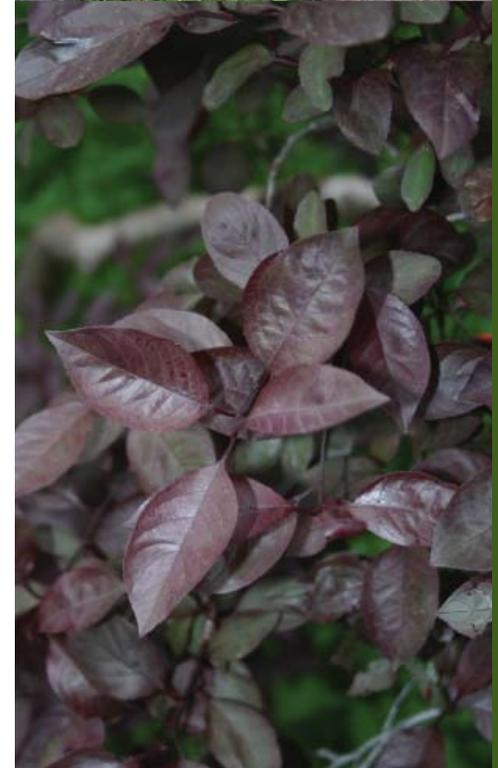
## *Prunus x cistena* Purpleleaf Sand Cherry

<b>Mature Height (ft.):</b>	12 to 15
<b>Spread (ft.):</b>	10 to 12
<b>Growth Rate:</b>	Moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	Spring, after leaves; white/pink, fragrant; slightly showy
<b>Fruit:</b>	Rare; blackish-purple; not tasty
<b>Color:</b>	Reddish-purple spring through fall

Purpleleaf sand cherry is typically seen as a large multi-trunk ornamental shrub, but may grow to a small tree. Its form is rounded with ascending, spreading branches that tend to develop an open center at maturity. The most striking feature of this tree is its reddish-purple foliage color. The foliage emerges bright reddish-purple and remains reddish-purple to dark bronze-green through fall. Best color is acquired in full sun, as the tree's foliage will appear olive green and less striking in shade. Branches are typically reddish-brown to purple-brown when young, turning almost purple-black, then purple-grey with age. Color may vary with cultivar.

Purpleleaf sand cherry prefers moderately moist, well-drained soil, but will tolerate some drought once established. It prefers a light-textured soil, but grows well in a moderate range of soils and is adapted to a variety of adverse conditions, including poor soils, drought, heat, and heavy shearing. This tree is one of the most cold-hardy of the purple leaved plants, but can struggle somewhat in warmer climates. It may become stressed in compacted soils, and the tree is not particularly pollution tolerant.

Pests and disease include Japanese beetle in mid-summer, and borers and trunk canker with age. This is not a long-lived tree, but can be useful as a temporary application in the landscape or as a patio or container specimen.



Small Deciduous

Choose Your Tree



## *Viburnum rufidulum*

### Rusty Blackhaw

<b>Mature Height (ft.):</b>	<b>10 to 15</b>
<b>Spread (ft.):</b>	<b>10 to 15</b>
<b>Growth Rate:</b>	<b>Moderate</b>
<b>Exposure:</b>	<b>Sun to part sun</b>
<b>Flower:</b>	<b>White, showy</b>
<b>Fruit:</b>	<b>Fall, blue berries</b>
<b>Color:</b>	<b>Rich burgundy fall color</b>

Rusty blackhaw can be a small tree or a large shrub, depending on the environment, and can typically be seen in drifts or thickets in the wild. The trunk is typically slender and the form of the tree usually has an irregular crown that is open and rounded. The young bark is dark and thin and branches start low. The mature bark develops an interesting small “blocky” texture that provides winter interest in the garden.

The tree is attractive in full sun where it becomes dense and the lustrous bright green, leathery leaves and clusters of white flowers are shown to best advantage. Buds of the tree are covered with rusty brown fuzz, unlike most other viburnums. In fall, the leaves may turn pink to crimson and attractive blue fruit appears.

Rusty blackhaw will grow in almost any well-drained soil. It grows well in partial shade where it will develop an open, airy crown and become more dense and bushy in full sun. It is very drought, heat, and cold tolerant, and even tolerates dry shade.

Rusty blackhaw cannot self pollinate and requires two different seedling plants for pollination. Fruits attract birds and small mammals. Its branches may droop under the weight of its fruit as the tree grows. The tree tends to sucker from the roots often forming thickets.

## EVERGREEN TREES

Evergreen trees are trees that retain leaves year round, as opposed to deciduous trees that shed all of their leaves for part of the year. Evergreens retain their leaves either by continuously replacing leaf growth year round or through the production of leaves that persist on the tree for several months, years, or possibly even decades. These trees typically can be categorized into “broadleaf” or “coniferous” evergreens. Broadleaf evergreens have leaves that are similar in size and shape to many deciduous trees’ leaves. Coniferous evergreens are cone-bearing woody plants with unique leaves that are shaped like small scales or long, thin needles. There are several types of evergreen conifers including cedars, junipers, and pines.

### Cedars

True cedars have needle-like leaves arranged in spiral clusters and scaly cones that disintegrate to expose the seeds. Although some trees have “cedar” as part of their common name (such as eastern redcedar, incense cedar, or cedar elm) they are not true cedars. Read more about the different types of cedars in this chapter on the following pages:

Atlas Cedar .....	89
Deodar Cedar.....	90
Cedar of Lebanon.....	91

### Junipers

These are an extremely tough and highly versatile group of evergreen conifers with small needle or scale like leaves and fleshy cones housing a hard seed. Junipers in this chapter include:

Hollywood Juniper .....	104
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### Pines

Pines have long thin needles rather than broad leaves and woody, scaled cones that house the seeds. Though not native to central Oklahoma, some varieties of pine are naturally occurring. Unfortunately, pines are susceptible to a number of pests and diseases, and often struggle in our region. Pines in this chapter include:

Japanese Black Pine.....	95
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## ***Calocedrus decurrens*** **Incense Cedar**

**Mature Height (ft.):** 30 to 50

**Spread (ft.):** 8 to 10

**Growth Rate:** Moderate

**Exposure:** Sun to part shade

**Flower:** Monoecious; male cones small and yellow; female cones small and yellowish-green

**Fruit:** Cones are about one inch long

**Color:** Shiny green foliage, reddish-brown cones, purplish-red to reddish-brown bark

Although not a true cedar, the genus name *Calocedrus* means “beautiful cedar.” Incense cedar has an unusual foliage texture that differs from the fine needles of a pine tree, with fragrant, small scale-like leaves that form flattened, chain-like branches, similar to the arborvitae. Complementing the rich green foliage is the attractive, bright cinnamon-red bark that becomes a highly textural and ornamental feature with age. The tree’s narrow, strongly pyramidal form is distinctive in the landscape, and requires no pruning to maintain its shape. Unfortunately, these trees are prone to losing their tops from freezes, which may affect their nice pyramidal shape.

This dense, columnar evergreen can be used as an accent in the landscape, stand alone as a vertical specimen, or can be planted in rows or groupings as a screen or backdrop. Incense cedar is adaptable to a wide range of soil types, from nearly neutral to strongly acid, and to soil textures that vary from coarse sands to very fine clays. Once established, incense cedar thrives in hot, dry climates and ranks second in drought tolerance to junipers and the ponderosa pine. Also withstanding extremes in annual temperatures, this is a hardy and beautiful evergreen tree for central Oklahoma.

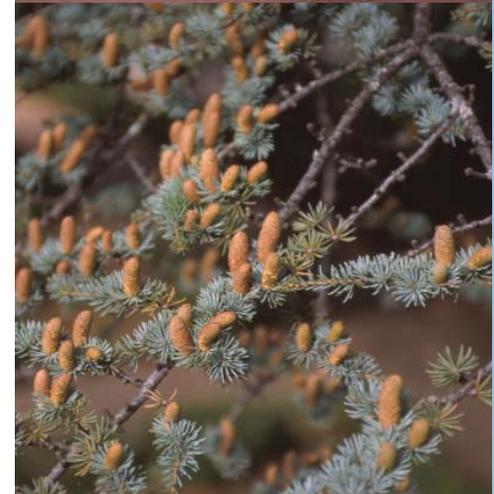
## ***Cedrus atlantica*** **Atlas Cedar**

<b>Mature Height (ft.):</b>	<b>40 to 60</b>
<b>Spread (ft.):</b>	<b>30 to 40</b>
<b>Growth Rate:</b>	<b>Slow to moderate</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Male flowers are small cones in late summer</b>
<b>Fruit:</b>	<b>Two to three inch long cone taking two seasons to develop (rarely seen in the U.S.)</b>
<b>Color:</b>	<b>Green, yellow-green, blue or blue-gray depending on cultivar</b>

This striking and majestic evergreen may take 50 years to fully mature, developing broadly horizontal, gracefully drooping arms of frosty blue, yellow-green, or rich green needles, depending on the cultivar. It grows rapidly in its first 10-20 years, developing a somewhat leggy appearance. It slows and becomes much more dense and picturesque with age. This tree may be used as a specimen tree for parks, golf courses, large gardens, and estates. Atlas cedar will grow in most soil types and environmental conditions, but it prefers fertile, well-drained soils and requires ample room to spread. Drought resistant once established, this tree is relatively maintenance-free and is avoided by insects, as are most evergreens. It is tolerant of pollution and urban conditions, but needs protection from sweeping winds and may get considerable needle burn and injury during cold winters or when sited poorly in windy locations.

The most commonly used and readily available variety of the atlas cedar is *Cedrus atlantica* 'Glauca,' known as the blue atlas cedar. Its stunning silver-blue foliage rivals the less dependable Colorado blue spruce, and although much larger, is an appropriate design alternative for the popular blue-gray coloration. It provides amazing contrast against dark green lawns, and should be carefully considered to complement the colors of the surrounding landscape. A weeping form, 'Glauca pendula,' can be trained to provide a very dramatic look, but patience is required to allow the tree to grow to maturity and develop the desired effect.

A very suitable alternative choice for a dark green foliage evergreen with similar habit and performance characteristics would be cedar of Lebanon, *Cedrus libani*. Aside from the coloration of the foliage, atlas cedar and cedar of Lebanon can be used interchangeably in the landscape.



Large Evergreen

Choose Your Tree



## ***Cedrus deodara*** **Deodar Cedar**

<b>Mature Height (ft.):</b>	<b>40 to 60</b>
<b>Spread (ft.):</b>	<b>20 to 30</b>
<b>Growth Rate:</b>	<b>Rapid</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Fruit:</b>	<b>3 to 5 inch cones</b>
<b>Color:</b>	<b>Varies by cultivar, generally attractive</b>
<b>Cultivars:</b>	<b>'Aurea' Golden (pyramidal); 'Fastigiata' (columnar); 'Pendulata' (pendulous limbs turn upright at ends); 'Aurea Pendula' (pyramid shape drooping branches, golden yellow needles); 'Silver Mist' (conical habit, drooping branches, whitish needles, slow growing); 'Blue Ball' (globe shaped, bluish-grey, slow growing)</b>

Deodar cedar is one of only four true cedars, and is native to the Himalayan Mountains where it can reach 150 feet tall and 40 feet wide. Though deodar cedar does not reach its full potential in central Oklahoma, this tree does require ample room for the spread of wide horizontal branches. It branches to the ground and the upper branches droop gracefully, then tip gently up in a slight wave. This dense branching system extends from a strong central leader, forming a large stately pyramidal shape in the landscape.

The color of this tree is typically attractive, ranging from bright green, blue-green, yellow-green, or light green depending upon the cultivar. Needles are typically stiff, 1 ½ to 2 inches long, and produced in whorls composed of up to 30 needles. Deodar produces cones that are 3 to 5 inches in length, egg-shaped, and blue-green in color. Cones persist for two years then shatter to disperse winged seeds. Male catkins are banana-shaped and produce wind-born clouds of yellow pollen in early spring.

Deodar does best in well-drained loam or clay loam soil in dry, sunny locations, but will tolerate compacted, poor or clay soils, and some excess moisture. Deodar is drought tolerant once established and appears to be fairly well suited to the urban environment; however, the tree does not prosper in high air pollution. Deodar is less cold tolerant than atlas cedar or cedar of Lebanon. Deodar's branches become more brittle with age and tend to die back at the top from cold damage. The result is sometimes an asymmetrical mature tree with a slightly flattened top.

Deodar cedars make a lovely statement at the back of the landscape and should be placed so that their color, drooping branches, and fine texture can be fully appreciated. Its wide spreading nature is one of deodar's most attractive features. One would think it is not an ideal specimen for locations near sidewalks or streets since limbing up the tree detracts from its natural shape; however, limbing up does not appear to adversely affect the health of the tree. Smaller cultivars are attractive and require less space in the landscape and may be better choices near sidewalks. Surfacing roots are usually not a problem.

## *Cedrus libani* Cedar of Lebanon

<b>Mature Height (ft.):</b>	40 to 60
<b>Spread (ft.):</b>	30 to 40
<b>Growth Rate:</b>	Moderate to slow
<b>Exposure:</b>	Sun
<b>Flower:</b>	Inconspicuous
<b>Fruit:</b>	3 to 6 inch cones
<b>Color:</b>	Dark green
<b>Cultivars:</b>	'Pendulata' (weeping greenish-blue); 'Green Prince' (very slow growth); 'Sargenti' (prostrate to low mound form); 'Glauca Pendula' (blue-green needle, weeping limbs)

Cedar of Lebanon is a large stately evergreen with a wide spreading pyramidal shape very similar to *Cedrus atlantica*, or atlas cedar. This tree eventually attains a massive trunk and very wide sweeping branches that droop to form tiers. Branches emerge from the central leader at right angles in young trees, with a very formal, somewhat upright appearance. Cedar of Lebanon becomes broader and more open with a flattened top at maturity, and it requires ample room to mature as the horizontal branches emerge low on the tree and droop to sweep the ground. The tree may be somewhat spindly when young but develops an impressive form with age.

Needles are dark green and approximately one inch in length. The 3 to 6 inch cones are blue to green and rise on stalks above the dark green foliage, adding to the impressive appearance of the tree. This tree performs best as a single-trunk specimen and requires little to no pruning to develop a strong structure. Though lower branches may be trimmed to allow for pedestrian traffic, this cedar is better suited as a specimen tree in locations where it can fully develop and showcase its impressive form.

Cedar of Lebanon prefers deep, well-drained loam, full sun, and ample room to grow. Once established, this cedar is very drought tolerant. The tree will not tolerate shade and does not react well to air pollution or consistent high humidity. Although it is moderately cold tolerant, it may exhibit signs of die-back and needle burn at temperatures below zero degrees (F). There are no serious pest or disease issues with this tree.



Large Evergreen

Choose Your Tree



## *Pinus elliotti* Slash Pine

<b>Mature Height (ft.):</b>	<b>80 to 100</b>
<b>Spread (ft.):</b>	<b>30 to 40</b>
<b>Growth Rate:</b>	<b>Rapid</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Fruit:</b>	<b>3 to 6 inch cones</b>
<b>Color:</b>	<b>Medium green</b>

Slash pine is an evergreen conifer with persistent, flexible needles that are medium to dark green and 7 to 12 inches in length. Needles grow in clusters of 2 to 3. Cones measure 3 to 6 inches in length, are a glossy caramel brown, and mature in autumn. Cones drop the second year. The bark of this pine is furrowed and reddish brown when young. As the tree matures, the reddish tones are revealed as thin scales flake away from the thick plates covering the trunk and branches. The overall appearance of the mature trunk is heavily plated with mottled brown scales and newly exposed cinnamon patches.

This pine is upright with a narrow, loose, oval crown when mature. Branches extend at right angles with broom-like clusters of long needles at the ends of branches providing light-textured shade below. This pine has an extensive root system and a moderate-sized taproot. The wood is hard and moderately durable; however, the lower branches tend to die off as the upper canopy increases and blocks out light. These low branches then break and fall, requiring maintenance.

Slash pine is native to wetlands but will tolerate some drought, and is tolerant of a moderate range of soil conditions. This pine is not particularly tolerant of salt. Slash pine performs more reliably south of the Oklahoma City area. Slash pine provides an excellent environment for shade-loving plants such as azaleas, camellias, hostas, and others that will thrive beneath its light-textured shade.

Fusiform rust is known to attack saplings, and pine tip moth is a common pest. Pines are susceptible to a number of pests and diseases; however, slash pine is fairly resistant to pinewood nematode (pine wilt), which can prove devastating to other pine species.

## *Pinus ponderosa* Ponderosa Pine

<b>Mature Height (ft.):</b>	<b>40 to 60</b>
<b>Spread (ft.):</b>	<b>20 to 30</b>
<b>Growth Rate:</b>	<b>Slow to moderate</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Inconspicuous</b>
<b>Fruit:</b>	<b>3 to 5 inch long light red-brown cones, maturing in two years</b>
<b>Color:</b>	<b>Dark green needles and orange-brown bark</b>

Also known as “bull pine” and “western yellow pine,” ponderosa is the most common pine to be found in western North America, ranging from Canada to Mexico. Its orange and brown two-toned bark develops an irregular plate-like pattern much like a jigsaw puzzle. The distinctive bark, along with its thick, long needles, are the main characteristics that help differentiate ponderosa from its cousin pine trees. When young, this tree has a broad, pyramidal form that becomes more rounded with age.

As with most pines, this tree prefers a moist, well-drained loam soil, although it will tolerate moderate drought, poor soils and soil alkalinity. Surviving climates with extreme temperatures, this durable and rugged tree is well suited for the conditions of the Great Plains states. It withstands strong winds due to its strong wood. However, this tree will not fare well in wet soils or in areas with poor drainage. Although not particularly ornamental, the ponderosa pine can effectively be used in the landscape as a windbreak, evergreen backdrop, or shade tree, but keep in mind the presence of the prickly pinecones. Pests include pine tip moth and heart rot, but in general this is a durable, low-maintenance tree.



Large Evergreen

Choose Your Tree



## *Pinus taeda* Loblolly Pine

<b>Mature Height (ft.):</b>	<b>60 to 100</b>
<b>Spread (ft.):</b>	<b>30 to 50</b>
<b>Growth Rate:</b>	<b>Moderate to fast</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Inconspicuous</b>
<b>Fruit:</b>	<b>Clusters of light brown cones, 3 to 4 inches long, retained for several years</b>
<b>Color:</b>	<b>Light green turning yellow-green to brown in winter</b>

Loblolly pine, a major source of lumber and pulpwood in the southern United States, is cultivated for commercial use because of its rapid growth on a wide range of sites. It is an excellent pine that will tolerate Oklahoma's adverse conditions, including poorly drained or clay soils, as well as drought. The form of the tree is moderately ornamental in youth. It loses its lower branches and becomes more open with age.

The pine needles of the loblolly are longer than most pines, measuring up to eight inches in length. These pine needles, which are rich in acidity, are prized as mulch around azaleas, gardenias, and camellias. The pinecone is covered with protective spines, and remains green and hard until maturity the following year. As this species retains its fruits for several years, the presence of these clusters of pinecones may help distinguish loblolly from other species of pines. Loblolly pines provide habitats and food sources for wildlife, as well as supplying humans with lumber and bark mulch. In addition to these uses, loblolly may be used in the urban landscape to stabilize eroded or damaged soils, for casting loose shade, as a background planting, or as an ornamental tree.

In general, pines are susceptible to a number of pests and diseases, including pine wilt, which can be devastating to the pine population; however, loblolly pine is highly resistant to pine wilt.

## *Pinus thunbergii* Japanese Black Pine

<b>Mature Height (ft.):</b>	<b>40 to 60</b>
<b>Spread (ft.):</b>	<b>20 to 30</b>
<b>Growth Rate:</b>	<b>Moderate to fast</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Inconspicuous</b>
<b>Fruit:</b>	<b>Light brown cones, up to two inches long</b>
<b>Color:</b>	<b>Dark green</b>

Often mistaken for the Austrian pine, the Japanese black pine is a fast growing conifer that tolerates a wide range of conditions. Commonly planted in coastal areas because of its drought and salt tolerance, this tree can be seen planted in sand, as well as most soil types. The form of the tree is pyramidal when young, but if conditions are favorable for rapid growth, it can assume a loose, irregular shape. With age, this evergreen develops a more oval crown with an asymmetrical, informal branching habit.

The Japanese black pine is an effective screen in the landscape. Its fast growth promotes wind and ice resistance, although in harsh winters, the tips of branches may be damaged by early fall or late spring freezes. Extreme cold events or prolonged summer heat and extreme drought may cause injury or death. As with most non-native pines in central Oklahoma, this pine is very susceptible to pine wilt; therefore, other evergreen species should be considered for planting.



Large Evergreen

Choose Your Tree



## *Quercus virginiana* Live Oak

<b>Mature Height (ft.):</b>	40 to 80
<b>Spread (ft.):</b>	60 to 100
<b>Growth Rate:</b>	Slow to moderate
<b>Exposure:</b>	Sun
<b>Flower:</b>	Inconspicuous female flowers, yellow male flowers in long clusters in early spring
<b>Fruit:</b>	Medium to dark brown acorn, about one inch in length, single or in clusters
<b>Color:</b>	Dark green
<b>Cultivars:</b>	'Boardwalk'; 'Parkside'; 'Cathedral'

This broadleaf evergreen is tolerant of harsh urban conditions. Its thick, leathery dark green leaves are resistant to many leaf-eating insects and contribute to the tree's tolerance to drought. In addition, live oak can withstand poor soils, compaction, and air pollution, making it a suitable street tree. Special consideration for the location of this tree must be made to accommodate its marginal cold tolerance and ultimate large size. Only moderately cold hardy, the live oak may react to late or prolonged freezes by defoliation or ultimately death. It has been noted that this tree is very seedling variable and more reliable performance can be achieved with proven cultivars that are suitable for central Oklahoma, such as *Quercus fusiformis* 'Quartz Mountain.' It should also be noted that live oaks respond poorly to over watering and intense fertilization.

Like others in the oak family, the live oak has extremely hard, durable wood, making it resistant to damage from wind, ice, and vandals. The graceful horizontal branching of this oak develops into a broad, shade-producing canopy, and contributes to the magnificence and grandeur of this evergreen tree. It may require some maintenance, as it sheds old leaves in the spring, just before producing new leaves at the beginning of the growing season. Additionally, pollen from the tree's flowers and small acorns may litter sidewalks.

## *Thuja plicata* 'Green Giant' Green Giant Arborvitae

<b>Mature Height (ft.):</b>	<b>50 to 70</b>
<b>Spread (ft.):</b>	<b>15 to 25</b>
<b>Growth Rate:</b>	<b>Rapid</b>
<b>Exposure:</b>	<b>Full sun</b>
<b>Flower:</b>	<b>Inconspicuous, yellow</b>
<b>Fruit:</b>	<b>½ inch cones</b>
<b>Color:</b>	<b>Dark green</b>
<b>Bark:</b>	<b>Cinnamon red</b>

Green giant arborvitae is a vigorously growing tree with densely covered horizontal branches extending from a single leader, providing a uniform pyramidal shape. The crown of this tree is typically identical from tree to tree. The deep green color of green giant arborvitae is consistent, regardless of most planting conditions. Flattened, plate-like sprays of scale-like leaves remain full and green year-round.

This variety of arborvitae is an extremely resilient tree with strong wood that is resistant to breakage from ice and snow. The tree performs best in moist, well-drained soils, but will perform well in almost any soil, including heavy clay. The tree is moderately drought and salt tolerant; however, growth may be less than vigorous in very dry situations.

Though green giant arborvitae tolerates shearing, it requires minimal pruning to develop a strong adult form. The tree has no significant disease or pest problems, and unlike other fine-textured evergreens, bagworms are usually not a problem. Green giant arborvitae can be used as a specimen or a screen.



Large Evergreen

Choose Your Tree



## *Cupressus arizonica* Arizona Cypress

<b>Mature Height (ft.):</b>	25 to 30
<b>Spread (ft.):</b>	15 to 25
<b>Growth Rate:</b>	Fast
<b>Exposure:</b>	Sun to partial shade
<b>Flower:</b>	Inconspicuous
<b>Fruit:</b>	Cone, one inch in diameter
<b>Color:</b>	Green to silver-green, depending on cultivar
<b>Cultivars:</b>	'Blue Ice'; 'Blue Pyramid'; 'Carolina Sapphire' (has proven to not be cold hardy)

This striking evergreen possesses some remarkable characteristics with unusual coloration, texture, and shape. Sculpturally fashioned from the loose, open canopy is an attractive pyramidal form that needs ample space to fully develop. Its fine textured, silver-green foliage provides contrast against its attractive reddish-brown peeling bark. It is the only cypress native to the southwestern United States and thrives in sunny, hot, and dry locations. This hardy evergreen can tolerate partial shade; however, it becomes more susceptible to health problems and disease when located out of full sun.

In our area, these trees have been noted to develop shallow root systems that make them susceptible to toppling if located in windy or wet sites. Although relatively short-lived with a life span of 30 to 40 years, this evergreen can grow up to three feet per year and can provide an immediate impact on the landscape. Often used as a windbreak, barrier, or background plant, this tree may also make a statement in the landscape as a specimen planting. Overall, the Arizona cypress requires very little maintenance and is virtually pest and disease-free when grown in ideal conditions. However, in areas with high rainfall or high humidity, mistletoe, blight, and rust may develop.



## *Juniperus virginiana* Eastern Redcedar

<b>Mature Height (ft.):</b>	<b>Reaching 30</b>
<b>Spread (ft.):</b>	<b>20</b>
<b>Growth Rate:</b>	<b>Moderate to fast</b>
<b>Exposure:</b>	<b>Sun</b>
<b>Flower:</b>	<b>Inconspicuous</b>
<b>Fruit:</b>	<b>Small bluish-purple round berries, about ¼ inch in diameter</b>
<b>Color:</b>	<b>Deep green</b>
<b>Cultivars:</b>	<b>‘Taylor’ (extremely fastigate form without trimming, can reach 40’)</b>

Despite its name, the eastern redcedar is not a true cedar, but is actually a juniper. Very hardy and tough, this native evergreen tree grows in almost any soil, tolerates a wide range of soil pH, and withstands hot temperatures and drying winds. It has a moderately dense, pyramidal form with ascending branches when young. Its rapid growth slows as the tree matures, eventually developing a rather loose, open form. The small, scale-like leaflets retain their dark green color during the winter months, but may develop a purplish cast, making this tree a unique backdrop in the winter landscape. Male trees form small pollen cones, and female trees produce small blue fruits that are often eaten and then reseeded by birds.

Depending on the cultivar or seedling variation, the eastern redcedar differs in form, size, and fruit quality. Ornamental qualities of the different cultivars include prolific and colorful sprays of bluish-purple berries, highly textural peeling bark, or a stately columnar form. A particularly attractive cultivar, the ‘Canaert’ may be used as an ornamental specimen, but can become leggy if planted in the shade. Another variety, ‘Taylor,’ with an extremely tight, columnar form, may be a good option for specimen planting. Uses for this adaptable evergreen include specimen planting, screening, massing, windbreak, foundation planting, or backdrop. Eastern redcedar is an alternate host for a disease known as cedar-apple rust, which forms harmless orange, gelatinous tentacles on the juniper, but affects the fruit production on apple, crabapple, or hawthorn trees. Bagworms may also be a problem with this species.



Medium Evergreen

Choose Your Tree



## *Pinus bungeana* Lacebark Pine

<b>Mature Height (ft.):</b>	30 to 50
<b>Spread (ft.):</b>	20 to 35
<b>Growth Rate:</b>	Slow
<b>Exposure:</b>	Sun
<b>Flower:</b>	Inconspicuous
<b>Fruit:</b>	2 to 3 inch cones
<b>Color:</b>	Medium to dark green
<b>Cultivars:</b>	'Compacta' (more compact habit)

Lacebark pine is a very slow growing tree that may be grown as a multi-trunk tree to take advantage of the showy exfoliating grey-green bark. The tree is topped by an oval crown that will begin to spread and flatten at about 40 years of age, allowing additional sunlight through the attractive broad spreading canopy. The bark will mature into an equally attractive patchy, chalky white. The tree can be trained as a single trunk but is prized for the characteristic multi-trunk form and showy bark.

Lacebark pine produces light yellowish-brown cones that are two to three inches in length and width. Cones are persistent on the tree throughout the winter. Stiff sharp needles two to three inches in length persist for three to four years. The wood of this pine is weak and prone to breakage at the crotch or weak limb attachments under the weight of snow and ice. Eliminate weak trunks and branches by properly pruning young trees to improve their adult form.

Lacebark pine grows best in full sun with well-drained, acidic soil. It will tolerate some variation in soil pH, but will not tolerate overly wet or dry conditions. This tree, like most pines, is susceptible to a number of pests and diseases, including pinewood nematode.

## *Ilex vomitoria* Yaupon Holly

<b>Mature Height (ft.):</b>	15 to 20
<b>Spread (ft.):</b>	15 to 20
<b>Growth Rate:</b>	Slow to moderate
<b>Exposure:</b>	Sun to shade
<b>Flower:</b>	Inconspicuous, creamy white blooms
<b>Fruit:</b>	Small shiny red berries, persisting throughout winter
<b>Color:</b>	Medium to dark glossy green
<b>Cultivars:</b>	'Pride of Houston' (heavy fruit production); 'Nana' (mound form); 'Pendula' (weeping form)

A very adaptable and tough holly, yaupon holly can be used as a small evergreen tree with multiple trunks with an asymmetrical form. It accepts pruning easily and can be shaped for a formal appearance, or maintained in its natural state. Care should be taken to remove no more than ten percent of the canopy when pruning to avoid prolific suckering of sprouts at the base of the tree.

Unlike the large, spiny leaves of other holly plants, this species maintains rich evergreen foliage that is elliptical in shape, bordered by a delicate sawtooth margin. Yaupon holly offers hints of seasonal color, as spring growth renders shiny leaves tinged with red-purple veins, and fall and winter present an abundance of small red berries. In addition to producing fruits that attract wildlife, the yaupon's dense, twiggy form provides shelter for many species of birds. In time, the trunks develop a smooth, gray bark that continues to provide additional interest as the plant matures.

Making a lovely patio planting, courtyard tree, accent plant, planter specimen, or use as a screen, backdrop, or understory planting, yaupon offers unlimited options for use in the urban landscape. This tree is adaptable to a wide range of growing conditions. In addition to heat and drought resistance, this species will tolerate most soil types. Moreover, yaupon holly can be planted in sites with excessively moist to extremely dry conditions while maintaining good resistance to pests and disease.



Small Evergreen

Choose Your Tree



## *Ilex x attenuata* Foster Holly

<b>Mature Height (ft.):</b>	<b>20 to 25</b>
<b>Spread (ft.):</b>	<b>10 to 12</b>
<b>Growth Rate:</b>	<b>Moderate</b>
<b>Exposure:</b>	<b>Sun to shade</b>
<b>Flower:</b>	<b>Inconspicuous</b>
<b>Fruit:</b>	<b>Bright red single berries or in clusters (very showy)</b>
<b>Color:</b>	<b>Deep blue-green</b>

Foster holly, a hybrid of American holly (*Ilex opaca*) and Dahoon holly (*Ilex cassine*), is grown for its exceptional pyramidal form, effective seasonal color and adaptability. Densely covering the canopy of the plant, its dark blue-green leaves are relatively small and elongated with shallowly margined teeth. Showy clusters of bright red berries adorn the tree in the winter, attracting birds hungry for a meal. In time, the trunk develops a smooth, gray bark that provides additional seasonal interest as the plant matures. The many ornamental qualities of this small tree provide various opportunities for use in the urban landscape. Foster holly can be planted as a screen, backdrop, for massing, as a specimen, or as an accent plant.

This species is tolerant of a wide range of conditions. It can be grown in full sun to partial shade in dry to moist conditions and in many soil types. However, high soil alkalinity may cause yellowing of the leaves, called chlorosis. In addition, foster holly may be sensitive to high concentrations of salt and fertilizers that can damage roots, ultimately affecting the health of the plant. It is important to know the quality of the soil before planting this tree on any site. If a plant with the general characteristics of foster holly is desired for planting in disturbed soils, near construction sites for example, a suitable substitution may be the Nellie R. Stevens holly.

## *Ilex* x 'Nellie R. Stevens' Nellie R. Stevens Holly

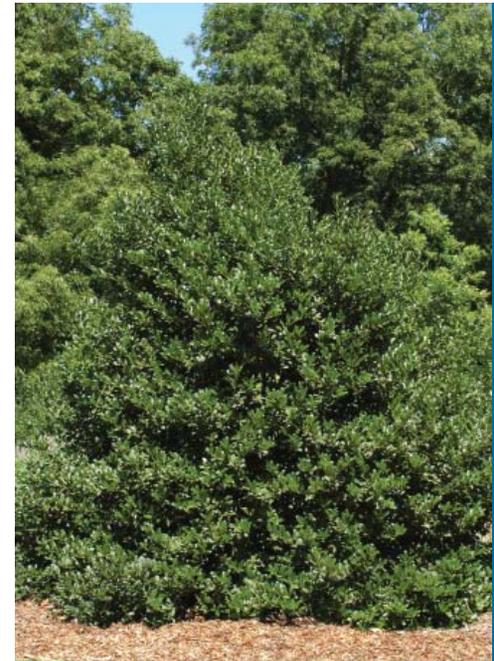
<b>Mature Height (ft.):</b>	<b>20 to 30</b>
<b>Spread (ft.):</b>	<b>10 to 15</b>
<b>Growth Rate:</b>	<b>Moderate to fast</b>
<b>Exposure:</b>	<b>Sun to shade</b>
<b>Flower:</b>	<b>Inconspicuous</b>
<b>Fruit:</b>	<b>Bright red single berries or in clusters (very showy)</b>
<b>Color:</b>	<b>Lustrous dark green</b>

Nellie R. Stevens holly is an upright hybrid broadleaf evergreen tree that retains the best traits of both parents - European holly (*Ilex aquifolium*) and Chinese holly (*Ilex cornuta*). The tree has a neat pyramidal shape with lustrous dark green leaves and an abundance of striking red berries. The tree grows quickly and maintains its attractive shape with minimal pruning. The branches of this tree are moderately resistant to breakage, but the thin bark can be easily damaged with maintenance equipment. This is typically not a problem as the leaf coverage is extremely dense. Training as a single trunk may assist in the prevention of breakage due to snow or ice storms.

The leaves are thick and waxy, and are lined with serrated edges, or 'teeth,' often seen on hollies. A male with similar bloom time, such as the Chinese holly, is necessary in the area to ensure pollination and abundant fruit production. The fleshy half-inch berries are very attractive on the tree in winter. The fruiting tree provides both habitat and food for several varieties of birds, including robins and woodpeckers.

Nellie Stevens prefers well-drained, acidic soil but is adapted to a wide variety of soil conditions. The tree appears to tolerate urban conditions such as air pollution, compacted soils, and poor drainage. The tree is moderately drought tolerant once established and will also tolerate some flooding.

Practically maintenance, disease, and pest free, this tree is ideal for use in a variety of settings. It is lovely as a specimen tree in the landscape or in containers. It is also very well adapted for use as a protective buffer or screen. It can be used in a mixed row with other plants that attract birds.



Small Evergreen

Choose Your Tree



## *Juniperus chinensis* 'Torulosa'

### Hollywood Juniper

<b>Mature Height (ft.):</b>	<b>15 to 20</b>
<b>Spread (ft.):</b>	<b>6 to 10</b>
<b>Growth Rate:</b>	<b>Moderate to slow</b>
<b>Exposure:</b>	<b>Sun to shade</b>
<b>Flower:</b>	<b>Inconspicuous</b>
<b>Fruit:</b>	<b>Blue; not showy</b>
<b>Color:</b>	<b>Green and fragrant</b>

Hollywood juniper is a small dense evergreen conifer with a variable, narrow cone shape that opens up with maturity. As the tree matures, graceful twisting branches sprout up and out from the dense upright body. Though this juniper can be trained to topiary forms, it is best left to fully develop without pruning to form an interesting and picturesque specimen tree. The tree is prized for its shape; each tree is unique in its form, and its deep green color is particularly striking against light colored walls. Place this tree in an open location to allow its quirky shape to fully develop and to be fully appreciated. Can also be used as a wind break, but it does not make a good hedge due to its variable form.

Hollywood juniper requires no pruning to develop a strong, healthy form, which is resistant to breakage from wind, snow, or ice. Although birds are attracted to the berry-like cones, the tree does not attract other wildlife, nor does it present a litter problem. It performs best in full sun where it dries quickly after rain events. It is tolerant of a variety of soil types, but well-drained soils are essential. Hollywood juniper is cold tolerant and very wind- and drought-tolerant. It also has a good tolerance to salt and other urban pollutants.

Mites and bagworms can infest the tree, and it is susceptible to root rot and bacterial blight under shady conditions or in situations where the soil remains consistently wet for long periods of time.

## *Magnolia grandiflora* 'Little Gem'

### Little Gem Magnolia

<b>Mature Height (ft.):</b>	15 to 20
<b>Spread (ft.):</b>	10
<b>Growth Rate:</b>	Medium to Slow
<b>Exposure:</b>	Sun to partial shade
<b>Flower:</b>	Showy, 4 to 6 inch creamy white blooms in summer and fall
<b>Fruit:</b>	Not commonly produced
<b>Color:</b>	Dark green leaf surface with rusty bronze underside
<b>Other Cultivars:</b>	'Teddy Bear'; 'Alta'; 'Kay Paris'

Considered a dwarf form of southern magnolia, the Little Gem magnolia is a slow-growing hybrid of *Magnolia grandiflora* that only grows to approximately 20 feet in height. Its attractive evergreen leaves provide interest all year, with a lustrous, dark green surface and rusty bronze underneath. Although considered a broadleaf evergreen, some of the thick leathery leaves will shed as new growth emerges in late winter / early spring. However, these leaves are smaller than the southern magnolia, therefore leaf litter is less of a problem.

Unlike the southern magnolia, this variety will bloom when the tree is relatively young. These creamy-white, lemony vanilla-scented blooms last longer through the growing season than other magnolias, making 'Little Gem' an effective ornamental showpiece in the landscape. These plants may be used as evergreen screens, refined specimens or container accents. Mature plants maintain an attractive, upright form, and can be allowed to retain their lower branches to the ground, making this plant an excellent choice for use as a hedge or backdrop. Proper pruning of young trees will improve form and long-term performance of this trees.

They are virtually pest and disease-free plants that will tolerate occasionally wet soils, as well as moderate drought once established. Supplemental winter irrigation is required during the establishment period of the first few years after planting. 'Little Gem' prefers moist, well-drained, slightly acidic soils, therefore careful site selection is mandatory for the vitality and long-term performance of this tree.



Small Evergreen

Choose Your Tree



## *Prunus caroliniana* Cherry Laurel

<b>Mature Height (ft.):</b>	<b>20 to 25</b>
<b>Spread (ft.):</b>	<b>20 to 25</b>
<b>Growth Rate:</b>	<b>Rapid</b>
<b>Exposure:</b>	<b>Sun to partial shade</b>
<b>Flower:</b>	<b>Small, creamy white blooms in clusters</b>
<b>Fruit:</b>	<b>Shiny black in late summer / early fall</b>
<b>Color:</b>	<b>Glossy deep green</b>
<b>Cultivars:</b>	<b>'Bright N Tight' (compact pyramidal habit)</b>

Cherry laurel is a fast growing small evergreen tree with fragrant tiny white flowers in dense clusters that appear in early spring. Bees are attracted to the fragrant flowers. The crushed leaves and twigs may give off a subtle sweet cherry fragrance; however, all plant parts are poisonous and should not be eaten by humans. In late summer to early fall, an abundance of shiny black fruits ripen, providing a very good food source for birds and other wildlife.

This tree is prone to suckers at the base that may require occasional pruning to maintain an attractive upright oval tree form. Otherwise, it tends to form a large shrub. It is often intentionally grown as a shrub or hedge as it responds well to trimming. Shrubs can be pruned into shapes if desired; however, maintaining a tight, controlled form requires frequent pruning due to the vigorous growth of the plant. In its natural habitat, it is often encountered in large colonies due to the vast production of fruit and its tendency to sucker at both the base and the root. Seeds are viable and will germinate easily beneath the tree. Birds also contribute to the distribution of seeds, often beneath power lines, creating cherry laurel lanes in utility corridors.

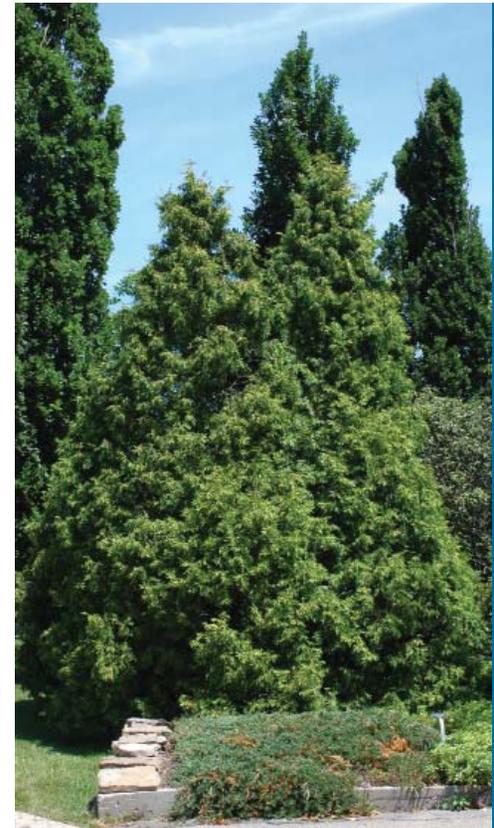
Cherry laurel is adaptable to most light conditions and will grow in practically any well-drained soil. It will perform poorly in soggy soils, but will tolerate clay soil where water does not stand. Cherry laurel will not tolerate hot, dry conditions, but it is moderately drought-tolerant once established.

## *Thuja occidentalis* Eastern Arborvitae

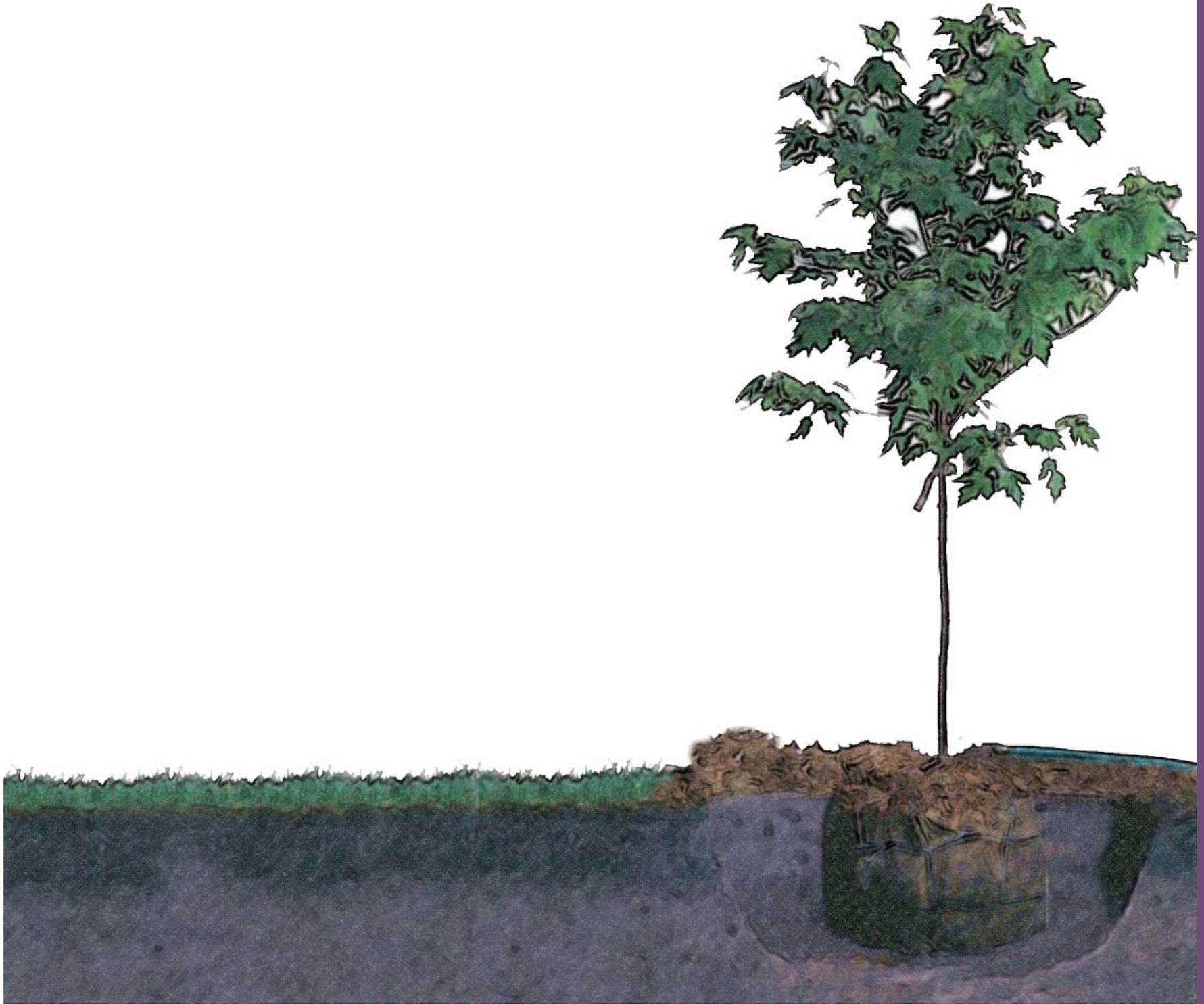
<b>Mature Height (ft.):</b>	Varies by cultivar
<b>Spread (ft.):</b>	Varies by cultivar
<b>Growth Rate:</b>	Slow to moderate
<b>Exposure:</b>	Sun to shade
<b>Flower:</b>	Inconspicuous
<b>Fruit:</b>	½ inch woody cones
<b>Color:</b>	Medium to dark green; varies by cultivar
<b>Cultivars:</b>	'Pyramidalis' (pyramidal light green); 'Techny' (pyramidal dark green); 'WinterGreen' (pyramidal holds color in winter); 'Rheingold' (compact golden-orange foliage); 'Emerald' (upright dark green); 'Aura' (globular golden-yellow foliage)

Eastern arborvitae is a dense, conical evergreen an upright branching habit. Generally there is a single central leader that should be encouraged. The bark is reddish brown with fissures and furrows. Its leaves tend to be medium to dark green in summer depending on the cultivar, generally turning yellowish brown in winter. Winter color can be rather unattractive. The size of arborvitae varies greatly by cultivar, but most available upright tree forms are 20 to 30 feet tall with an 8 to 10 foot spread. It tolerates pruning well, and its size and shape may be controlled to suit its design use in the landscape.

This tree requires a fair amount of humidity and soil moisture, and is particularly sensitive to lack of moisture in winter. It prefers deep, well-drained soil and will thrive in marshy loam with full sun. Although this tree will tolerate part shade, it will become thin and spindly in full shade. Eastern arborvitae is susceptible to strong wind, snow, and ice damage, and will suffer from drought, exposure, and desiccation by dry winds. But once well established, the tree becomes more heat and drought tolerant.







**Plant Your Tree**

## SELECTING PLANT MATERIAL

Whether planting a single tree on a residential property, or developing an entire landscape design, the most important factor is the selection of an appropriate tree for the location.

### Adaptability

Most importantly, analyze the environmental conditions of the site before the selection process begins (sun/shade, moisture, drainage, exposure to the elements throughout the seasons, and soil type). A soil test and drainage test may be useful. Research the tree's culture to select a species that will tolerate the conditions of your site, and then narrow your selection considering the following factors.

### Culture

Select healthy, pest-free trees from a reputable nursery. Check on the tree's resistance to insects and disease and tolerance to the conditions in the landscape. Consider the maintenance of the tree through its life cycle (litter, weak wood, poisonous fruits, etc.), rate of growth, and expected mature size.

### Scale

Make sure the scale of the mature tree is compatible with the scale of the surrounding structures and landscaping. Maintain a comfortable ratio between trees and structures. Examples include small to medium sized trees near a single-story dwelling and medium to large trees in commercial or public areas. Refer to "TREE SPACING" on page 14 for recommendations on selecting appropriately sized trees and guidelines for spacing trees based on their growth habit and size.

### Shape

Consider the shape (or form) of your tree as it matures to ensure the design intent is achieved in your landscape. For example, select full and rounded trees that keep low canopies for screening, pyramidal or ornamental trees for accents, and large-spreading, high-canopied trees for shade.

### Color

Consider the colors of the tree through each season, whether acting as a backdrop or in the foreground, to complement the colors of surrounding materials. For example, plants may lose their effectiveness in the landscape if the color of the plant matches the color of its surroundings, causing it to "disappear." Conversely, avoid trees that may clash with the colors of their surroundings. If the interest is fall color, select the tree during late September or October, when the leaves change color.

## PURCHASING PLANT MATERIAL

Plants are available several ways. Below are three of the most popular methods.

### Balled and burlapped (B&B)

B&B trees are large and usually purchased by contractors for commercial or public sites. Occasionally, contractors plant these in home landscapes. Trees are dug with roots and soil intact. The root ball is covered with burlap and held together with string or wire. Approximately 80% of the roots are lost during digging, and damage to the remaining roots can cause tree death. Remove the wire cage from the root ball and the string from around the trunk when planting to prevent the tree from being girdled. This growth causes stress that can eventually kill the tree. The burlap will decompose in the soil and not cause any harm to the tree or its roots. Plant B&B trees soon after purchase and do not let the root ball dry out.

### Container grown

There are a variety of modified growing systems continually being developed to provide plant material healthier root systems. Container grown stock usually produces a good quality tree since the roots are not disturbed during harvest. Container grown plants are available for homeowners who plant smaller sized trees than contractors. Container grown trees need to be transplanted to bigger pots as

they grow. If this does not occur, plants develop extensive roots that encircle the inside of the container (root bound). Avoid trees in this condition. Planting can be delayed for a short time after purchase. Monitor moisture and water as needed.

## **Bare root**

These trees are sold primarily through mail order. Bare root plants are dormant young deciduous trees and shrubs sold for early spring planting. The roots should be wrapped in a material that can be kept moist. Remove the bag and any string or wire when planting. Plant soon after purchase/arrival.

## **TREE QUALITY**

After selecting a tree species, look for the following characteristics when purchasing the tree:

- Trunk should be stout. Twigs on the trunk are desirable, since sunscald is reduced.
- Branching structure should be symmetrical with no overlapping or rubbing branches.
- Bark should be intact; with no peeling, cracking, or scarring.
- Leaves should be consistent in size and color, and free from insects, discoloration, dried spots, or blemishes.
- Root ball should be solid and free from loose soil and cracks from lack of water.
- Inspect container-grown trees to ensure they are not root bound.

## **WHEN TO PLANT**

In general, broadleaf evergreens (holly and magnolia) should be planted in the spring. Pine and deciduous shade and ornamental trees should be planted in early fall.

## **Bare root plants**

It is best to plant bare root plants in late winter or early spring. Make sure the soil is loose and in good condition to allow the roots to readily take in water, oxygen, and nutrients. Avoid planting during exceptionally wet, dry, or windy conditions.

## **Balled and burlapped (B&B) and container-grown stock**

It is best to plant deciduous B&B trees while they are dormant, after they have dropped their leaves in the fall and before bud break. Cool temperatures and moist soils aid trees in establishing roots before spring, when their energy is redirected toward leaf production. Container-grown stock extends the time in which trees can be planted, but it is best to plant trees in the spring before temperatures reach 80° F, or early fall before the soil freezes. Avoid planting all trees during times of extreme heat or cold, low wind-chill temperatures, or high winds.

## **Evergreen trees**

Most evergreen trees can be planted in the early fall, as long as moisture in the soil is adequate and maintained throughout the winter months. Broadleaf evergreen trees should be planted in the spring.

## **PREPARING SOIL FOR PLANTING**

Researchers recommend planting tree species that tolerate the soil type on site. If the soil is clay, trees that tolerate “wet feet” or poor drainage and dry periods are the best choice. If the soil is sandy, then the drainage capacity is better than clay soils; therefore, tree species that tolerate good drainage are appropriate choices.

Frequently, new sites contain poor soil due to construction practices. Often, the topsoil is removed during the initial construction phase. The remaining soil is compacted from heavy equipment usage and storage, and building debris may be buried below the soil surface. Remove all debris. Compost can be incorporated into the soil; however, this may be expensive depending on the size of the area.

Also, the compost will decompose and additional organic matter will be difficult, if not impossible, to add after trees are established.

Use backfill soil removed from the planting hole to plant the tree. If a loam or peat moss is mixed with backfill soil, establishment is delayed. Roots grow in the good soil, but growth slows as they have a difficult time establishing in the poorer quality soil. This affects the overall growth of the tree. By using backfill soil as the tree is planted, the tree develops a tolerance to the natural surrounding soil.

## PLANTING PROCEDURES

1. Dig the planting hole two to three times the diameter of the tree's root ball, and only as deep as the height of the root ball. If soils are heavy clay, it is beneficial to work the soil three to five times the diameter of the root ball, and make the planting hole two to four inches shallower than the height of the root ball so the root ball is slightly higher than the existing grade. This allows for drainage.
2. Be sure to remove any container or packaging material around the root ball, taking care to not disturb the root ball. Remove the burlap around the trunk. All string, wires, and ties should be removed completely. Place the plant in the center of the hole.
3. Fill the planting hole with soil and tamp lightly. Make sure to cover any exposed areas of the root ball with soil, tapering the soil to the existing grade.
4. Water the tree slowly and thoroughly after planting, then hand water thoroughly every seven to ten days during the establishment period. Irrigation is not necessary if at least one inch of rainfall per week is received during the growing season.
5. Place three to four inches of mulch under the drip-line of the tree. This area extends to the outer branches. A six-foot diameter is a good general rule. Keep mulch away from the trunk to avoid harm to the tree bark from organisms that cause decay. Properly maintained mulch reduces weed competition and prevents mower damage.
6. As a tree moves or flexes, it develops strength. If a tree requires staking, ensure there is plenty of room for movement. Protect the bark from wire ties or ropes with cushioning such as tree straps. Wires or similar materials can damage the bark. Place stakes outside of the planting hole in firm, undisturbed soil. Stakes should remain on trees for a minimum of one growing season, but no longer than two growing seasons.
7. Sunscald is a problem on young, thin-barked trees. This is also called southwest injury since it occurs on the southwest side of tree trunks. This damage weakens the tree and provides a source for insects and diseases to enter. Twigs shade the trunk; however, if twigs do not provide adequate cover about the trunk, install tree wrap in November and remove in March.

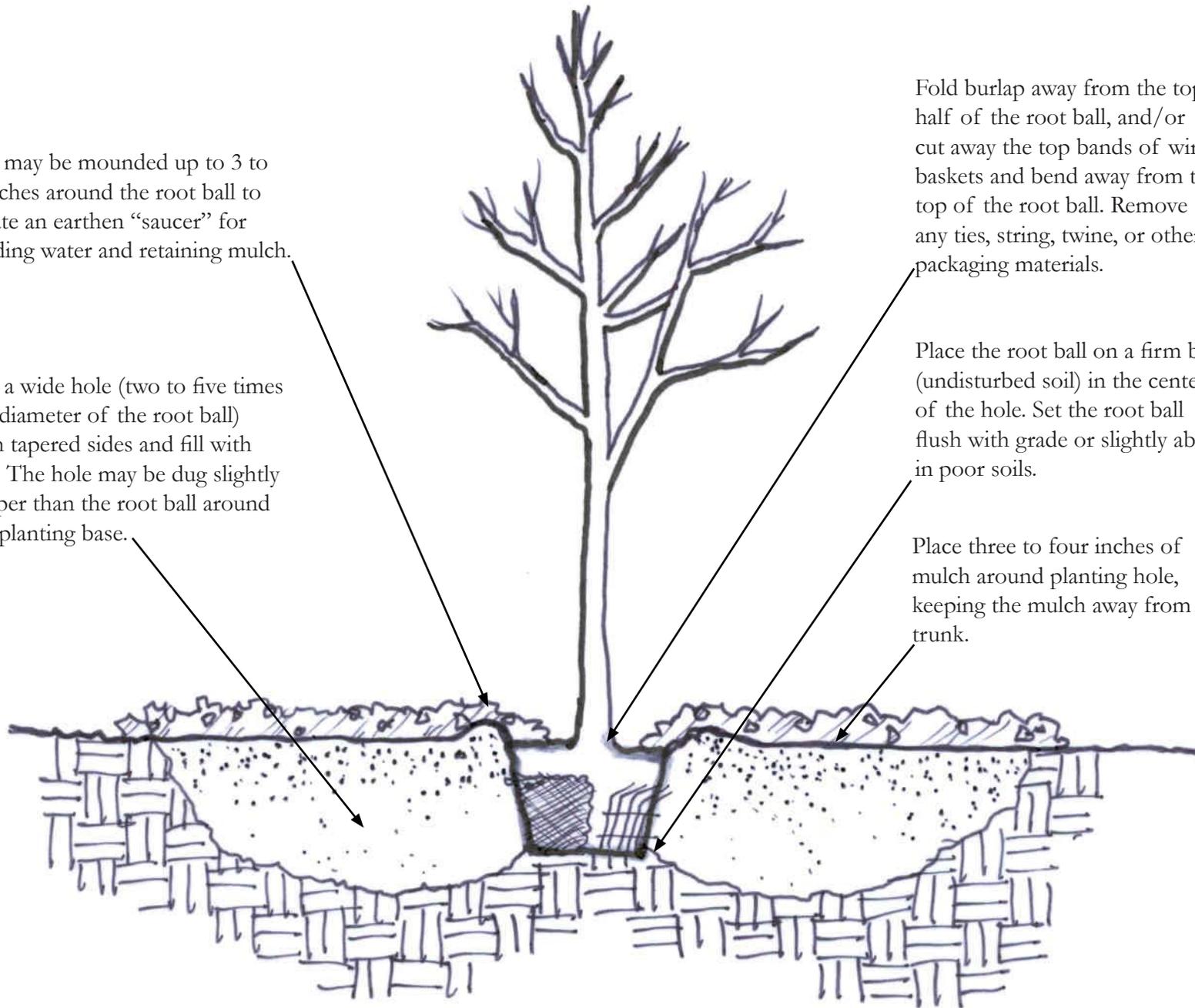
## Things to keep in mind when planting your tree

- The sides of the planting hole should be rough and broken up. Glazed soils may create a "bowl" where water can collect in the planting hole and affect the health of the tree. In addition, roots may not be able to penetrate this compressed soil and may grow in an unhealthy manner within the confines of the bowl area.
- Be sure to remove any tree tags or ribbons from branches.
- A circular ring of soil (tree well) can be built up from grade about three inches in height around the diameter of the root ball. This well helps retain water around the root ball, allowing water to soak into the soil where it is most needed.
- Prune any broken branches, but be prudent with corrective pruning cuts until the tree has had time to establish.

## Tree Planting Detail

Soil may be mounded up to 3 to 4 inches around the root ball to create an earthen “saucer” for holding water and retaining mulch.

Dig a wide hole (two to five times the diameter of the root ball) with tapered sides and fill with soil. The hole may be dug slightly deeper than the root ball around the planting base.



Fold burlap away from the top half of the root ball, and/or cut away the top bands of wire baskets and bend away from the top of the root ball. Remove any ties, string, twine, or other packaging materials.

Place the root ball on a firm base (undisturbed soil) in the center of the hole. Set the root ball flush with grade or slightly above in poor soils.

Place three to four inches of mulch around planting hole, keeping the mulch away from the trunk.





Care for Your Tree

## COMMON PROBLEMS OF TREES

### Wet feet

Over watering and clay soils are the main contributors to this condition. Some trees do not tolerate clay soils, which contribute to poor drainage. Often, trees respond to wet feet by wilting, which may be mistakenly interpreted as lack of water.

### Nutrient deficiency

Soil pH affects the availability of nutrients that trees and plants can absorb. If the pH is too high or low, the plant may not be able to utilize nutrients even though they are sufficient in the soil. A soil test clarifies this situation and an expert can recommend proper treatment.

### Leaf/trunk damage

Some trees are sensitive to the hot, drying summer winds common to Oklahoma. Often, the tips of leaves turn brown in the summer due to this condition. Although trees can tolerate summer leaf damage, sunscald injury that occurs on tree trunks is more difficult to overcome. This occurs on warm winter days when the temperature of the bark rises and then drops quickly. To reduce this damage on young, thin-barked trees, place tree wrap on the trunk during winter months, or retain leaves and small branches about the trunk.

### Diseases

Disease organisms that infect trees include fungi, bacteria, viruses, and nematodes. Symptoms caused by these organisms include leaf spot, stem die-back, cankers, root rot, and wilts which can lead to the death of the tree, depending on the organism or the severity of symptoms. Favorable conditions that promote organism infections and growth include consistent low light or cloudy days, leaf wetness and/or high humidity for several hours, and mild temperatures. Removal of diseased leaves, needles, and trees reduces the spread of disease. Before applying any chemicals, consult an expert to determine if a fungicide is necessary or available. The best method

for reducing the occurrence of disease is to select and plant disease-resistant trees.

### Insect problems

Pest insects are attracted to stressed trees. Most insects harm trees by feeding on leaves, which may lead to defoliation. As the tree uses precious energy to produce new leaves, the health of the tree may continue to decline. A few insects are vectors that transmit devastating disease organisms. If insect populations are high and severe damage is anticipated, a high-pressure water hose will knock many from leaves. Consult an expert to determine if an insecticide is necessary before applying any pesticide.

### Ice and wind

Strong winds and heavy accumulations of ice or snow may break weak-limbed trees, or cause trees to uproot. Select slow growing trees that tolerate these weather conditions. For example, Silverleaf maples grow fast and are notorious for receiving wind damage. Consult a professional tree trimmer to properly prune trees to prevent an accident or further tree damage. ALWAYS consult an expert before pruning trees with storm damage. Some trees may require removal instead of selective pruning.

### pH problems

Most soils in Central Oklahoma have a high pH (alkaline). Some plants will not tolerate alkaline soils. To ensure the vitality and long-term health of your plants, select trees that tolerate high pH soils. If pH problems are suspected to be affecting established trees, an expert can interpret a soil test result and recommend the proper amount of sulfur to reduce the pH level.

## WATERING

### New trees

New trees require at least one inch of rainfall per week to ten days during the first growing season, and should be carefully monitored

for adequate moisture during their establishment period (around two to three years). Water slowly, allowing the water to soak the entire root system. Do not keep the soil saturated; allow the soil to somewhat dry out between waterings.

### **Winter irrigation**

Winter dehydration is an often overlooked form of drought. Dry, cold weather is a major contributor of death to newly planted trees. All plants use water in the winter. Check the soil before irrigating to ensure it is dry.

## **MULCHING**

One of the most important and cost-effective practices for keeping the soil moist and weed-free around new trees is to apply a thick layer of mulch. It also cools the soil in the summer and reduces erosion due to bare soil. The thickness of the layer of mulch may vary between two and four inches deep. Fresh mulch should be regularly reapplied to maintain a thick layer over the soil, as mulch decomposes or is lost from surface runoff. Local utility companies can provide large amounts of chipped wood for a nominal fee.

There are numerous types of organic mulches:

### **Chipped wood or bark**

Certain bark mulches that are lightweight and loose-structured, such as pine bark, can wash away from a heavy rainfall. Large, coarse textured mulches are good at providing ample air circulation and avenues for the movement of water. Avoid black walnut tree wood chips. Black walnuts contain a natural compound that inhibits plant growth.

### **Shredded wood**

Shredded mulches tend to lock in place as they settle, forming a more dense structure that is harder to budge by running water. Shredded cypress or cedar mulch has an attractive color and scent when fresh, and provides relatively stable and long-lasting coverage.

### **Seed hulls**

Cotton seed and cocoa hulls are extremely lightweight, and often need to be reapplied after strong winds or significant rains. Peanut hulls supply plant nutrients and improve soil structure. Pecan hulls are heavier and more durable, and remain intact for a long time. In addition, pecan hulls provide a rich color and add the benefit of leeching acidity into our highly alkaline soils.

### **Conifer needles**

Pine needles decompose rather slowly, improve soil condition, and over time, will increase soil acidity. However, if applied too thickly, may mat down and restrict air and water movement.

### **Leaves**

Fresh leaves are considered a poor mulching material because they compress together so tightly they restrict air circulation and water flow to the root ball. Whole leaves should be allowed to decompose slightly before applying in thick layers as mulch. The best practice is to shred whole leaves, or mix shredded leaves with other organic materials to reduce matting and mulch loss from wind.

### **Lawn clippings**

These are the least effective and desirable organic mulch, as they are lightweight, and may form a dense mat that restricts air and water to the root zone. In addition, grass clippings may contain herbicides and weed seeds. Grass clippings may be used in conjunction with other yard waste to form a looser-structured organic compost.

## CHEMICAL APPLICATIONS

When trees are planted in environments that are not well suited to their biological needs, they are more prone to disease and pests. The application of fertilizers and pesticides temporarily and artificially alters those environments so that the tree may have a better chance of survival. However, fertilizers and pesticides can have a devastating long-term effect on our environment, most notably through the contamination of surface and groundwater.

Choosing plant material that is suitable to the site in which it will be planted is the most effective way to ensure both a healthy tree and a healthy environment. Employ the lowest impact treatment first when, and if, supplemental fertilizing becomes necessary or pests become detrimental to the health of the plant. There are various natural methods available to improve soil condition and control pests.

Always ensure that the problem affecting the health of your tree is known before applying chemicals to treat a symptom. Also, treatment should be applied at the recommended rate and under the conditions described on the label. Inappropriate applications of chemicals may be detrimental to your tree. For example, if an insect pest is treated through a general, non-selective pesticide application, any natural insect predator that could keep that pest in check could also be killed.

Careless use of chemicals, whether liquid, powder, or granular form, can be a serious threat to the water quality of streams, rivers, and lakes, and may contribute to a broad range of environmental problems. To minimize this threat, the least toxic chemical labeled for the specific problem should be carefully applied while strictly following the directions provided on the label. Do not use chemicals at a higher application rate or more often than is stated on the label. Proper disposal methods for unused pesticides and chemicals should always be followed. Never discard chemicals as household waste or pour into sinks or storm drains. Oklahoma City provides free

hazardous waste disposal at their municipal facility, located at SW 15th Street and Portland Avenue.

### Herbicides

Herbicides are commonly used to control weeds and other unwanted vegetation, but if used improperly, they can cause serious damage or death to desired plant materials. Herbicide damage can be caused by drift or overspray, runoff, or direct contact with desired plants. In addition, improper application rate, wrong choice/selection of product, or incorrect timing of the application can also cause damage.

### Pesticides

Other pesticides, such as fungicides, insecticides, miticides, and other related controls can also contribute to environmental problems. Often pesticides are used in response to a perceived disease or insect problem. Many trees can tolerate a reasonable amount of pest damage without long-term detrimental effects; therefore, applications of pesticides are not always necessary. Pesticides are important tools that should be respected and should only be used according to label directions.

Less than 10% of the insect population is actually harmful to plants, yet insecticides eliminate many more insects - including beneficial ones.<sup>1</sup> When insecticides are used and the beneficial insects are killed, the pest insect problem may become worse in the next generation without a “checks and balance” system in place. For many small insects like aphids or lacebugs, predatory insects keep pest insect populations balanced.

### Fertilizers

Fertilizers may be a source of pollution in urban areas. When used improperly, chemical or synthetic fertilizer residual may cause serious damage to tree roots and kill soil microbes. Excess nutrients

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<sup>1</sup> Environmental Protection Agency Publication, [Green Landscaping – Benefits of Native Plants](#), January 1997.

may also lead to groundwater contamination through leaching and surface water pollution through runoff. Surface water is negatively affected when algae and other aquatic weeds grow due to increased phosphorous and nitrogen levels. Fertilizer applications should not be a regularly scheduled activity or routine, but should be performed according to actual nutrient requirements for your soil. Always perform a soil test to determine nutrient deficiencies or excesses, and apply the proper amount and type of fertilizer.

Young trees or newly planted trees may benefit from an application of fertilizer after one year of establishment. Fall is a good time to fertilize after the first killing frost. A soil test is recommended to ensure the proper amounts of nutrients and pH levels are maintained. Contact the County Extension office for information on soil sample collections and the recommended fertilizer ratio for your situation.

## ORGANIC FERTILIZERS & NATURAL PEST CONTROL

An alternative to chemical applications is the use of organic fertilizers and natural pest controls. Organic fertilizers, such as manures, compost, processed sludge, etc. can improve the condition of the soil while providing available nutrients for the plant. However, when improperly applied, organic fertilizers can damage plants, and excess nutrients may leach or runoff, degrading water quality.

Natural pest controls create an environment where pest populations are regulated by biological means, such as the use of companion planting, predator insects, and/or beneficial bacteria/viruses. Natural pest control measures may be used to restore and maintain the balance of natural predators and pests, which may have been disrupted by the use of pesticides. Many nurseries and websites can offer information on the purchase of various predators such as lady bugs, praying mantis, spiders, and other insects.

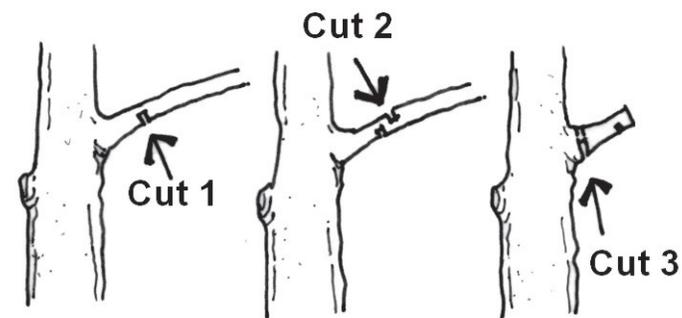
If pests are present, the least-toxic choice of control methods should be used first, such as repellents, beneficial insects, and/or biological soaps or oils. The more toxic but short-lived botanical or natural

insecticides should be used only if necessary to minimize the risk of harm to beneficial insects, wildlife, and water quality.

## “DOs” & “DON’Ts” OF TRIMMING OR PRUNING

### Proper procedures

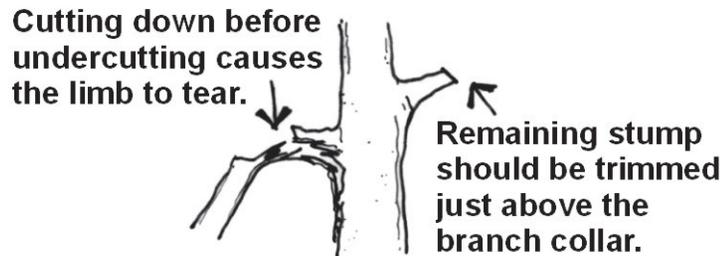
- Contact a professional Arborist or tree trimmer if you cannot prune safely from the ground with a hand tool. This will reduce accidents and tree damage. Professionals and County Extension offices have additional information on specific pruning practices for your situation.
- Prune most trees while dormant. Spring-flowering trees (redbud, crabapple, smoketree, etc.) should be pruned after the flowers fade.
- Remove injured or diseased branches immediately to reduce potential hazards.
- Prune only broken or damaged branches after planting.
- Always prune just above the branch collar.
- Prune young branches before they reach one inch in diameter.



1. Undercut 12"-24" out from the branch collar part-way through the limb.
2. Cut downward all the way through the limb 2"-3" to the outside of the first cut.
3. Trim the remaining stump just above the branch collar.

### Improper procedures

- Never remove more than one-third of the total mass of an established tree.
- Never top a tree (remove the main leader). This does not improve growth and increases disease and insect infestation.
- To avoid stimulating new growth, do not prune from late summer until the tree goes dormant in early winter. Do not prune during the spring flush of growth.
- Do not over-prune new trees. If possible, leave lower limbs and twigs on trunks for the first few seasons to reduce sunscald damage.
- Do not plant large-maturing trees under overhead lines. This often leads to harsh pruning, which distorts the tree's natural shape and weakens the tree, creating potential hazards from wind and ice damage.



## PROTECTING YOUNG TREES

### During the winter months

Protect young thin-barked tree species from sunscald (southwest injury) during their establishment period of the first two to three years. Southwest injury occurs when solar radiation heats the southwest side of the tree during the winter months, causing bark cells to absorb water during the day. Cells do not have time to expel this water before nighttime temperatures drop below freezing.

This activity causes bark cells to rupture as internal water freezes. Thin-barked trees, such as maple, are quite susceptible to damage.

### When, why, and how to wrap young tree trunks

Wrap trunks in November and remove the wrap in March before temperatures warm. Tree wrap provides a micro-environment for insects and diseases to attack the trunk during the growing season, so removal is required. Commercial crepe-type tree wrap, available at your local nursery, is recommended. To apply the wrap, begin at the base of the trunk, overlapping the edges of the wrap by approximately one-third to one-half. Secure the end with tape or tuck the end under.

### Lawn equipment might be a threat

Ideally, trees should be planted in locations where the use of lawn mowers and weed trimmers cannot damage trunks. If located in areas that may be exposed to such equipment, a mulched area a minimum of six feet in diameter should be installed and maintained at the base of the tree. As an alternative, tree guards may be used to protect the base of trees from lawn equipment damage. Install tree guards flush with the ground. Check the guards regularly to make sure they are not damaged or moved away from the trunk. It is important to allow the guards to expand as the tree matures to avoid girdling or damage to the trunk. As trees mature and develop thicker bark, the guards will no longer be necessary and should be removed.

### When to remove staking or bracing systems

Most trees' bracing systems, which may include tree stakes, straps, or other bracing methods, should be removed after the first growing season. Some larger evergreen trees like cedars may require longer periods of support, but should be inspected regularly to avoid potential damage. Leaving supports on for too long can permanently damage trees.

<b>ANNUAL MAINTENANCE SCHEDULE<sup>1</sup></b>	
<b>January</b>	<ul style="list-style-type: none"> <li>• Protect against winter drought – if precipitation has been deficient (less than 1” of snow or 1/10” of rainfall per week), be sure to irrigate plantings.</li> <li>• Treat young pines for tip borers if you did not do so in November.</li> </ul>
<b>February</b>	<ul style="list-style-type: none"> <li>• May fertilize trees per soil test requirements.</li> <li>• Prune shade trees, summer flowering shrubs and hedges.</li> <li>• Plant bare-rooted trees and shrubs.</li> <li>• Apply broad-spectrum herbicide with pre-emergents to dormant Bermuda lawns.</li> </ul>
<b>March</b>	<ul style="list-style-type: none"> <li>• Apply new or replenish existing mulch in beds and tree wells.</li> <li>• Prune roses before first signs of growth.</li> <li>• Mow or cut back lirioppe and other ornamental grasses.</li> <li>• Divide and replant summer and fall blooming perennials.</li> <li>• Prune spring-flowering shrubs.</li> </ul>
<b>April</b>	<ul style="list-style-type: none"> <li>• Time to watch for and control fungus and disease.</li> <li>• Watch for cedar-apple rust. May treat affected apple and crabapple trees with a fungicide following a rain when signs of the disease appear on junipers.</li> <li>• Watch for signs of powdery mildew to appear in spring and treat immediately.</li> <li>• In mid-April, plant bedding plants, summer flowering bulbs and annual flower seeds.</li> </ul>
<b>May</b>	<ul style="list-style-type: none"> <li>• Time to watch for harmful insect pests. <ul style="list-style-type: none"> <li>- Bagworms on juniper and arborvitae</li> <li>- Elm leaf beetles on elm</li> <li>- Webworms on mimosa and honey locust</li> <li>- Lace bugs on sycamore, pyracantha and azalea</li> </ul> </li> </ul>

<b>June</b>	<ul style="list-style-type: none"> <li>• Remove or prune back unwanted or overgrown limbs on new trees.</li> <li>• Continue to watch for harmful insects, including spider mites.</li> <li>• Maintain adequate moisture in the soil. May need up to one inch of water per week for new plantings.</li> </ul>
<b>July</b>	<ul style="list-style-type: none"> <li>• Continue to watch for and control spider mites.</li> <li>• Continue to supplement water for new plantings as needed.</li> </ul>
<b>August</b>	<ul style="list-style-type: none"> <li>• May need to irrigate plantings during times of drought.</li> <li>• Divide and replant spring blooming perennials.</li> <li>• Prune hedges and shrubs.</li> <li>• May fertilize young trees and shrubs.</li> <li>• Watch for and treat grubs in lawns.</li> <li>• May apply pre-emergent weed killer for winter weeds on warm-season lawns, such as Bermuda.</li> </ul>
<b>September</b>	<ul style="list-style-type: none"> <li>• Select spring flowering bulbs.</li> </ul>
<b>October</b>	<ul style="list-style-type: none"> <li>• Plant spring flowering bulbs.</li> <li>• Dig and store frost-tender bulbs and tubers for next planting season.</li> <li>• Plant container-grown shade trees and pines.</li> </ul>
<b>November</b>	<ul style="list-style-type: none"> <li>• If plants are performing poorly, may want to test soils for nutrient deficiencies before winter.</li> <li>• Compost plant debris and leaves.</li> <li>• Treat pines for tip borers.</li> </ul>
<b>December</b>	<ul style="list-style-type: none"> <li>• Protect against winter injury and drought by irrigating plantings prior to hard freezes if soil is dry.</li> </ul>

<sup>1</sup> OSU Extension Fact Sheet F-6408, “Landscape Maintenance Schedule”



## **GLOSSARY**

### **Bioregion**

A geographic area that shares similar plant and animal species, water, climate, rocks, soils, and landforms and is bounded by natural rather than artificial borders. Also may be called an “Ecoregion.”

### **Canopy**

The upper most branches and foliage of a single tree, or a group of trees.

### **Catkin**

A compact and often drooping cluster of reduced, stalkless flowers.

### **Chlorosis**

A condition in which leaves produce insufficient chlorophyll due to the lack of available iron or other necessary minerals, causing normally green plant tissue to appear yellow, yellowish-green, pale green, or white.

### **Columnar Form**

A narrow, upright form of a tree or plant.

### **Compound Leaves**

A leaf divided into smaller leaflets.

### **Cultivar**

A “cultivated variety”; or new plants, arising either naturally or as a result of hybridization, but selected and maintained by persons.

### **Deciduous**

The term that applies to plants that drop their leaves at the end of each growing season.

### **Defoliation**

To cause the leaves of a plant to drop.

### **Endemic**

To be unique to and growing only in a specific part of an area, habitat, or bioregion.

### **Evergreen**

Plants that keep their foliage throughout the dormant season.

### **Exotic / Introduced**

A non-native or non-indigenous plant species brought deliberately or accidentally by human activity to an area outside of its native distributional range that may become established and reproduce there without human assistance.

### **Fastigate Form**

An upright form of a tree with vertical, somewhat parallel branches.

### **Germinate**

Seeds initiate growth or sprout.

### **Globular Form**

A tree’s form that has a round shape.

### **Grafted Trees**

Trees that are propagated by joining the stem of one tree to another. In most cases, the stem of a tree selected for its ornamental attributes is grafted to the stem of a tree selected for its hardier rootstock. Grafting is a technique used to combine specific characteristics from different trees, and can be used to manipulate fruit-production, create weeping form, or improve performance.

### **Growth Rate**

The rate at which a tree species may typically grow in a year. In this guide, growth rates are generally defined as:

- Slow - up to 12 inches per year
- Medium - up to 24 inches per year
- Fast - more than 24 inches per year

### **Hybrid**

A plant resulting from a cross between two or more parents.

### **Indigenous**

Originating or occurring naturally in an area or environment.

**Inflorescence**

The flowering part of a plant, where the structure consists of more than one flower and usually comprises distinct individual flowers.

**Introduced**

See exotic.

**Invasive**

Typically non-indigenous species, but can include indigenous species that have a marked tendency to spread and impose a negative impact on the existing habitat. Trees may become invasive due to a loss of natural controls in the environment or from being introduced into a new environment which has no natural controls.

**Latent Bud**

A bud that is undeveloped or dormant, but is capable of normal growth under the proper conditions.

**Native**

Plant species indigenous to a specific area, habitat, or bioregion.

**Panicles**

A loose, irregularly compound inflorescence with pedicellate flowers.

**Pendulous Form**

More or less hanging or weeping.

**Perennial (Herbaceous)**

A non-woody plant that lives without end as long as the environment is favorable, and dies back to the ground in the winter and then comes back in the spring.

**Perennial (Woody)**

A plant that lives for more than a year, has hard rather than fleshy stems, and bears buds that survive above ground in winter.

**Propagation**

Production of living plants from seed or by vegetative means.

**Pyramidal Form**

A tree's form that has longer branches at the base of the tree and shorter branches towards the top forming a pyramid shape.

**Seedling Variation / Seedling Variability**

Seedling offspring produced by the parent plant may not necessarily perform in the same manner as the parent.

**Species**

A population of plants that have the potential to freely breed with one another and that is discontinuous in variation from other plants.

**Sprout**

Unwanted shoots that occur on the trunk or branches of the tree.

**Sucker**

Vigorous, upright shoots that grow from below the ground or roots, primarily from latent buds.

**Tap Root**

An enlarged or primary root which initially anchors the tree by growing vertically downward. This central root will give rise to lateral roots that become the primary life support system for the tree.

**Terminal Bud**

A bud formed at the tip of a stem, twig or branchlet.

**Understory**

The shrubs and smaller trees growing between the forest canopy and the groundcover.

**Watersprouts**

Vigorous, upright shoots that grow above the ground, primarily from latent buds on the trunk or older branches.

**Weeping Form**

Having drooping branches.

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*The best time to plant a tree was 20 years ago.  
The next best time is now.*

*~Chinese Proverb*

