Best Management Practices for Planting Ornamental Plants

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While spring is a popular planting season, fall may be the best time to plant. Fall planting can help woody ornamental plants survive in the landscape. In fall, plant shoots need fewer nutrients because winter dormancy is approaching. In fall too, carbohydrate plant "food" is produced in leaves and moves to roots, which helps plant growth and survival. Importantly, roots continue to grow until soil temperatures drop below 45-50 F (7-10 C). It is extremely important to water when planting in fall because October and November are usually very dry months with little rainfall. But fall-planted plants also will not need as much summer irrigation as ornamental plants installed in spring. So, while there are more choices for plant material at most garden centers in spring, fall root growth provides a tremendous advantage over the spring-planted ornamentals if irrigation is not available or in drought and extreme heat. A large number of plants are killed between leaving the nursery and being planted in the landscape because of mishandling. Start by avoiding windburn and plant desiccation and cover plants with a tarp during transport. Other best management practices for transporting, handling and planting these plants will help reduce homeowner and contractor losses. Keep in mind that recommendations change with time. Our knowledge in two critical areas has improved over the last few years: 1) the size and depth of the planting hole, and 2) use of soil amendments in backfill soil.

Preparing the hole

When planting individual plants, it is important to dig the hole not deeper, but *two to three times wider* than the root ball. A wide hole provides room for roots to grow to the sides and away from the plant. Slope the sides of the hole too; so new feeder roots in the top 12 inches (30 centimeters) of soil have the most room to grow. The edge of a shovel or spade should be used to roughen the sides of the hole, especially in a high-clay soil. Clay that is wet can "glaze" when dug, as the shovel pan creates a slick, waterproof barrier. Roots also have difficulty penetrating the walls of a glazed hole.

In a well-drained soil, dig the hole *as deep as* the root ball and let the root ball sit on solid ground, rather than loose soil, otherwise the plant will settle, then be planted too deep. A shovel handle or stake can be laid across the hole to help show the correct depth of the root ball in relation to the ground soil line (Figure 1).

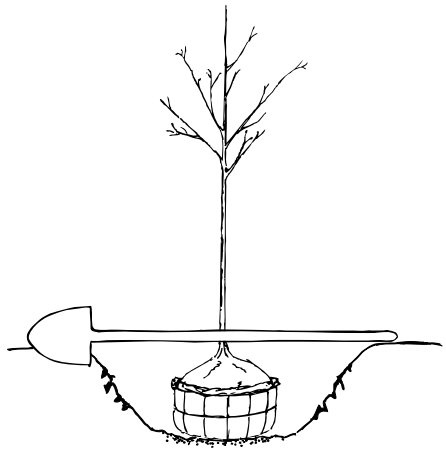


Figure 1a. Balled-and-Burlapped

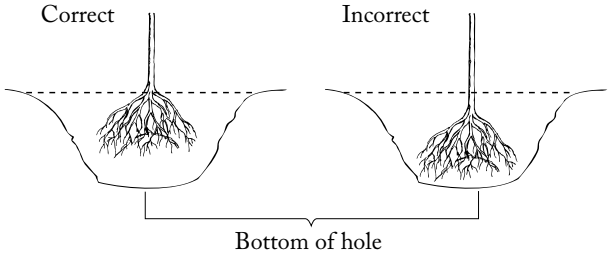


Figure 1b. Bare-root

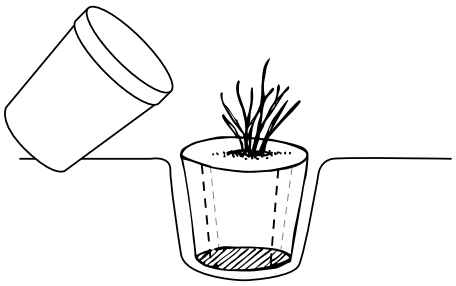


Figure 1c. Container

Figure 1. Planting depths

In poorly drained soil, dig the hole 1 to 2 inches (3 to 5 centimeters) *shallower* than the root ball. Doing this raises the roots high enough to let water drain away from the roots. Then after planting, cover the exposed part of the root ball with mulch. This same technique should also be used to plant azaleas, rhododendrons and other plants that are susceptible to root rots. In really moist soils, plants can be set on the ground then a well-drained soil or fine mulch can be mounded around the roots. In dry weather, these plants will need to be watched closely to see if they need water.

Figure 2a. Mature tree planted correctly showing root flare

Bed preparation and soil improvement

In today's new home developments, soil in the average landscape is less fertile and more compacted following construction. Heavier equipment is used and topsoil may have been removed. A common belief, that soil amendments are needed to help plant growth and survival, has failed in research tests. Creating two different soil zones for plant rooting, for example by filling a hole dug in compacted soil with peat moss or pine bark, creates a 'pot' that lets the roots grow in the amended soil, but will not grow into the native soil. So, the plant slowly declines. Instead, adopt the following best management practices for planting trees, shrubs and perennial plants.

When installing groups of trees, shrubs or flowers in a large space, it is best to prepare the soil uniformly instead of planting into individual holes. The very first step is to collect native soil for a soil test to see what nutrients and amendments are needed. Contact your local county Extension agent for more information about submitting soil samples to the university to be tested.

After receiving the soil test results, till soil 8 to 10 inches (20 to 25 centimeters) deep and add 2 to 3 inches (5 to 7 centimeters) of organic material or topsoil, as well as any lime or other nutrients as directed by the soil test results, evenly across the top of the tilled soil, then

Photo courtesy of Mark Halcomb, UT Extension

Figure 2b. Serviceberry tree planted too deeply

till again. One cubic yard of organic material applied 3 inches (7 centimeters) deep will cover 100 square feet (9.3 m^2) of planting bed. Rake the soil surface smooth to help make sure that some plants do not sink into low spots where water will accumulate.

The bed is now ready to plant. Now, because the entire soil area was tilled, you can dig holes the same depth as the plant's root system or slightly less to allow to sufficient drainage. If the root system of a larger tree or shrub demands a deeper hole than the soil that has been tilled, then apply the same best management practices described for digging a single hole in untilled ground (Fig 2a., 2b.).

Why add organic matter?

Organic matter improves soil tilth, soil texture and water-holding abilities and also provides a weak negative electrical charge. As organic matter decomposes, its negative ions help positively charged nutrients remain in the soil and available to plants. In Tennessee, municipal compost, cotton gin waste, rice hulls, poultry litter, well-rotted sawdust and commercially prepared amendments are organic materials that are readily available. A word of caution, however: these products *must be well composted* and the uniformity of this practice varies between producers. Because un-composted organic matter binds plant nutrients more tightly for a longer time, it is not well suited for landscape use.

Planting plants grown in containers or pots

Container-grown nursery plants need special handling to ensure proper landscape growth and survival. Before planting, water container plants, then remove the container or plastic bag from around the roots. If the container was a fiber pot and appears to have been treated with a preservative, then remove it before planting. Check for and do not be afraid to cut any circling or girdling roots. Use a sharp knife to make three or four vertical, ¼-inch (0.6 centimeters) deep cuts down the root system (Figure 3). This type of root pruning cuts circling roots and stimulates new root growth. Gently loosen the cut root ball to expose other roots to the surrounding soil.

Place the plant in the hole so the top of the container soil is even or 1 to 2 inches (3 to 5 centimeters) above the soil grade. Backfill half of the hole with soil. Again, it is not necessary to amend the native soil with organic matter like peat moss. Water the root zone thoroughly. This is particularly important with container-grown plants because the soilless media dries out much faster than the soil.

Finish filling the hole with existing soil, water again and rake soil so the backfill is even with the existing ground line. The top of the soilless container media will still be visible, so cover the entire area and container root ball with 2 to 3 inches (5 to 7 centimeters) of mulch.

Figure 3. Scored root ball

Planting balled-and-burlapped (B&B) plants

Small balled-and-burlapped (B&B) plants are either hand dug or machine dug at the nursery, wrapped with burlap and secured with twine and pinning nails. Large B&B plants are dug with a mechanical spade and often placed in wire baskets at the nursery. Both small and large B&B plants can be very heavy. When handling B&B plants, lift the plant by the root ball, not by the trunk. If the root ball breaks away from the trunk, feeder roots can be broken and air cracks can form that will rapidly dry out and kill the fine roots that help the plant survive. Large plants may need two or more people to carry them. A tree dolly can also be used to carry plants across the site. If plants are not installed immediately, place them in the shade and keep the root ball moist. For longer storage, the root ball can be covered with moist sawdust or pine bark until planting time. The covering will help hold moisture and gives some protection from drying winds and cold temperatures.

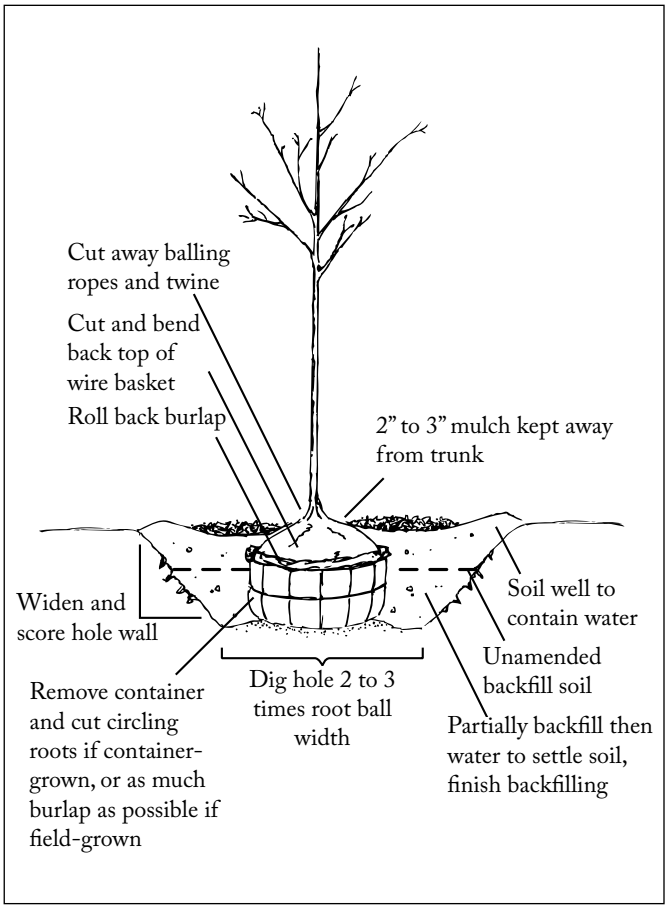


Figure 4. Planting balled-and-burlapped plants

To plant B&B trees and shrubs follow the best management practices described for digging the hole (Figure 4).

Many times, B&B plants have a wire basket around the root ball that helps support the root system until the plant is installed in the landscape. Leave the wire basket in place while handling the tree. Do not remove the burlap from the root ball before it is set into the planting hole. Remember, the plant should sit on solid ground rather than on loose soil. Once the plant is in place:

1. Untie any rope, jute or nylon twine that is tied on the trunk of the plant.
2. Pinning nails should be removed from the top of the root ball.
3. Fold the burlap down (about one-third) around the root ball. Do not allow the burlap to extend above the soil surface because it can act like a wick to pull soil moisture away from the root ball.
4. It is not necessary to remove the wire basket from large trees and shrubs; just cut off the top ring of the wire basket. The lower portion of the wire basket will help support the root ball until new roots start growing.
5. Backfill half of the hole with existing native soil. Remember; do not amend the backfill with organic matter, like peat moss that will cause problems with drainage of the planting hole.
6. Water the root zone thoroughly to help the soil settle and remove large air pockets.
7. Finish backfilling and water again.
8. Rake the soil evenly over the entire area so backfill is even with the existing soil line and finally,
9. Cover the entire area with 2 to 3 inches (5 to 7 centimeters) of mulch to help hold water and keep weeds from germinating (Figure 5).

Figure 5. Add mulch around the trunk of the plant

Planting bare-root plants

Sometimes easy-to-transplant plant species, like roses and grapes, are sold bare-root without soil around their roots. Some plants are sold with their roots in plastic bags surrounded by damp sawdust. Be sure to keep the root system moist if plants are not installed

immediately. They are more perishable than B&B or container-grown plants. When planting these bare-root specimens, remove any packaging material from the roots. Soak roots in water for up to 24 hours before planting. Remove broken and diseased roots as well as roots encircling the trunk.

The hole for bare-root plants should be large enough to let roots spread out normally, without being twisted or cramped. In the bottom of the hole, use the native soil to mound a cone in the center of hole, hold the plant in place at the proper depth, and then spread the root system over the cone. The mounded cone will help support roots when the backfill soil is replaced (Figure 6). As the soil is added, gently pack the soil around the roots to eliminate air pockets. When the hole is about two-thirds full, fill the hole with water and let it soak in. Finally, backfill, re-water, rake the soil evenly with the ground line and cover the entire area with 2 to 3 inches (5 to 7 centimeters) of mulch.

Figure 6. Planting a bare-root plant

Transplanting established plants

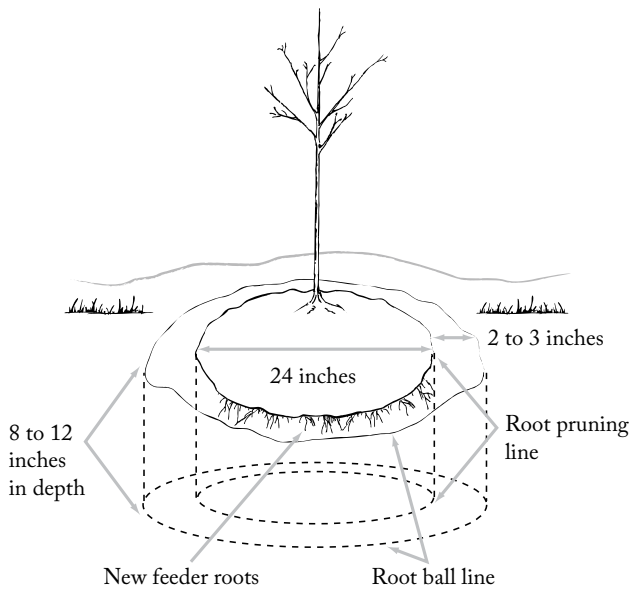
Before digging a B&B plant at the nursery, or transplanting a plant in the landscape, prepare the plant for the move (Figure 7). At least six months to a year before moving the plant, determine the proper size of the root ball to be dug. The American Nursery and Landscape Association (ANLA) recommends a 10- to 12-inch (20 to 30 centimeters) root ball for every inch of plant caliper diameter measured on the main stem about 6 inches (15 centimeters) above the ground. Therefore, if a plant has a 2-inch (5 centimeters) diameter caliper, the root ball should be 20 to 24 inches (50 to 60 centimeters) in diameter.

Figure 7. Measuring a root ball

Draw a circle on the ground around the trunk, then draw a second circle about 2 to 3 inches (5 to 7 centimeters) inside the first. Next, use a sharp spade and cut the blade into the soil about 8 to 12 inches (20 to 30 centimeters) deep in the north and south quarters around the inner circle. Three to six months later, repeat the process on the east and west quarters of the inner circle (Figure 8). This will help save the many new feeder roots that develop from the severed roots by keeping them within the outer circle (dug) area.

After another three to six months and during the dormant season, the plant is ready for transplanting. If soil moisture is low, water the plant a couple of days before you dig. Tie branches out of the way with twine. Dig a shallow trench around the outside of the original root ball circle. The root ball should be about two-thirds as deep as the diameter. Dig completely around the root ball, keeping the root ball intact. Gently roll the ball to

one side and place a large piece of burlap around the root ball. Roll the root ball to the other side so the burlap covers the entire root ball. Firmly wrap the burlap and tie it around the root ball for the move. A root ball 20 to 24 inches (50 to 60 centimeters) wide may weigh several hundred pounds, so do not lift the plant by the trunk or stems. For easier handling and to reduce lifting, carefully roll the root ball onto a tarp and drag the plant to the new planting site. Plant the tree or shrub according to the best management planting practices described earlier.



The inner circle represents the area for root pruning. The outer circle represents the original root ball circle. The new feeder roots are located in the area between the two circles.

Figure 8. Steps in transplanting

Pruning at time of planting

It is not necessary to prune woody ornamentals at transplanting. In fact, research shows that plants pruned at planting grew no better than un-pruned plants and in some instances *grew less* than un-pruned plants. In part, this is because pruning removes vital plant tissues that produce plant hormones like auxins. Auxins are stored primarily in the shoot tips and stimulate both spring bud break and root growth. Therefore, removing shoot tips can promote tall, leggy plants with bushy bases and delay bud break in spring.

Mulching

Proper application of mulch is important. Mulch helps conserve water, maintains even soil temperatures and inhibits weed growth. A 2- to 3-inch (5 to 7 centimeters) deep layer of mulch with a diameter about three to four times the diameter of the root ball is adequate for most plants. Less mulch may not control weeds or reduce moisture loss and mulch more than 4 inches (10 centimeters) deep will limit water and air movement above the root system. Organic mulch can hold enough moisture to keep the bark continually wet, causing bark decay, so it should not come in contact with the trunk or stem of the plant. Simply remove mulch with your hand. A shovel can cut plant bark, inviting pest and disease problems.

Watering

Watering newly set plants is essential for early growth and survival in the landscape. A strong root system will produce a better plant that is able to withstand dry periods later. The amount of water needed is dependent on soil type, rainfall and plant species. If the soil moisture level is high, then oxygen levels may be low and adding more water can suffocate the plant. A good rule is to water at about five- to seven-day intervals with enough water to soak the root ball. Light, frequent watering is harmful because the soil surface stays moist but the entire root system will not be wetted. Plants will develop a shallow root system that will dry out during prolonged droughts.

Staking and stabilization

Staking trees presents additional management challenges in the landscape and is often not necessary. If winds, soil conditions, slope, tree size, risk management issues or contract stipulations require tree staking, then use the following best management practices that were developed by Dr. Bonnie Appleton at Virginia Polytechnic Institute and State University.

1. Wooden and fiberglass stakes or posts are good for short-term tree stabilization.
   a. For trees less than 2-inch (5 centimeters) caliper or 6-8 feet (2 to 2.5 m) tall, use a single stake inserted at least 18 to 24 inches (45 to 60 centimeters) into the native soil.
   b. Trees up to 6-inch (15 centimeters) caliper need two stakes, while larger trees need three or more stakes.
2. Root anchor products are often preferable to support lines, particularly in areas with foot and animal traffic. Keep in mind that root anchors left in place may present future problems for tree removal equipment (e.g., stump grinders).
3. If support lines are needed, use either plastic (poly) chain lock or woven cloth (web) strapping (Figure 9) instead of wire and twine guys that can damage thin bark.
4. If the tree is in traffic areas, tie flags or ribbons on guy wires to protect pedestrians and pets.
5. Loosely connect supports or guides around the trunk to allow slight movement and both trunk caliper and taper growth.
6. Don't anchor trees too high on the trunk and avoid securing guides in narrow crotch angles of branches.
7. Prevent bark abrasion, particularly on thin-barked trees like maple and cherry trees, by using recommended rubber bands, pads or springs with supports or stakes. Cut pieces of hose degrade very quickly if used with thin wire or left untended.
8. Remove stabilizers after new root growth adequately penetrates existing soil. Time needed for roots to anchor the tree will vary by tree species, size, soil type, etc. but is often achieved after the first growing season.

Photo courtesy of www.treestaking.com

Figure 9. Staking and stabilization

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