chapter 11

Woody Ornamentals

UNIVERSITY OF WISCONSIN–MADISON • DIVISION OF EXTENSION
FOUNDATIONS IN HORTICULTURE

In a nutshell...

- Woody ornamentals are long-term investments that form the backbone of your landscape.
- Most woody ornamentals and especially trees need supplemental water for the first year or two.
- Trees live on a different timeline: *"Time is different for a tree than for a man. Sun and soil and water, these are the things a weirwood understands, not days and years and centuries. For men, time is a river. We are trapped in its flow, hurtling from past to present, always in the same direction. The lives of trees are different. They root and grow and die in one place, and that river does not move them. The oak is the acorn, the acorn is the oak."*

  —George R.R. Martin, A Dance with Dragons
- Check the resources at **hort.extension.wisc.edu** for issues not covered in this chapter.

MASTER GARDENER
UNIVERSITY OF WISCONSIN–MADISON
DIVISION OF EXTENSION

Introduction

Trees, shrubs, vines, and groundcovers are key components of any landscape. These ornamental plants are long-lived and often permanent additions to their surroundings. Woody plants add beauty and natural character, increase property value, screen undesirable views, define spaces or landscape continuity, reduce noise and air pollution, and provide shade in the summer, privacy, serenity, and habitat for wildlife.

When selecting among the wide variety of ornamental plant species and cultivars available, give careful consideration to hardiness, height, growth habit, form, color, texture, site, soil requirements, and other characteristics. Proper site selection, ground preparation, and planting techniques are essential for establishment and vigorous growth. Planned maintenance and care will keep your woody ornamentals healthy and beautiful for years to come.

Learning objectives

- Understand the terminology of woody plants, trees, shrubs, and vines.
- Gain knowledge of the management and care of woody plants, with an emphasis on planting and pruning methods.
- Identify ornamental trees and shrubs hardy for your area.
- To use the resource materials, determine the ornamental plant hardiness zones, environmental adaption requirements, and cultural recommendations.

About woody ornamentals

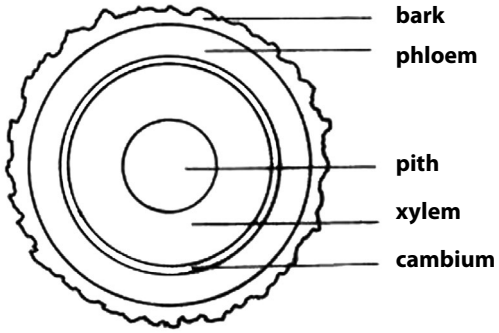
Woody ornamentals include trees, shrubs, and vines—all generally long-lived plants that will survive and perform better in your landscape when cared for properly. This care begins at planting and should extend through the life of the plant. Understanding how woody plants function is important in avoiding common mistakes when locating, planting, or maintaining trees and shrubs. Trees, shrubs and vines used for fruit production, though biologically the same as ornamentals, are managed differently to achieve optimal fruit production. See chapter 15, Fruits.

Portions of this chapter were adapted with permission from *Master Gardener Core Course,* Trees and Shrubs, University of Minnesota Extension. Author: Kathy Zuzek, extension educator—horticulture,

Woody plant structure and function

Trunks, stems, branches, twigs, leaves, and roots contain the plant's vascular system, which transports nutrients and water from the root system and the products of photosynthesis (carbohydrates) to where it is used or stored in the plant. All plants have this, but woody plants have a specific arrangement of the components. Visualize the vascular system as a series of "straws" arranged in rings within the trunk (figure 1). The outside edge is a corky bark, which serves to protect the vascular system in the inner part of the trunk.

FIGURE 1. The vascular system of a woody plant



The next ring is the **phloem**, a thin ring that transports sugars (produced through photosynthesis) from the leaves to other parts of the plants—such as flowers, fruits, or healing tissues—to use or to store for winter.

The next ring is the **cambium**, which is a ring of meristem cells that is actively dividing. As these cells divide, the trunk or stem grows wider, called secondary growth.

The next inner ring is the **xylem**, which conducts water and nutrients from the roots up to the top of the plant, for use in leaves, twigs, and buds.

The xylem and phloem are produced by the dividing cambium cells.

Finally, the center of the trunk or stem is the **pith**, which is made up of old xylem cells that lend strength and structure to the trunk or stem.

The vascular system extends to the tips of roots and into leaf veins, connecting all parts of the plant. Damage to the vascular system can prevent the movement of water and nutrients throughout the plant, resulting in poor growth, dieback, or death of the entire plant. This is more important in woody plants than in herbaceous ones, since woody plants can't just grow a new stem like annual and perennial flowers do each year.

Tree root systems are composed of large, woody, perennial roots and small, short-lived feeder roots. The large woody perennial roots are long-lived, increase in length and in diameter, anchor the tree in the ground, conduct water and minerals, and store food. They grow several feet below the ground but are primarily located in the top two feet of soil. Historically, root spread was believed to be as wide as the tree canopy. We now know that a tree's root system extends far beyond the **dripline** and is often 2 to 3 times the width of the tree crown.

Feeder roots are small (approximately 1/16" diameter) and have a lifespan of just a few weeks. They originate all along the perennial root framework but are primarily found in the top 12 inches of soil. They constitute the major part of a roots system's surface area because they branch to form large fans of roots that end in thousands of very fine root tips. Feeder roots are responsible for most of the absorption of oxygen, nutrients, and water from the soil and these roots appear and disappear based on the presence or absence of water, oxygen, and nutrients in soil.

Is it a tree or a shrub?

In general, trees have a single, perennial woody stem (trunk), a raised canopy of foliage, and a mature height of at least 13 feet. Shrubs are smaller woody plants, usually with several perennial stems branching at the base.

There really is no distinction between "tree" and "shrub" on a biological or taxonomic basis, however—these terms only describe the form and function of a particular plant within its environment. Many species of large plants are capable of growing as either a tree or a shrub, and some trees grow with multiple trunks.

Vines lack an erect stem and will climb surfaces or other plants using specialized structures such as tendrils, suction pads, or by entwining.

What affects root health and where and when roots grow? Root growth is a direct response to the localized nutrient and water content of soils. Feeder roots don't grow to these resources; instead they are produced where optimal levels of these resources are located in the soil.

Protecting the root zone

A mature tree's roots grow horizontally in the top layers of the soil, generally less than 15 inches under the surface. At that depth, oxygen needed by the roots can permeate the soil. Those roots also extend far beyond the dripline, often as much as three times as far out as the branches on the top of the tree. This is called the tree's root zone (figure 2). It is important to protect that root zone to keep the tree healthy and vigorous.

Never cover the root zone with additional soil, as this can suffocate the roots. While fast growing trees such as poplars and silver maples can tolerate a little soil placed over the root zone, slower growing trees such as oaks and sugar maples are very likely to be killed from just a couple of extra inches of soil. It may take 4 to 5 years of declining before the tree actually dies. For the same reason, installing a raised bed planter around the trunk of a mature tree is not recommended.

Sometimes roots of mature trees appear at the soil surface, especially with trees such as silver maples. In this case, it's okay to place just enough soil around the exposed roots to cover the roots so that they are not damaged when you mow under the tree.

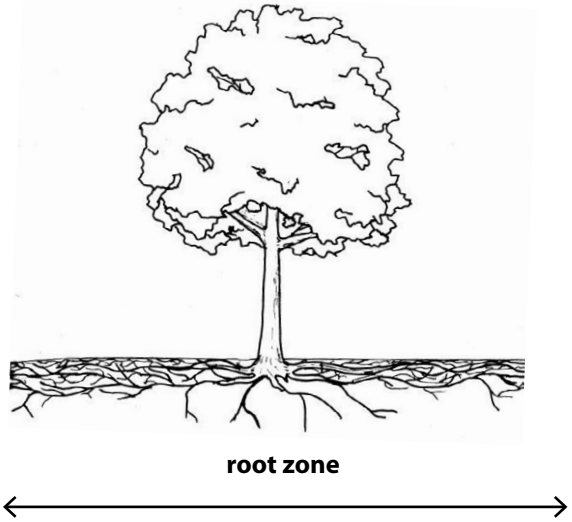
Avoid compacting the soil over the root zone by foot or vehicle traffic. This can restrict the flow of oxygen to the roots, making it difficult for them to grow. Keep in mind how far roots grow from the tree's trunk and take care when digging or excavating so that you don't damage them.

Selecting woody ornamentals

Adding woody plants to a landscape has many advantages, but it also requires significant investments in money, time, and effort. In order to develop healthy, long lasting plantings, it's important to do some research before selecting trees, shrubs, and vines. With woody ornamentals potentially living for decades, the concept of "right plant, right place" may be even more important than with herbaceous plants. Careful selection, proper planting and good follow-up maintenance will go a long ways toward ensuring that your plant purchases add longterm value and enjoyment to your landscape.

Besides adaptability to weather and physical characteristics of its new home, consider what the plant will ultimately grow into, how it can enhance (or detract from) your landscape, and how it will function in your yard. Simply observing what trees or shrubs do well in your neighborhood is also a good way to identify what common trees might be appropriate for your landscape.

FIGURE 2. A tree's root zone



Climatic adaptability

Plants can survive only within certain limits of temperature, particularly cold winter temperatures. Many are very well adapted to surviving Wisconsin winters, but some are less cold hardy than others. For more information on plant hardiness zones, see chapter 9, General Gardening Practices.

Cold hardiness

Cold hardiness is an essential concern when selecting woody plants in Wisconsin. Winter survival of woody plants is a complex issue. It is affected by a plant's genetic makeup and by specific environmental and climatic conditions which vary from year to year. Woody plant species with a wide geographical distribution usually have an equally wide range of cold hardiness. In these cases it's important to select individual plants from a provenance (location of the original seed source) with a climate similar to that of a new plant's planting location.

For example, red maple (*Acer rubrum*) is native to the United States and ranges in latitude from Maine to Florida. A red maple grown from seed originating in Maine would be better adapted to growing in Wisconsin than one grown from a Florida seed source; this is because of greater similarities in latitude and climate between Wisconsin and Maine.

Wisconsin's zones range from USDA Zone 3a in the north (where average minimum temperatures fall between -40˚F and -35˚F) to Zone 5a in the south (where average minimum temperatures fall between -20˚F and -15˚ F).

Acclimation and deacclimation

Every year, woody plants become dormant and survive low temperatures in winter through a process called acclimation. During acclimation, plants progressively develop greater cold tolerance. Acclimation occurs from late summer through early winter and is triggered by shortening day lengths and decreasing temperatures. After acclimation, woody plants typically reach their greatest degree of cold hardiness in midwinter (this is what a plant's cold hardiness rating measures). Then, as days lengthen and temperatures warm during late winter and spring, woody plants deacclimate. During deacclimation, plants lose their cold tolerance and prepare for active growth again.

Some winter injury occurs when midwinter low temperatures are extreme. But winter injury can also be due to sudden temperature changes during the acclimation and deacclimation periods. Factors that delay normal acclimation in autumn (e.g., excessive fertilizing or heavy pruning in late summer or early fall and the presence of bright lights that mimic long day lengths) make plants more susceptible to winter injury.

Plant health

Plants that are stressed by factors such as insect or disease damage, drought, or nutrient deficiency are often more susceptible to cold injury than they would be in a healthier condition.

Microclimates

Environmental factors such as sun, shade, wind protection, city heat sink effects, water bodies, and topography can affect temperatures on a very localized level. You may find that a friend who lives a few miles away can successfully grow a shrub species that has repeatedly suffered winter dieback at your house, simply because your friend has a more favorable microclimate in their yard.

The urban forest

The urban forest is made up of all the vegetation in the cities, towns, and villages where we live, including trees and shrubs on private and public lands. In many municipalities, city foresters manage the trees in the parks and along roadways. Management of trees on private property is the responsibility of the property owner. The urban canopy, however, runs across property lines.

One very important objective is the increased diversity of the urban forest. Research states that an urban forest should be:

- No more than 5% of any one species, including cultivars and varieties.
- No more than 10% of any one genus.
- No more than 20% of any one family.

Encourage your community and neighbors to plant underused varieties of trees and shrubs to encourage the biodiversity needed to keep the urban forest healthy, and educate them about the value trees provide and the part they play in the urban forestry canopy.

Source: www.ces.ncsu.edu/fletcher/programs/nursery/metria/metria07/m79.pdf

Snow cover and mulch

The insulation provided by snow cover or mulch can aid winter survival of woody plants by buffering soil temperatures, decreasing the depth of soil freezing, and decreasing soil moisture loss during winter.

Mild winter temperatures and snowless winters often occur together in Wisconsin and winter injury can be severe during these mild winters. Because winter temperatures were mild, observed cold injury the following spring can be puzzling. Cold injury during this type of winter often results from lower soil temperatures and soil moisture levels rather than from low air temperatures. During these winters, roots of woody plants are often injured when snow cover and its insulating capacity are missing, and soil temperatures and soil moisture levels, drop to points low enough to damage or kill roots.

A common frustration for gardeners is finding several different zone ratings listed for one plant among different catalogs, reference books, and websites. From the discussion above, you can understand that assigning a hardiness rating to any one plant is a complicated issue compounded by many factors. In addition, laboratory testing procedures for measuring woody plant hardiness is rarely done because it is an expensive and time consuming process. Instead, hardiness ratings are usually assigned by the breeder or nursery introducing a new cultivar. The introducer may or may not have grown and evaluated the plant in different hardiness zones; often hardiness ratings are assigned based on ratings for similar cultivars originating from the same plant species. If you find conflicting hardiness zone ratings for a plant you are interested in growing, it is worth checking with gardening peers, public garden staff, or other local resources to see how the plant has performed in your area.

In addition to cold hardiness, considering heat tolerance is important for some species. This is less of an issue in our northern climate than it would be in southern states, but may also be a consideration for some species. The American Horticultural Society has developed a Plant Heat Zone Map for predicting how well plants will tolerate warm summer conditions (not the same as the USDA hardiness zones). The map is divided into 12 zones based on the average number of days that the temperature is over 86˚F, the point at which some (not all) plants begin suffering physiological damage from heat:

- Most of Wisconsin is in Zone 4 (14 to 30 days);
- The central part of northern Wisconsin and Door County are in Zone 3 (7 to 14 days);
- A few pockets of Wisconsin are in Zone 2 (only 1 to 7 heat days);
- Some areas of the south and western part of the state are in Zone 5 (30 to 45 days).

Not nearly as many plants have been assigned heat zones as are identified by USDA hardiness zones. In Wisconsin, white birch trees are the best example of a heat-sensitive woody ornamental. Native to the central and northern parts of the state, these trees tend to wither when planted in the front yards of homes in southern Wisconsin. Lack of heat tolerance may also contribute to problems of trees planted too close to paved surfaces, such as blacktop driveways, or where their roots do not remain cool.

Environmental adaptability

In addition to temperature, many other aspects of their environment influence plant survival and growth. Try to choose a plant to match your site's growing conditions whenever possible.

Sun and wind exposure

Consider the potential exposure of a site in all seasons.

- Most plants prefer full sun to light shade for proper growth and flowering, but some are tolerant of more shade.
- Will there be sufficient light for the plant, even after a few years when adjacent plants have grown, or will buildings or neighboring plants block sunlight during much of the day?
- Is the site likely to be buffeted by harsh winds in winter that could cause branch dieback or kill flower buds?
- Will excessive heat be generated by reflection off a building to create such a hot, dry environment in summer that plant growth is stunted?

Plants susceptible to exposure damage should be sited out of winter wind and sun, and away from eaves where falling snow may break branches.

Light

The majority of woody plants grow best in full sun or at least part-day sun. Winter sun and its intensity can also impact plant survival in winter by causing damage to leaves, needles, and bark of some evergreen and deciduous woody plants. A number of broadleaf and needled evergreens are susceptible to winter burn on their foliage. Winter burn occurs when sunlight heats the leaves enough to cause **stomata** to open, resulting in loss of water from the leaves. Strong wind can exacerbate the water loss. In warmer seasons, the plant would respond by drawing water into the roots and transporting the water to the leaf to replace lost water. When the ground is frozen though, water cannot be replaced. This can lead to desiccation of leaf cells and possibly browning and death of the entire leaf. The dead foliage often becomes very noticeable in late winter or early spring. Buds and stems are less susceptible to winter burn than leaf tissue, so new growth may cover old winter-burned foliage by midsummer. In severe cases of winter burn, pruning or complete plant removal may be required.

When planting winter burn-susceptible evergreens such as yews and rhododendrons, site them on north or east sides of buildings or other locations where they will be shaded in winter and be sure to water all evergreens thoroughly in autumn before the soil freezes. Apply several inches of mulch around the plants to preserve soil moisture.

Winter sun can also cause **sunscald** on the trunks of thin-barked deciduous trees. Sunscald occurs when winter sun, including reflection off snow, heats tissue on the south to southwest side of tree trunks. This tissue can be warmed enough to become active. Late in the day, when the sun is no longer heating the trunk, the ambient below-freezing air temperatures can cause sudden chilling and damage to the tissue. This can result in sections of dead tissue on the trunk. Current recommendations to reduce the chance of sunscald on thin-barked trees are shading the trunk with sections of loose-fitting white PVC tubing or with a board loosely tied to the south side of the trunk. Protection should be removed in the spring.

Soil

Choose plants that are adapted for your soil type, pH, and texture. Some plants tolerate poorly drained soils, while others need good drainage to flourish (see box). Soil pH and compaction are other factors that can be at least partially corrected before planting, although it is difficult to change pH very much. A soil test (see chapter 2, Soils) will help determine many characteristics of your soil. Clay soils are quite acceptable for most trees and shrubs, since these soils hold moisture well and release nutrients slowly. Sandy soils may have poor fertility and will dry quickly, so irrigation may be necessary in some landscapes during periods of insufficient rainfall.

Water availability

All plants need water to survive, but some species are more tolerant than others of low moisture. Consider your ability to irrigate plants with high water requirements if they will be sited in a location that dries out quickly or in the event of insufficient rainfall. Wet areas will have to be re-engineered to reduce water retention if you must put a plant that prefers dry soils there. The easiest solution is to select a plant adapted to the moisture level of your site. Access to water is especially critical as the woody plant establishes itself after it has been transplanted.

Salt tolerance

Salt and deicing products are often applied to roadways and sidewalks during winter weather.

Salt used to melt ice on walks and roads can damage woody plants in two ways:

- Plants can be "sprayed" with salt from passing roadways, resulting in bud death and twig dieback. Many trees and shrubs along highways develop brooming, or clusters of twigs growing from branches, as a result.
- Salt can also get into the soil, killing roots or preventing them from taking up water. Symptoms may not show up for a year or two, but include off-color foliage (especially blue green coloring), smaller than normal leaf size, marginal leaf burn, early fall color or leaf drop, and stunted growth.

If the tree is likely to be exposed to deicing salts each winter, select a tree that is more tolerant of salt. For less tolerant species, select a site well away from roads where salt is spread. Some woody plants tolerant of deicing salts include honeylocust, junipers, and rugosa rose.

Urban tolerance

The urban environment is not always the most hospitable for trees. Compacted soil, poor drainage, deicing salts, high soil pH, poor soil aeration, air pollution, and nutrient availability, carelessness with lawn mowers and string trimmers, vandalism, and damage from cars are just some of the challenges an urban site may provide. Although some factors can be corrected, choose a tough tree that can tolerate these less-than-ideal conditions. Urban tolerance varies, but can be enhanced with proper cultural practices.

Growth habits

Different types of woody plants serve different functions within the planned landscape. Careful study of the site will help determine what roles plants need to fill in each area. There are many choices of plant species and cultivars for any role within a landscape.

Most planned landscapes use a combination of deciduous and evergreen woody plants. Deciduous plants lose their leaves in autumn and grow new leaves in spring. Evergreen plants retain their green living leaves throughout the year, though each leaf will eventually be shed; evergreen leaf retention typically ranges from 2 to 4 years but may be longer in some species. Evergreen woody plants may be broad- or narrow-leafed. Broad-leafed evergreens have leaves that resemble typical deciduous plants. Examples include boxwood and many species of rhododendron. Narrow-leafed evergreens have needle or scale-like leaves. Examples include pine, spruce, fir, arborvitae, and juniper.

The botanical terms "evergreen" and "conifer" are NOT synonymous, but unfortunately they are often used that way. Conifers are narrow-leafed plants that bear seeds in specialized structures called cones. The confusion stems from the fact that most of the commonly grown

Checking soil drainage

Check for water drainage at your site by digging a 1-foot diameter hole, 1-foot deep. Fill it with water, and time how long it takes the water to soak away naturally.

- If the water is all gone in an hour, then drainage is good.
- If it takes several hours to disappear, the drainage is fair.
- If water still remains after 6 hours, drainage is poor.

conifers in Wisconsin are indeed evergreen: pines, spruce, fir, arborvitae, and junipers. These plants are all evergreen conifers, but there are also conifers that are not evergreen. An example is American larch or tamarack (*Larix laricina*), a Wisconsin native. Larch is one of a small group of trees known as deciduous conifers; they bear cones and also lose their leaves annually. Other deciduous conifers include bald cypress (*Taxodium distichum*) and dawn redwood (*Metasequoia glyptostroboides*); neither of these unique trees is fully hardy in Zone 4.

Deciduous trees and shrubs provide much interest from spring through autumn with foliage, flowers, fruit, and autumn color. In Wisconsin, deciduous plants are leafless for 5 to 6 months of the year. During this time they can still provide interest through bark, fruit, and branching structure, but they do not serve some of their summer functions such as shading and screening.

The growth characteristics and appearance of trees and shrubs are very important features in the home landscape. Choose a species for planting based on size, form, ornamental features, and for specific functions in your yard.

Mature size

The sapling you purchase at the nursery will eventually grow up. Consider its ultimate size relative to your site and the rest of the landscape. Will the tree crowd out adjacent trees, cast shade over your vegetable garden, or grow too close to the house? Don't plant a large tree under power lines or in a small space where it will require lots of pruning. Consider a shrub's natural, mature width to prevent eventual crowding.

Growth form

Trees grow in various shapes, which can be more appropriate for some locations and uses than others. A few of the categories and examples include:

- Upright and narrow: Lombardy poplar
- Columnar high growth with limited lateral growth: some maple cultivars
- Rounded: sugar maple, globe arborvitae
- Pyramidal: spruce
- Weeping: willows, Norway spruce, birch

Growth rate and longevity

Some trees grow more quickly than others. If no trees are present and shade is an immediate objective, fast growing cultivars such as a hybrid freeman maple, silver maple crosses, swamp white oak, red oaks, or lindens are good options. Slow growing trees may not mature during the time you own the house.

Fast growth rate comes at a price—these trees often do not live as long as plants that mature more slowly and may have more pest problems or be subject to limb breakage. This is not always a drawback; these trees can be used to create quick privacy or shelter, with the intention of removing them after several years, once other trees have grown up.

Undesirable features

Some woody plants have characteristics that make them a poor fit for some, if not all, sites.

- Trees and shrubs such as poplar, lilac, dogwoods, and sumacs sucker and spread excessively, making them less desirable to plant near lawns and gardens.
- Excessive seed or fruit production in some plants—boxelder, elm, flowering crabs, honeysuckle—means they should be limited to mowed or mulched areas.
- Some species that have been used as ornamentals in the past, such as buckthorn, Amur maple, and Tartarian honeysuckle, should never be planted in the landscape because they are highly invasive and readily move into natural areas.

Tolerance and resistance to disease and insects

No woody plant is completely unaffected by diseases, insects, wildlife, and other pests. When selecting plants, choosing those that are known to be tolerant of or resistant to the common pests in your area results in reduced pesticide use, reduced maintenance, and a healthy, long-lived landscape.

A proactive strategy in the plant selection process to minimize future pest management issues is:

- Become familiar with the common pests in your area and select pest-resistant cultivars. Let's say you want to plant a flowering crabapple. There are dozens of crabapple cultivars available from nurseries and garden centers. These cultivars vary widely in their susceptibility to common disease problems such as apple scab and fireblight. You have learned that apple scab is common in your area. Cultivars such as 'Hopa' and 'Radiant' are extremely susceptible to apple scab, often resulting in moderate to severe defoliation of the tree by late summer. A better choice for your landscape in terms of reduced fungicide use and greater landscape value would be cultivars such as 'Prairiefire' and 'Donald Wyman', both of which have high resistance to apple scab.
- Select alternative species or hybrids within a genus. Some tree and shrub species have few or no cultivars available or all cultivars that are available may be susceptible to a pest problem. In this case, you may want to look for a different, but related species. For example, you might want to plant a red oak (*Quercus rubra*) but you have become aware that oak wilt is a serious disease problem of oaks in your area. There are no oak wilt resistant cultivars of red oak (in fact, there are few cultivars of red oak at all). But other species of oak, including white oak (*Q. alba*) and bur oak (*Q. macrocarpa*) are less susceptible to oak wilt and would fill landscape functions similar to red oak.
- Select a completely different plant. Perhaps you were thinking about planting a green ash (*Fraxinus pennsylvanica*), a large tree that's been widely used for commercial and residential landscaping in Wisconsin. While it has many desirable traits, emerald ash borer, a devastating insect problem, is now known to be present in the area where you live. All ash species are susceptible to emerald ash borer, so simply selecting an alternative species within the genus is not a good option in this case. The best course of action is to consider all trees that have the qualities you were looking for (specific size, soil tolerances, etc.) and narrow your selection from those.

Maintenance issues

Part of the plant selection process involves thinking about future maintenance requirements of plants and their fit to the available level of maintenance for that landscape. Some common maintenance issues to think about include:

- Messy fruit or pods that drop to the ground and require removal. Kentucky coffeetree pods, large-fruited crabapples, and walnuts are examples.
- Plants requiring frequent pruning. Shrubs, such as many forsythia and dogwoods, with a fast growth rate that mature to a large stature often require frequent pruning to maintain appropriate size in landscapes. Elms are an example of a tree species that requires consistent and frequent pruning to create a central leader.
- Plants such as chokeberry (*Aronia* spp.) with suckering plant habits require frequent maintenance to reduce plant width.
- Plants lacking in disease or insect resistance may become aesthetic liabilities in the landscape without frequent pesticide applications. Roses lacking resistance to blackspot are an example.
- Plants without adequate hardiness may need winter protection (such as tipping a hybrid tea rose) or may need to be replaced regularly.

Ornamental features

Many people choose plants for their yard for a specific showy aspect, such as the big burst of flowers in the spring or brilliant fall color. These and other ornamental features enhance the landscape and provide considerable aesthetic value. Many plants have more than one ornamental attribute. Consider all the ornamental features when selecting plants for a landscape AFTER the other factors listed above have been taken into consideration.

There is no such thing as a maintenance-free landscape. Carefully designing your landscape, however, can help reduce time-consuming and expensive maintenance.

Accent or specimen plants provide visual interest in the landscape and are intended to be a focal point of the area, or draw the eye to another feature in the landscape, such as a fountain or view. These plants have significant ornamental features, such as masses of flowers in the spring, an interesting shape, or spectacular fall color. Accent plants are used in combination with other plants, while specimens are generally larger and isolated in the landscape with a focus on flowers, fruit, form, color, texture or size.

Flowers

Nothing is quite as spectacular as a crabapple or azalea in full bloom in early spring. Other flowers are not as showy and may be best appreciated up close. Some shrubs, such as lilac or mock orange, have the added bonus of being fragrant and should be placed in the landscape to take advantage of this trait. Most woody plants flower in spring, with their flowers lasting only a week or two, so other ornamental characteristics should be considered as well.

Fruit

Ornamental fruit provides a display of color after flowering on some woody plants. The fruit may persist into winter, providing late-season interest.

- Many trees that fruit heavily and retain their fruits into winter may be attractive to birds or other wildlife.
- Some trees produce fruits that can be a mess to clean up, including black walnut, some crabapples, female ginkgo, ash, honeylocust, and some hawthorns.
- Trees with heavy seed set can give rise to unwanted volunteer plants.
- The fruit of some species, such as serviceberry, are edible and can be used in preserves.
- Other species, such as yew, bittersweet, and euonymus, have poisonous fruit or seeds and should be avoided in areas where there are children.
- A few species may require pollination by another plant to produce fruit. Some species that have separate male and female flowers produced on different plants (are **dioecious**) include holly, ginkgo, ash, honeylocust, and yews.

Bark and branching

Deciduous woody plants can have other attractive features, particularly once their leaves are shed. Exfoliating or patterned bark can provide up-close visual interest. River birch, shagbark hickory, ninebark, and redtwig dogwood all have attractive bark that adds interest in the winter. The layered branching structure of pagoda dogwood, the contorted branches of 'Harry Lauder's Walking Stick' contorted hazelnut, or corkscrew willow also add a unique dimension to the winter landscape.

Foliage

Many plants are considered ornamental because of the brilliant color of their autumn foliage.

- Gingko and some cultivars of poplars have deep yellow leaves in fall, while the leaves of sugar maples are often bright orange.
- Variegated plants, with leaves of both green and yellow or white, can provide interest during the growing season.
- Some trees have dark purple leaves that provide a nice contrast to green foliage.
- Evergreens provide year-round color, and come in a variety of shades and textures.

Some plants have large, coarse leaves, while others have much finer foliage. Both the color and texture of foliage can be used to provide either contrast or symmetry relative to the other nearby plants.

Function

The way you intend to use a particular plant or group of plants should influence what species you select and where you place it in the landscape. You might need trees and shrubs to provide shade, add ornamental interest, create a screen or windbreak, or help with noise reduction. Providing food and shelter for wildlife may be another primary consideration when selecting plant material.

Street trees need to be tough plants tolerant of urban conditions. They tend to be large, shade trees, and their location near the street often exposes them to more stress, such as road salt, compaction, high pH, and restricted water and root space due to narrow parkway width. Overhead wires may influence the type of tree

most suitable for the location. Species that make good street trees include hybrid maples, honeylocust, hybrid elms, and some oaks, if space is available.

Protection or definition

Trees or shrubs in dense groups—either the same or different species—can provide protection for other parts of the property. Woody trees and shrubs can create microclimates, control wind speed and direction, and reduce heating and cooling costs by shading or creating air pockets around our buildings. A screen provides privacy or eliminates undesirable views, while windbreaks reduce the force of the wind to provide protection from the elements for both other plants and outdoor activity areas. Hedge or barrier plants are designed to provide a visual, sound or physical shield—essentially serving as a living fence. The plants need to be full, with a closed texture to provide this screening value.

- Hedges are more ornamental and do not have to be sheared to a precise shape, but will require some pruning to keep the desired shape and fullness.
- Barriers are defensive, to keep objects away or deter movement, and often have sharp thorns or branches.
- Properly placed woody plants are also useful as "living snow fences" in the winter (see chapter 16, Landscape Design).
- Trees or shrubs can provide a backdrop for other plantings, such as annual or perennial flowers, or serve as a border, providing a sense of enclosure by defining the outdoor space.

Foundation plantings are individual or groups of plants around a home's foundation that can have multiple functions. They visually anchor the building to the ground, soften or hide unattractive architectural features, provide energy savings by shading the house or buffering heat loss from the building, and can deter or prevent access to windows or the basement. These plants, along with proper soil grading, can also assist with water, wind, and temperature management around the structure.

Groundcovers and vines

Woody vines serve important purposes in our landscapes by adding color and interest where shrubs simply won't fit. Vines can also soften walls, absorb sound, help conserve energy, and provide screening. Low, spreading groundcover plants create the "floor" of the landscape, aid in preventing erosion, help reduce weeds, and can be a lower maintenance alternative to lawns, particularly on slopes.

Trailing vines provide shade when grown over an appropriate structure, such as an arbor. They may also provide visual interest when grown on a wall or trained to frame a doorway. Some may be used as a cascade down an embankment to reduce soil erosion, but others may choke out trees and other plants if positioned inappropriately. While some vines, such as Boston ivy, attach to walls without support, others, such as clematis, require a trellis.

Vines can be purchased in the same way as deciduous shrubs. Usually they are purchased as containerized plants and can be planted at any time during the growing season. Choose a vine that will provide the needed color or texture for your landscape design and will not overgrow the structure on which it will grow.

For the most part, woody vines can be treated similarly to deciduous shrubs. They are planted in the same manner, and will benefit from mulch over the roots. They require supplemental watering when first planted or during droughts, as well as fertilizer based on soil conditions. They may also require training to encourage them to grow in the desired direction.

Wildlife

Some plants are useful to wildlife for food, shelter, or nesting. For more on this topic see chapter 8, Wildlife.

Purchasing trees and shrubs

When planting new trees or large shrubs, bigger is not necessarily better! In many cases, smaller trees recover from the transplanting shock sooner and reach a good landscape size faster than trees that are transplanted when larger. New transplants first spend energy growing roots and usually do not put on much top growth until there is sufficient root system established to support growth, which may take several years.

Choose trees that have a good **central leader** and side branches that go horizontally out from the trunk, forming wide **crotches**. Look for shrubs with a balanced growth and the appropriate amount of shoots coming from the crown. Look for damage to the trunk and branches, and check for any visible disease or insect problems. If possible, check to be sure the plant has a healthy root system that has not been allowed to dry out. Avoid trees and shrubs with fewer leaves than normal or leaves that are spotted or off-color.

Sometimes, people own or have access to woods and attempt to transplant small trees out of the woods into their yards. While this is possible, trees transplanted in this manner have a much lower survival rate.

- Usually, a much smaller percentage of roots are dug than with nursery-grown trees, which are subjected to root pruning to create a compact root ball.
- These trees suffer severe stress when planted out in the open after having grown up with the shelter of surrounding trees. Their trunks are typically thin and overly flexible, causing severe bending in the wind, and the bark is subject to **sunscald** (damage from winter sun).
- Trees from the woods usually do not have the form and branch structure desired for attractive landscape trees.

If you do choose to transplant trees from a woodland, it is best to move only smaller specimens (4 to 5 feet maximum height) rather than taller trees for a higher success rate.

Bare root, ball and burlap, or containers?

Once you have decided on the species or cultivar of tree or shrub you wish to plant, there are several options for purchasing your plants. Trees and shrubs can be purchased bare root, balled and burlapped, or in containers.

Bare root

Bare root trees and shrubs are usually available only in early spring. These plants are dug from nurseries in late fall and all soil is removed from their roots. They are held in climate-controlled coolers over the winter and sold bare root in spring.

While bare root trees and shrubs can be very economical, they are highly perishable and it is imperative that the roots never be allowed to dry out. They are usually available only for a short time in spring (typically the end of April or beginning of May in Wisconsin) so you do not have the flexibility of when to plant that you have with containerized or balled and burlapped trees and shrubs. Bare root trees are available in a variety of sizes, usually with a maximum of 1½-inch trunk diameter. Bare root shrubs are available in a variety of sizes, usually determined by height. Not all species of trees can be transplanted as bare root. Many species are intolerant of this transplanting process. Evergreens are rarely available bare root, except as small seedlings.

Ball and burlap

Balled and burlapped trees and shrubs are dug with the soil around the roots (root ball) intact. That root ball is wrapped in burlap and enclosed in a wire basket, which is tied around the trunk. Balled and burlapped plants cost more than bare root stock, but they are typically available throughout the growing season. By digging the root ball with the soil intact, the plants may suffer less transplant shock due to root loss. Larger trees and shrubs are usually sold this way, rather than bare root or containerized. The root ball of balled and burlapped trees can dry out very easily, so when choosing a tree, make sure it is well mulched and does not look dry or otherwise stressed and be sure to keep the root ball

protected and moist until it is planted. Because of the large root ball, these plants are often very heavy and more difficult to move.

Containers

Containerized trees and shrubs are sold in a variety of different sized pots. The pots may be plastic, paper-mâché, or wooden "bushel baskets." In some cases, the plant has been growing in the container since it was a seedling; in others, it was planted in the container as a bare root plant. Most trees available in nurseries were planted into those containers as bare root stock in early spring. Containerized trees and shrubs are available throughout the growing season and can be held in the containers for quite some time (as long as they are well watered, keeping in mind they can dry out very fast), allowing for more flexibility in planting.

Planting woody ornamentals

Planting and successful establishment of newly planted woody plants is really all about roots.

All newly planted trees and shrubs are vulnerable to water stress until a complete root system has grown and reestablished. How long does it take for a tree or shrub to replace lost roots? A newly planted tree or shrub often sits in its new landscape for a year or more, looking as if it is not growing. There is actually a lot of growth occurring, but it is happening underground where the plant is replacing missing roots.

The priority for a newly planted tree or shrub is to replace the root system that was lost during harvest in the production nursery. There is a saying that a newly transplanted tree will "sleep" the first year, "creep" the second year, and "leap" the third year. This is because woody species have a characteristic shoot-to-root ratio. When the ratio is altered, plants respond by redirecting most of its resources to replace the removed parts. If roots are removed, shoot growth in the canopy will be reduced while the plant directs its resources into replacing the missing roots. During year one after planting, there are few roots to absorb soil-supplied resources so leaves are usually small and there is little shoot growth in the canopy. What photosynthate is produced is sent to developing roots. In spring of year two, there is a little canopy growth because of increased nutrient and water supply by the now larger root system. The larger canopy produces increased photosynthate for the root system that is still being replaced. Eventually, when the root system that was lost is replaced and the balance between roots and shoots is restored, the tree canopy "leaps" into active shoot growth.

The time it takes to restore the root-to-shoot ratio varies with climate and length of growing season. In warm, humid North Florida it takes three months for each inch of trunk caliper. In Chicago it takes one year for each inch of trunk caliper, and in Minneapolis it takes 1½ years. Caliper is the diameter of the tree six inches above the ground if the diameter is four inches or less at that height. If the diameter is greater than four inches, move to a point on the trunk 12 inches above.

Site selection and spacing

Planning for maintenance when designing your landscape will save a great deal of time and money over the life of the landscape. Carefully selecting the site, and spacing the plants correctly will mean better likelihood of establishment and less work in the long term.

When deciding where to plant long-lived woody ornamentals, think about lawn maintenance and safety.

Remember:

Call digger's hotline before planting!
www.diggershotline.com or call 811

- Plant trees and shrubs in mulched beds whenever possible; this eliminates the need to mow around or between the plants and allows you to irrigate them separately from the grass. Not only will they grow better because of less competition and better soil conditions, mulched beds also protect woody plants from accidental damage caused by lawn mowers or string trimmers. Plant shrubs far enough inside beds so that when mature, the canopy doesn't hang over the edge and shade out grass or be subjected to damage from the mower.

- Avoid planting woody plants near driveways and sidewalks where you will need to pile snow. Snow can break branches and ice buildup and salt residues can damage roots.
- Plants on the edges or corners of driveways may be run over by an errant driver or snowplow operator.
- For high-risk areas select sturdy woody plants such as shrub roses and spirea, or choose herbaceous perennials and annuals that won't be present in the winter instead.
- Remember that flowering shrubs tend to attract pollinating insects (that can sting), so locate those plants accordingly.

If you are planting trees in a grassy lawn area, apply a ring of mulch a few feet in diameter around the trunk so you won't need to use a string trimmer.

Digging the hole and planting

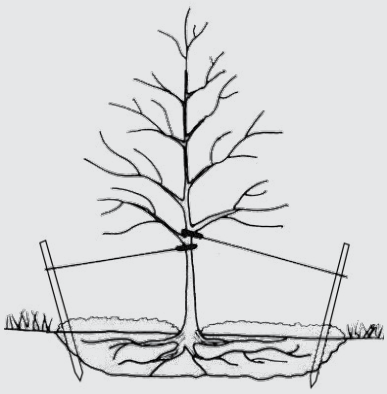
Start by digging a hole only as deep as—but wider than—the root system. Because most tree and shrub roots grow out horizontally, it is best to leave the soil below the root system undisturbed to provide a solid base and prevent future settling. Be sure the diameter of the hole is big enough so that the roots can point outward and not be curled around inside the hole. The wider the diameter of the hole, the better.

The depth of the hole should be such that when backfilled, the soil grade will be below any graft on the tree and so that the **root flare** is visible. If planted too deeply, the tree may develop girdling roots—roots that grow upward toward the surface for oxygen, then turn back toward the trunk, eventually strangling the tree. Roots may also sprout to the surface, forming suckers, which will have to be removed. When in doubt, it's best to set the tree slightly higher to allow for some settling of the root zone over time.

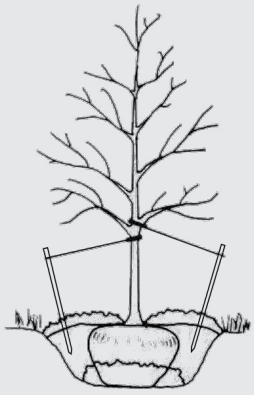
How to plant a tree

Dig planting hole to accommodate root system. Wider is better, but dig only as deep as necessary so that roots sit on undisturbed soil to reduce future settling.

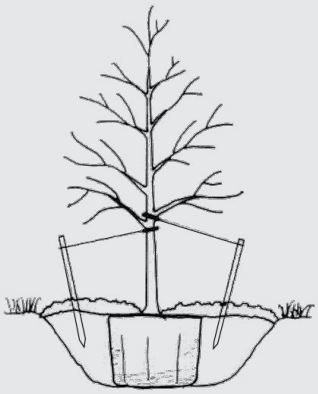
1. Remove container or burlap.
2. Set the tree so that the start of the root flare is above the final soil level.
3. Position the roots to grow outward, and gently backfill the soil, watering well to settle soil around the roots.
4. Use two to three opposing stakes to stabilize the tree for the first growing season. Be sure to use soft ties that won't damage the trees bark, and remove the stakes after one year.
5. Apply wood mulch 4 to 5 inches deep (so it will settle to 3 to 4 inches) to reduce weeds and retain moisture. Keep mulch away from the plant's trunk or stem to avoid rotting or other damage.



Bareroot



B&B (balled & burlapped)



Container

For bare root plants, look at the roots to be sure the hole is wide enough, and prune off only broken or damaged roots. Spread the roots within the hole to encourage them to grow outward. Carefully fill the root zone with soil, being sure there are no air pockets around the roots and that roots are not damaged. Do not add fertilizer as you backfill, as it may burn the roots.

Never backfill a tree's planting hole with compost, topsoil brought in from elsewhere, or other amendments. This will discourage roots from growing outward and will result in a small root zone, which will be unable to support the tree in the future. Choose a tree that is adaptable to the existing soil conditions rather than altering the makeup of the soil in the planting hole.

Remove plants from the containers and "tease" the roots outward. If the plant was very pot-bound, you may need to score or slice the mass of roots around the edges to encourage outward growth. If you don't do this the tree may not be well anchored and may easily tip, even many years later. Circling roots can also become girdling roots, eventually killing the plant.

Remove paper-mâché or bushel basket-type containers before planting, as some of these break down very slowly and can restrict root growth. If you choose to set the containers in the planting hole, at least break away portions of the container to allow for free root growth outward into the soil.

Set balled and burlapped trees and shrubs firmly on packed soil at the bottom of the hole. Remove the entire wire basket or cut as much away as possible; the wire used is generally galvanized and will not rust away, and the baskets have been found to **girdle** roots as plants grow (see box). Once the root ball is set in the hole at the proper depth, remove all strings or ropes that attach the burlap to the trunk, and peel the burlap completely away from the root ball and discard it. Tease roots outward as much as possible. Backfill the hole with removed soil.

Girdling

Girdling occurs when something damages the bark and inner vascular system of the plant around a significant portion of the circumference of the stem. Common causes of girdling are:

- Lawnmower or string trimmer damage.
- Rope, wire, or twine from sale tags left around the base of the tree.
- Antler rubbing, sunscald, or one branch rubbing on another branch or trunk.
- Boring insects that get under the bark and feed on the inner wood.
- Diseases that cause **cankers** (ulcerations in the bark tissue and inner wood) and girdle the vascular system.
- Animals, especially rabbits and rodents, that commonly chew on bark and girdle young trees and shrubs.
- Roots that grow in toward the trunk instead of outward and, if they come in contact with the trunk just below the soil surface, girdle the trunk over time.

Girdling symptoms include smaller than normal or fewer leaves, dieback of some or all branches (especially on the side of the tree where trunk damage has occurred), wilting and dropping of leaves, early fall color, or unusually high seed production. If these symptoms occur, inspect the trunk or branches for damage.

Once damage has occurred, there is not much you can do to repair it. Trees and shrubs will often try to bypass the damage, and their success will depend on the severity of the problem. If you find cankers caused by disease pathogens on branches, prune them away to prevent the pathogen from invading the rest of the plant.

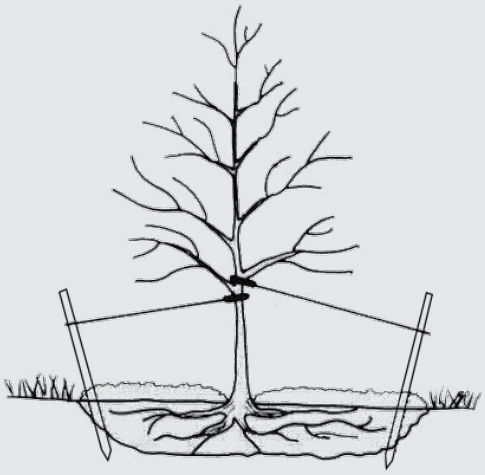
When planting any tree, don't prune except to remove any broken or damaged branches or branches that are crossing others or growing inward toward the trunk. And if more than one leader is present on a tree, choose the strongest and straightest and prune away the others. Always use sharp pruning tools and make good, clean cuts.

To stake or not to stake?

Stake newly planted trees for one full growing season to prevent them from tipping in high winds. Tipping can break precious roots, which are typically in short supply on newly planted trees.

Use two or three opposing stakes to provide support from all directions. Use something soft, flat, and wide around the trunk such as thick rope, webbing, or old nylons or socks. DON'T use any wire or narrow rope that could cut into the tree bark or cause a rubbing wound. Put only light tension on the ropes, as a slight bit of movement in the wind helps the tree develop a strong trunk.

After one year, the soil should be well settled and the roots able to anchor the tree. Remove all ropes and stakes. Ties left on a tree too long can cause damage to the bark and interfere with the trunk's natural growth.



Water newly planted trees and shrubs thoroughly to settle soil around the roots. Young trees should also be staked for support their first year ONLY to prevent tipping in high winds, which may damage the fragile root system.

Caring for newly planted trees and shrubs

Transplanting is stressful to trees and shrubs. To become well-established they require special attention during the first few years to develop a good root system and overall structure.

Protection

Mulching helps the plant get a good start by moderating moisture loss, reducing competition from grass, and protecting the trunk from lawnmower and string trimmer damage. Apply mulch 3 to 5 inches deep, and take care NOT to bury the trunk. Volcano mulching results when mulch is applied too deeply and buries the trunk of the tree. Pull mulch away from the trunk.

Trunks of young, smooth-barked trees should be wrapped for several winter seasons in the cold Wisconsin climate to protect them from sunscald.

Young trees and shrubs should also be protected from animal damage. Deer, rabbits, and voles can be especially destructive to young plants. Protect the plant from rabbits and mice by placing a ring of ¼ inch mesh hardwarecloth around the trunk of trees and shrubs. The mesh should be buried a couple inches below the soil line to protect against burrowing rodents and should extend a couple feet above the expected snow level to protect against rabbits. Other types of tree guards—such as plastic spiral materials—are available online and from nurseries and garden centers.

Trunk protection should be removed in the spring to allow air circulation around the bark and to allow for the normal outward diameter growth of the trunk. See chapter 8, Wildlife, for more information on protecting plants from animals.

Fertilizer and water

Wait until the next growing season to fertilize newly planted trees and shrubs. As fertilizers are typically high in nitrogen, applying them will only encourage the plant to produce top growth—when root growth is what newly planted woody ornamentals need most.

Water recently planted trees and shrubs frequently, being careful to not overwater. Roots need oxygen as well as water, and too much water prevents oxygen from getting to the roots, which can result in root rot and root death. As a general rule, for newly planted plants, if the top ½ to 1 inch of soil becomes dry, soak the plant's root zone. This will happen more often in a light, sandy soil than on a heavy, clay soil. Be sure to water thoroughly so that the water soaks down throughout the root zone. Light surface watering will encourage roots to grow upward and the plant will be less able to withstand droughts in the future. Also, be sure to water beyond the root zone to encourage roots to grow outward.

Caring for established trees and shrubs

Watering

As trees and shrubs grow and develop larger root zones, they become better equiped to tolerate dry periods. Water newly planted trees and shrubs regularly for the first year, and be sure to provide periodic supplemental watering for the next several years. Even mature, well-established trees need supplemental watering during droughty times, especially when growing on light, sandy soils.

Woody plants need an inch of water each week, either from rain or supplemental watering. A thorough weekly watering is much more effective than more frequent light watering. Deliver water slowly to allow maximum absorption into the soil. Be sure to water the entire root zone, not just around the trunk. The most active roots are at or beyond the plant's dripline. Running a slow sprinkler on the soil above the root zone is the most effective way to water. Place a rain gauge or other container in the watering zone to determine when an inch of water has been applied.

Water requirements for trees & shrubs

Less than 2-inch diameter planting stock

- Water daily for 1 week; every other day for 1–2 months; weekly until established.

2- to 4-inch diameter planting stock

- Water daily for 1–2 weeks; every other day for 2 months; weekly until established.

4- inch diameter planting stock

- Water daily for 2 weeks; every other day for 3 months, weekly until established.

Note:

- Eliminate daily irrigation when planting in fall or early spring. Little irrigation is needed when planting in winter.
- Reduce frequency in cool, cloudy, wet weather if soil is poorly drained (soil drains less than ¾ inches per hour). Eliminate daily irrigation in poorly drained soil. After a rainfall, wait until all moisture drains out of the soil.
- Establishment takes about 12 months per inch of trunk diameter.
- Minimum frequency for survival could be once each week.
- Stop irrigation once trees drop deciduous foliage in the fall.
- At each irrigation, apply 1 to 1.5 gallons to the root ball for each inch of trunk diameter.

Mulching

Mulches commonly used around trees and shrubs include shredded wood or bark, wood chips, pine needles, and cocoa bean hulls. Landscape fabrics and plastics aren't recommended because they decrease air circulation, and can keep soil very wet or very dry.

Coarse mulch such as wood chips or shredded bark should be applied 3 to 4 inches thick so that it will settle to a depth that will control weed growth. For fine mulches, such as compost, shredded leaves or pine needles, only apply 2 to 3 inches. If the mulch layer is too thick, it can reduce air penetration into the soil. Do not place mulch against the plant's trunk; it can cause moisture buildup around the plant's bark, leading to rotting and girdling. If using organic mulch, do not use a landscape fabric or plastic. Allow the mulch to decompose over time and incorporate into the soil. Topdress the mulch every few years for appearance and weed control.

Fertilizing

Routine fertilization of trees and shrubs is not recommended. Most soils in Wisconsin supply enough nutrients for good growth. Woody plants benefit from fertilizers applied to surrounding lawns and flowerbeds. Newly planted trees and shrubs, or those with a damaged root system should never be fertilized because the plant needs to direct energy into root growth.

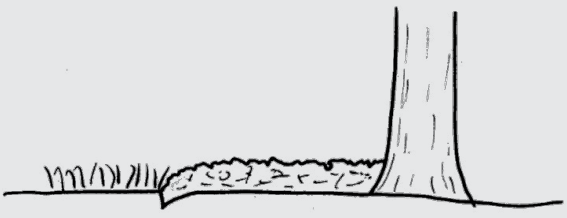
There may be times when a tree or shrub seems to be slow growing, in a state of decline, or it has small or light green leaves. In the Midwest, the most common nutrient problems are nitrogen, manganese, and iron deficiencies due to high soil pH (see *Chlorosis* and *Reducing Soil pH* in Resources). Before applying any type of fertilizer or pH amendment the nutrient problem should be confirmed by a soil or foliar test (see chapter 2, Soils).

Mulching trees and shrubs

When mulching around trees and shrubs, pull mulch away from the trunk to prevent damage.

CORRECT
Mulch pulled away from the tree trunk

INCORRECT
Mulch against the tree trunk



If you are fertilizing your grass properly, you are also most likely providing all the nitrogen a tree needs to be healthy.

If recommended by soil test results, fertilize trees and shrubs in late April to early May, or in fall after plants are dormant. Select a fertilizer containing 12 to 30 percent nitrogen (at least 50 percent of nitrogen should be slow release or water insoluble) and 3 to 12 percent potassium. In Wisconsin, fertilizers containing phosphorus should not be used unless indicated by a soil test. The application recommendation for woody plants is 2 to 3 pounds of actual nitrogen per 1,000 square feet (0.2–0.3 pounds per 100 square feet).

Tree roots can extend far beyond the dripline of a tree. Spread the recommended amount of fertilizer evenly over the ground to a distance of 1½ times the diameter of the tree canopy. For shrub beds and groups of trees, apply fertilizer to the soil in the entire planting area.

Winter care

Established trees and shrubs require less winter protection than young plants, but salt and a buildup of ice or snow can still damage them.

Avoid using ice-melting salt in areas where it can damage trees and shrubs. Plant-safe alternatives, such as sand or potassium chloride products are available.

Plants are able to withstand a certain amount of snow and ice buildup in winter. They may sag and bend but quickly bounce back once the snow falls off or the ice melts. In extreme cases where a heavy buildup of wet snow or ice (greater than ⅛ inch) risks breaking branches, it may be helpful to use a rake handle or other round stick to gently tap branches to remove some of the ice or snow. Be sure to tap branches gently so that you do not damage the plant, and remove just enough ice and snow to relieve some of the weight and risk of breakage. You do not need to remove all of the snow and ice.

Evergreens that are hardy in Wisconsin should need minimal help to get them through winter. Be sure all plants—especially evergreens—are watered right up until the ground freezes. Because evergreen needles are exposed to drying winter winds, they may suffer some burning or browning by spring. Plant evergreens so they are protected from strong winter winds if possible. Also, be sure to plant evergreens where they will not be subjected to salt damage, which also results in brown needles. Plant yews where they will not be exposed to winter afternoon sun. Wrapping evergreens in burlap may protect against desiccation, but it is more desirable to choose plants that can withstand the conditions.

At the end of winter, sunscald is a special concern, especially in young trees.

Pruning

Why prune

Pruning trees and shrubs serves several purposes.

- Pruning helps create a good, strong structure on trees and shapes plants into the desirable form.
- Pruning typically promotes the growth of new, young wood, which is more likely to produce flowers and fruit on certain species.
- Removing diseased plant parts helps prevent spread of the disease into other parts of the plant.
- Removing dead or dying branches improves a plant's appearance and prevents the hazards they pose should they fall.

When pruning, disinfecting your pruning tools each time you move from one plant to another may prevent the spread of disease. Dipping the pruners in a 10% bleach or 70% alcohol solution will kill most pathogens. Disinfect your tools between cuts if the plants you are working on might be diseased.

When to prune

The season to prune can vary depending on the species of plant, extent of pruning to be conducted, and the annual frequency of pruning (does it get pruned every year or not). The following guidelines are best for homeowners to follow, however you will encounter exceptions:

- Pruning of deciduous woody plants is best done in the late dormant season (roughly February through early April).
- Removing a large percentage (25% or greater) of the plant is best done in the late dormant season.
- Shearing is best done in the growing season, and by removing only the new growth.
- Oak trees should not be pruned from April through October to minimize infestation of the disease oak wilt. If a cut needs to be made, this is the only time pruning paint is recommended. This also applies to elm trees.
- Pines, spruces, yews, etc. may require special considerations when pruning. Those details are provided later in this section.
- If pruning during the growing season, it is best to complete it by August so any new growth has time to harden off before winter.
- Pruning some trees in the spring, such as maple or birch, will result in "bleeding" or oozing of sap. This oozing will result in a sticky mess that may attract insects and be unsightly, but it does not hurt the overall health of the tree.
- Dead and diseased wood can be removed at any time during the year.

Landscape contractors and for-hire arborists often can be found pruning all throughout the growing season. Their advanced knowledge in pruning techniques and the pruning requirements of the landscape can allow for certain types of pruning all season long.

How to prune

Tools for pruning

Correct use of the right tools is important in pruning (figure 3). Pruning shears are used to make cuts up to ¾ inch in diameter. Lopping shears are like pruning shears with long handles to make pruning the interior of shrubs easier. The long handles provide greater leverage to cut tree and shrub branches up to 1½ inches in diameter. Hedge shears are used for pruning succulent and/or small stems to create hedges. Bow, pruning, and hand saws are used to cut branches greater than one inch in diameter. Pole saws have very long handles or poles and are used to cut branches up in tree crowns while standing at ground level. Chain saws are used on larger branches. Wear safety glasses and protective clothing when using a chain saw and never use it above your shoulders or on a ladder.

CODIT

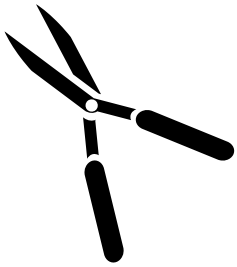
To properly prune a woody plant, it is important to have basic knowledge of how a tree or shrub responds to wounds on woody tissue.

Compartmentalization of Decay In Trees (CODIT) is the theory of how woody plants respond to wounds, insect attacks, and microbial infestations. In short, woody plants will place a series of barriers within its tissues to slow or stop the spread of decay or disease throughout the plant. A very important aspect of CODIT is that each year a woody plant puts on a new ring of lateral growth (growth rings). This growth essentially "seals" over any external wound, and in time will completely cover the wound.

This knowledge of woody plant biology will help you understand the recommended pruning techniques. When done properly, pruning wounds will be sealed naturally by the plant.

FIGURE 3. Pruning tools

pruning shears



hedge shears

lopping shears

pruning saw

pole saw close-up

bow saw (above) and folding saw (below)

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Techniques

Proper pruning utilizes two basic techniques, the **3-point cut** and the heading-back cut.

Make a 3-point cut to remove a lateral branch from the trunk of the woody plant.

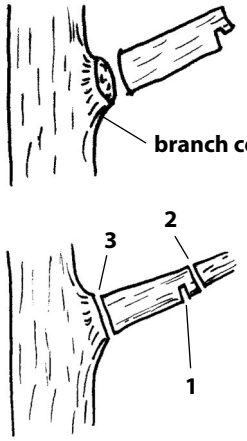
- Step one: Make the first cut 12 to 18 inches from the limb's point of attachment.

  Make an undercut halfway through the branch (see figure 4). This cut is very important because it relieves weight from the branch collar and prevents accidental tearing of bark from the tree's trunk when the limb is removed.
- Step two: Make the second cut on the outside of the first cut (i.e., farther from the trunk). Cut all the way through the limb from the top down, removing the weight of the branch.
- Step three: Make the final cut next to the tree's trunk outside of the branch collar. Cut from the top down and all the way through the remaining branch stub. The branch collar should be left intact. DO NOT cut the branch flush with the tree's trunk. A proper cut avoids large wounds, and allows the tree's wound to close quickly.

Successful pruning of lateral branches removes the branch without damaging trunk tissue. Improper cuts include:

- A stub cut results when too much of the branch tissue is left on the tree.
- A flush cut results when the branch collar is removed along with the branch.

FIGURE 4. Branch collar (above) and 3-point cut



Both of these improper cuts can slow the sealing of the wound and may increase decay in the tree.

A **heading-back cut** is the shortening of a branch or stem, reducing its overall length or height. For small diameter stems, cut the branch back to ¼ inch above a bud.

For larger branches, cut the branch at a smaller limb that is ⅓ to ½ the diameter of the cut branch.

The use of wound dressings is not recommended, even on large pruning cuts, as it can interfere with the plant's ability to heal. The only exception is when elms or oaks must be pruned during the growing season (such as from storm damage).

Strategies

When pruning, you may employ a combination of 3-point cuts and heading-back cuts as part of the strategy to shape the tree or shrub.

Shrubs

When you plant shrubs, space them so they have enough room to reach their full, mature size without the need for size-reducing pruning. You may need to prune to:

- Remove dead, dying, or diseased branches.
- Increase flower and fruit production.
- Improve or maintain the desired form.
- Improve or maintain the shrub's bark color.
- Remove crossing or wayward branches.
- Encourage vigorous growth.

Pruning shrubs usually encourages new growth near the pruning cuts. Be sure to keep in mind your objective in pruning shrubs so that you encourage new growth where you really want it.

Summer-flowering shrubs typically produce flower buds on new growth in the spring. It's best to prune these shrubs when they are dormant, in part to reduce disease or insect problems, which are also dormant during winter.

Because pruning typically encourages new growth, don't prune in late summer. New growth triggered by late-summer pruning may not harden off in time for cold winter weather, which may result in dieback or other damage.

Renewal

Older, overgrown shrubs may benefit from renewal pruning to reduce the overall size of the plant and to encourage young, flower-producing growth (figure 5). Pruning entire stems back to the ground typically encourages growth at the base of the shrub, which can be useful to eliminate old wood and rejuvenate a shrub. Thinning a shrub in this manner maintains the plant's overall shape, yet reduces the plant's size. As a general rule, never remove more than ⅓ of the total number of stems (canes) in one season.

For some shrubs in need of severe rejuvenation that readily sucker from the base, the entire shrub can be cut back to a height of 4 to 10 inches. Shrubs that can tolerate this severe pruning include Annabelle hydrangea, butterflybush, potentilla, and Japanese spirea.

Thinning

Suckering shrubs that produce multiple stems from the crown benefit from an annual thinning that maintains young growth and good flower production. Remove a few of the largest, oldest canes at the crown each year to prevent them getting old.

- Shrubs maintained with this type of pruning will never get to the point of needing renewal pruning.
- Thinning will also maintain the plant's natural shape, but the overall size of the shrub may be a bit smaller.
- Thinning is especially useful for maintaining colorful twig color on shrubs such as red twig dogwood, since older canes lose their color.
- Thinning removes the larger canes of plants susceptible to stem borers and may prevent these pests from establishing.

Deadheading

Deadheading, or removing faded flowers in an attempt to encourage more flowering and to improve the appearance of the shrub, does not affect the plant's overall growth. It is typically done by hand as needed. Common deciduous shrubs that benefit from deadheading are spirea and shrub roses.

Shearing

Shearing is used to remove new shoots on primarily evergreen shrubs in formal plantings or hedges. When shearing a hedge, the top must be narrower than the bottom so that light is able to reach the lower branches. Each time you shear a hedge, leave 1 inch of the previous growth so that the shrub can initiate new growth.

Shearing typically eliminates or reduces the amount of flowers and overall foliage, and destroys the shrub's natural shape. Most shrubs should NOT be sheared, especially in an informal landscape design.

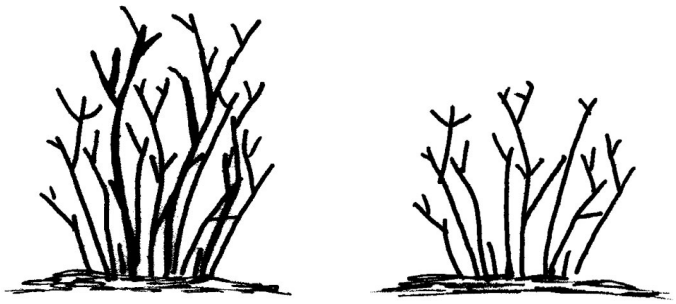
Trees*

Mature, established trees typically require less pruning than young trees. You will probably only have to prune to eliminate safety hazards or damaged branches and to improve the appearance of the tree.

You need to prune:

- Crossing branches that may rub on each other, which will damage the bark and attract diseases and insects.
- Dead, dying, or diseased branches.
- Water sprouts—young, weak growth that grows straight up off of the trunk or horizontal branches.
- Sprouts (suckers) at or near the base of the tree trunk.
- Branches that form with narrow angled crotches, which will be weak and split easily in high winds.
- Branches damaged in storms or by other means.

FIGURE 5. Before and after renewal pruning



Before **After**

*Adapted from treesaregood.com/treecare/resources/Pruning_MatureTrees.pdf

Pruning is the most common tree maintenance procedure. Although forest trees grow quite well with only nature's pruning, landscape trees require a higher level of care to maintain their structural integrity and aesthetics. Pruning must be done with an understanding of tree biology. Improper pruning can create lasting damage or even shorten the tree's life.

Crown cleaning
Cleaning is the removal of dead, dying, diseased, weakly attached, and low-vigor branches from the crown of a tree.

Thinning
Thinning is selective branch removal to improve structure and to increase light penetration and air movement through the crown. Proper thinning opens the foliage of a tree, reduces weight on heavy limbs, and helps retain the tree's natural shape.

Raising
Raising removes the lower branches from a tree to provide clearance for buildings, vehicles, pedestrians, and vistas.

Reduction
Reduction reduces the size of a tree, often for utility line clearance. Reducing a tree's height or spread is best accomplished by pruning back the leaders and branch terminals to secondary branches that are large enough to assume the terminal roles (at least ⅓ the diameter of the cut stem). Compared to topping, reduction helps maintain the form and structural integrity of the tree.

Topping
Never "top" a tree. Topping is the indiscriminate cutting of a tree branches to stubs or to lateral branches that are not large enough to assume the terminal role. Topping results in weak growth of water sprouts and suckers and increases the tree's susceptibility to diseases and insects. It also causes brooming on the ends of the branches and ruins the look of the tree, especially in winter.

To minimize stress, limit pruning of a tree to less than 30% of the canopy.

Visit our online module for more information on proper pruning of trees and shrubs: http://goo.gl/OFiWnJ

Safety

Anything you can't handle yourself, call an arborist! Large trees can be difficult to prune because of their size. For safety reasons, it is often best to hire a qualified, certified arborist to assess and prune large trees.

Evergreens

Most evergreen trees rarely require pruning, provided they are planted where they have adequate space to grow. Evergreen shrubs and dwarf conifers, however, can sometimes benefit from regular pruning that keeps them from getting bare and overgrown.

Most evergreens, other than pines, are best pruned before spring growth begins. They can also be pruned in mid-summer, when they are "semi-dormant."

Avoid shearing evergreens unless they are part of a formal garden or hedge. Instead, maintain the natural form of the shrub by heading back the longest shoots to a natural spot or vigorous bud. Unlike deciduous plants, evergreens do not readily sprout from a cut branch. Be sure to not make any "holes" in the plant's structure when pruning, as it may take several years to fill in.

If the central leader of a spruce, fir, or other conifer is damaged or destroyed, you can encourage a new leader to form. Trim back the damaged leader to about 2 inches above the first side shoot. Carefully tie one side shoot to the stub of the old leader so that it is pointing upward. Over time, the side shoot will take over as the central leader. If ever there are two leaders forming, prune away the smaller, weaker one.

Over time, lower branches on evergreen trees may lose their needles and die. Those unsightly branches may be pruned away, but eventually you'll need to decide whether to replace the entire tree.

Pines
Pines rarely require pruning. To reduce growth and limit plant size, you can remove up to ⅔ of the length of **candles**—or new, soft growth—in late spring or early summer. Branches can also be cut back to a vigorous bud or crotch to shape the plant, but these areas will not produce new growth.

Junipers
Upright junipers can be pruned into formal shapes or selectively pruned to maintain an informal shape. If you are trying to control the shape or size of the plant, prune each year, removing ⅔ of the new growth.

Keep spreading and creeping junipers looking their best by removing two or three of the longest, thickest, most vigorous branches each year. Cut back to the next main stem to encourage young growth. If you let the branches get thick and woody, you can cut them back to the base, but it will take several years for new growth to fill in.

Yews
Yews are best pruned in spring, before growth starts, or in mid-summer. They can be sheared formally if part of a formal landscape, or they can be selectively pruned to maintain a natural form, to keep the plant smaller and vigorous.

Arborvitae
Arborvitae should be pruned in early spring or mid-summer. Severely cut back and reshape overgrown plants; it will take several years for the new growth to fill in. While arborvitae can tolerate formal shearing, you can also leave them unpruned if enough space is available.

Spruce
Spruces are rarely pruned unless they are growing too rapidly. Prune unbranched tips of side branches back by ⅔ their length. This will help keep the tree from getting too wide.

Woody vines
Many woody vines need little or no pruning. Some, like clematis and wisteria, benefit with some pruning. Occasionally a vine may need pruning to keep it within its bounds. Regular maintenance pruning will prevent some vines from developing thick stems, which reduces flower and foliage production. Pruning usually causes vigorous new growth. Grape vines require extensive pruning to ensure quality fruit production (see chapter 15, Fruits).

Some woody vines will die back part way or all the way to the crown during winter. The dead vines can be pruned away in spring to allow for new, healthy growth the following summer.

Conclusion

Research has determined woody ornamentals offer us environmental, economic, and aesthetic benefits if they are properly selected and managed. If not, they can be insect or disease infested or, worse yet, develop into a liability to a household or community.

Tree care begins with selecting the right plant for the right place, considering both immediate and future conditions of the spot. Plant properly and you'll set your tree and shrub up to thrive, not just survive. And do the proper post planting care—pruning, watering, fertilizing—to allow the plant to be the long-lived specimen it is meant to be.

Resources

Wisconsin Horticulture publications are available at hort.extension.wisc.edu.

FAQs

What low-maintenance trees can I plant?

The right plant in the right place will reduce maintenance. Plant male cultivars (if available) to avoid messy fruit or choose insect, and disease resistant varieties. Plant cultivars with predictable form and growth habits for easier pruning.

How can I get rid of a tree stump?

The stump will decompose on its own with time. For fastest results, hire someone to remove it with a stump grinder.

When should I prune my shrubs?

Most can be pruned in the late dormant season. Pruning some spring flowering shrubs at that time may sacrifice a few flowers.

Woody Ornamentals, practice exam questions

1. **The root system of a mature tree**
   a. Provides anchorage and support
   b. Absorbs water and nutrients
   c. Requires oxygen
   d. All of the above
2. **When planting a tree**
   a. Replace ¼ the volume of the planting hole with compost
   b. Stake the tree rigidly for only 1 year
   c. Dig the hole deep enough to put root flare at natural soil grade
   d. All of the above
3. **The cambium of woody plants**
   a. Conducts water and nutrients
   b. Stores sugars
   c. Makes branches longer
   d. Makes branches thicker
4. **A heading-back cut**
   a. Removes a branch at a lateral branch or bud
   b. May be used when deadheading flowering shrubs
   c. Can be used to reduce the overall size of a woody plant
   d. All of the above
5. **In general, pruning of most woody plants is best done**
   a. While it is actively growing
   b. Only as necessary
   c. During summer months
   d. In the late dormant season
6. **The term "urban tolerance" may include**
   a. Pest and disease resistance
   b. Sun and wind exposure
   c. Soil compaction, excessive salt, and vandalism
   d. All of the above
7. **Newly installed woody plants**
   a. Can be structurally pruned immediately
   b. Require care until the roots are established and it can support itself
   c. Should be fertilized with a high N fertilizer
   d. Must have the canopy trimmed to balance with the roots
8. **Tree wrap**
   a. Can be used to protect young trees from animal damage
   b. May reduce sun scald
   c. Should be removed during the growing season
   d. All of the above
9. **Pest susceptibility in woody ornamentals**
   a. Should be a consideration when selecting new things to plant
   b. Can differ between different cultivars of the same species
   c. Can be greater when the plant is under stress
   d. All of the above
10. **When considering growth habits of woody ornamentals**
    a. Slow growing species will quickly provide shade
    b. Fast growing species may be resistant to limb breakage
    c. Small stature trees are suitable for under powerlines
    d. All of the above

Answer key
1. (d) 2. (c) 3. (d) 4. (d) 5. (d) 6. (d) 7. (b) 8. (d) 9. (d) 10. (c)