



# Planting Ornamental Trees and Shrubs

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

The investment in trees for the home landscape can be a considerable expense. Replacing trees that have died because of old age, machinery damage, lightning, disease, or pests is a continual process. Losses due to poor selection, incorrect planting practices, or improper care should be minimized.

The best time to plant is before trees break dormancy in spring or as leaves begin to change color in fall. This is when maximum root growth occurs, but with proper care, planting can occur anytime the ground is not frozen.

If planting during summer, keep the rootball moist. Summer heat can cause plants and soil to lose moisture rapidly. If the tree is not going to be planted shortly after bringing it home from the nursery, place it in a shaded area, mound mulch around the rootball, and water regularly until it is planted.

## Selection considerations

Selecting plant material appropriate for the site is often overlooked. *Shade and Ornamental Trees for Kansas* (MF-2688) can help you select the right tree. Find this and other publications at [www.oznet.ksu.edu/library](http://www.oznet.ksu.edu/library). Additionally, the Kansas Forest Service produces many preferred tree lists compiled by region. Simply finding a tree at a local retail outlet does not ensure survival at your planting site. Trees are often sold with a hardiness zone rating based on average minimum winter temperatures. The hardiness zone should be used as a guide, rather than a rule, in the selection process. Other factors such as the microclimate of the particular site and the soil type are critical to success.

Select a plant that is not only adapted to your region, but also fits the site and serves the intended landscaping function. Keep in mind the ultimate size and shape of the tree to ensure it does not outgrow the space and become a nuisance. Be sure the canopy will not interfere with utilities, structures, or road signs, and consider the root zone needed. The root system of a shade tree is extensive, and restricting its growth can shorten life expectancy. Give the tree as much unrestricted space as possible for root development.

**Soil:** Most nurseries grow plants in light to loamy soil. As a result, soil in the rootball may be different than at the

planting site. When plants are moved to a new site, the difference in soil texture can make establishment more difficult.

Establishing new plants in clay soils is a challenge. Because of their high water-holding capacity and low oxygen concentration, clay soils are difficult to manage. Correct watering is critical. Overwatering fills pore space, forcing oxygen out of the soil and causing plants to wilt. Underwatering may lead to dry and cracked soil, drying plant roots and possibly killing the plant. A clay soil that has become excessively dry can be difficult to wet again.

A good soil contains 45 percent mineral solids, 5 percent organic matter, 25 percent air, and 25 percent water. Soil of this composition is ideal for root growth. In an urban environment or new construction site, such soils rarely exist.

Amending the backfill with peat moss, compost, or other material is not recommended. When peat moss and similar amendments are incorporated into the backfill, the newly planted tree will grow an intensive root system throughout the planting hole with few roots penetrating the relatively heavy soil outside the planting hole. For long-term survival, roots must penetrate surrounding soil. Rather than amending the backfill, prepare existing soil by digging a planting hole two to three times wider than the rootball. This extensive soil disruption will encourage root growth.

## Planting trees

Trees are packaged for sale by nurseries balled and burlapped (B&B), container-grown, potted, bare-root, and tree spade. Packaging influences planting method.

**Balled and burlapped:** B&B trees are dug from the nursery when dormant, leaving a firm ball of soil around the roots, which is held together by burlap (Figure 1). With proper care they can be planted most anytime soil is not frozen.

Dig the planting hole for B&B trees two to three times wider than the rootball diameter (Figure 2). Depth of the planting hole should be equal to the height of the rootball from the first set of lateral roots (root flare) to the bottom of the ball. Often soil will need to be removed from the top of the rootball to find the first lateral roots. Never plant a tree so the top of the rootball is below the surrounding soil grade.

Once the hole is complete, situate the tree so it is standing upright. Remove string or twine from the top of the rootball and trunk (Figure 3). Backfill the hole halfway to help stabilize the tree while these tasks are accomplished. If the rootball is being held firm with a heavy wire basket, it is a good idea to remove the top half of the basket with wire cutters. While the basket may degrade, in some instances wire has girdled emerging roots over many years. With a sharp knife, begin removing the burlap. At a minimum, remove the burlap from the top of the rootball. Many retailers or landscapers will not honor the traditional one-year guarantee if the wire basket or burlap has been removed. Ultimately, this is the homeowner's decision, but removal of those products is recommended.

When backfilling the hole, break up soil clods that create large air pockets. Once the hole is half full, water to settle soil around the rootball. Continue backfilling the hole being mindful not to place soil on top of the rootball. Use excess soil to create a raised ring (3 to 4 inches) at the outer edge of the rootball. This ring will hold water and allow it to soak into the rootball as the tree is watered. Avoid tamping or stomping backfill around the rootball. Allow water to settle the soil in place.

**Container-grown plants:** Although many people are hesitant to plant container-grown trees, there is no reason to shy away from them. Container-grown trees offer advantages for the homeowner over B&B trees. In general container-grown trees are lighter, smaller, and more readily available.

Overall, the hole for a container-grown tree is similar to the hole for a B&B tree. It should be two to three times wider than the container and only as deep as the distance from the root flare to the bottom of the container. Backfilling is similar.

Regardless of material, the container must be removed before planting (Figure 4). Once the tree is free, inspect the root system. Circling roots at the perimeter is normal on a vigorous plant (Figure 5). Use a sharp knife or spade to cut into the rootball from the top to the bottom in three or four places. The cut should be made 2 inches deep. While this seems drastic, it will not hurt a well-grown tree, but it will prevent future girdling roots, and new roots will arise from the cuts.



Figure 1. Balled and burlapped trees are dug from the field with a ball of soil wrapped in burlap and placed inside a wire basket.

**Potted plants:** Plants dug as bare-root or B&B plants and potted in a container for sale that season are called potted plants. While this is less common than it used to be, it is still done occasionally. If the plant was recently dug as a bare-root plant and potted, it may not be well rooted into the container and should be handled as a bare-root plant. If the root system is well developed and artificial substrate holds the shape of the container when the plant is removed, it can be planted as if it were a container-grown plant. If a soil ball surrounds the root system, treat it as a B&B plant.

**Bare-root plants:** Although rare at the retail nursery, bare-root trees are still available. Homeowners frequently receive bare-root plants through mail-order catalogs. When planting bare-root trees, dig a hole large enough so roots can be spread in their natural position and deep enough so the root flare will be at the soil line. Remove broken and damaged roots by making clean cuts with pruning shears.

To plant the tree, spread roots out in the planting hole, making sure they do not overlap. Place a few shovels of topsoil over the roots and firm to eliminate air pockets. Add more soil and firm, then add water and let it soak in. Fill the hole with the remaining soil, leaving loose soil on the surface. Water the plant immediately and remember that bare-root plants may need more frequent watering than B&B or container plants during establishment.

Be sure to protect plants from heat and drying winds before they are planted. If roots seem dry, set the plant in a container of water for several hours before planting. When transporting to the site, keep roots moist and protected from the sun using burlap, straw, mulch, etc. If planting is delayed more than a few days, bare-root trees and shrubs should be covered with loose soil, straw, or mulch to protect roots.

**Tree Spade:** When large trees (4 inches or greater caliper) are desired, a trailer- or truck-mounted mechanical tree spade is often necessary (Figure 6). Using specialized tools, 8- to 10-inch caliper trees can be moved successfully. In general, move deciduous trees of this size only when dormant. Needled evergreens can be moved slightly earlier in the fall and transplanted later into the spring. As a guide, ensure there is 10 to 12 inches of rootball diameter for every 1 inch of trunk diameter measured 12 inches above the ground. For example, a trailer-mounted 44-inch tree spade can be used to



Figure 2. Measure the depth and width of the planting hole before placing the tree.



move a 4-inch caliper tree. A 90-inch tree spade can successfully move a 8- to 9-inch caliper tree.

## Care of newly planted trees

Once your new tree has been properly planted, care will determine whether it thrives. In general, consider your tree a new transplant one year for each inch in trunk diameter. In other words, a 2-inch caliper tree should be treated as a new transplant for two growing seasons, a 4-inch caliper tree for four years, and so on.

**Watering:** Proper watering throughout the first year often means the difference between success and failure. Keep in mind that watering practices will differ based on soil type. In general, clay soils hold water longer. Infrequent yet thorough watering of the rootball is best, bearing in mind that the water will not percolate through the soil rapidly. On a sandy loam soil, much of the water applied will percolate through the soil profile. Applying more water only means a greater quantity of water will percolate through. In this situation, lower volume, yet more frequent watering will maintain a moist root zone with a minimum of wasted water.

In an average sandy loam soil, spring-planted trees should be soaked twice a week if there is less than an inch of rainfall. In a heavy loam or clay soil, a good soaking every 7 to 12 days should be sufficient. These guidelines may vary depending on factors such as tree species, canopy size, and temperature. A screwdriver can indicate when trees should be watered. In a moist soil, the screwdriver should penetrate the soil easily. In a dry soil, it will be difficult.

Continue watering to supplement rainfall during the fall and winter until the soil freezes. Many fall-planted trees are lost because of inadequate moisture through the winter, especially evergreens that are exposed to drying winds. During dry winter periods, water evergreens if the ground is not frozen.

Continue regular watering as long as the tree is considered a new transplant. Although continued root development allows the tree to sustain itself better, watering can be critical, especially during an extended dry period.

**Mulching:** Aside from watering, few other horticultural practices can ensure the survival and growth of your new tree like mulching. Newly planted trees benefit from mulching, especially during the first years of establishment. Besides preserving moisture and moderating soil temperature, mulching controls competing weed growth (including turf). As important, mulch acts as a barrier to keep lawnmowers and string trimmers away from the tree trunk — a leading cause of damage to landscape trees.

Mulch can be made of many products, but bark chips, wood chips, and compost are the most common. Mulch should be 2 to 4 inches deep in a 2-foot radius around the tree. Mulch should not touch the trunk. A moist environment around the trunk encourages harmful insects and disease.

**Pruning:** When planting, remove identification tags and foreign objects from the trunk and branches to prevent girdling. Carefully inspect the new tree and remove dead, broken, or diseased limbs. Newly planted trees need little if any pruning at this stage. The new tree has suffered traumatic root loss in the digging process, but leaves manufacture



*Figure 3. Once placed in the planting hole, string, wire, and burlap can be removed gently.*



*Figure 4. Containers can be constructed of many different materials. All must be removed before planting.*



*Figure 5. Circling roots at the edge of the rootball should be cut before planting.*



Figure 6. Tree spades have the ability to move large caliper trees creating an instant landscape.

carbohydrates necessary to produce new ones. Reducing the top of the tree will slow root recovery. Once established (one year per inch of caliper), structural pruning can begin.

**Wrapping:** Avoid wrapping the trunk if possible. The protection wraps offer the young tree is often overstated. If rodent damage is a concern, install a mesh screen or plastic drainpipe around the tree to protect the trunk. Research shows that tight wraps do not buffer bark temperature as well as suggested. Bark cracking and sunscald are more likely attributed to borer insects, improper pruning cuts, or inadequate watering than sunlight on the bark. If not removed the wrap provides an ideal environment for insects and diseases during the growing season. If necessary, a trunk wrap from November to April is not likely to cause harm and may prevent small rodents from girdling the young tree.

**Staking:** Like wrapping, staking is a practice that should be avoided unless necessary. However, throughout Kansas, strong winds may dictate staking young trees to keep them from blowing over and dislodging the rootball. When staking, keep in mind that the main stem will be stronger if the top of the tree is free to move with the wind.

For most trees planted by the homeowner a one- or two-stake method should be sufficient (Figure 7). Drive a

2- by 2-inch stake into the ground at a 45 degree angle facing into the prevailing winds. Fasten the stake to the trunk 8 to 12 inches high with rubber strapping. Be sure strapping is between the bark and the stake so that the two do not rub and cause bark damage. This method allows the top of the tree to sway with the wind while preventing the rootball from rocking in the planting hole. The common two-stake method can be accomplished by setting staking posts into undisturbed soil far enough from the trunk so the two do not rub and damage the bark. Use wide strapping material or run wire through a rubber hose to strap the tree. Tie the tree at a point just high enough to hold it upright in calm weather. Under windy conditions, the tree should return to its vertical position when the wind stops. Inspect staking material throughout the year to ensure it is not girdling the tree or damaging bark. Make sure it has not come loose altogether. Except for the windiest sites, remove staking after a year.

**Fertilizing:** With the exception of trees planted in nutritionally poor soil, newly planted trees should not be fertilized during the first year or two. Once the tree is established, applying fertilizer at a low rate can encourage vigorous growth. For more information on fertilizing landscape trees see K-State Research and Extension publication, *Fertilizing Trees in the Landscape* (MF-2707).

Following recommended guidelines and seeking professional advice when necessary will ensure your new tree is off to a good start. Remember that a little extra work now will encourage a strong healthy tree for years to come.



Figure 7. A single stake is effective for most homeowners and can be removed after one year.

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