# Tree Planting Basics

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Anyone can plant a tree. Prepare a hole just wide enough to accommodate the roots, dig it extra deep and then throw in peat moss or gravel to enhance root growth and drainage, don't worry about removing root enclosures like containers, or burlap and twine (they'll decompose eventually), amend the backfill soil with rich organic materials and fertilizer, remove one-third of the branches to compensate for root loss, and stake the tree to prevent any movement. Right? Of course not! But unfortunately, many of these outdated, ill-founded practices persist. Yes, anyone can plant a tree, but to ensure success, sound installation practices must be followed.

## Initial Considerations

Before you pick up the shovel, review your game plan one more time. Have you chosen trees that conform to any and all spatial constraints presented by the site (consider power lines, sidewalks, streets, etc.)? Have you chosen trees with the genetic wherewithal to cope with any unique environmental conditions (consider south-facing walls that turn into blast furnaces in summer, wind tunnels, wet areas, etc.)? Were your trees purchased from reputable nursery operators (not dug from the woods) and are they of the highest quality? Finally, have you made plans to protect trees from mechanical injury, heat and cold, and from drying-out during transportation to the planting site and as they await installation? If you can answer yes to all of these questions, then you're ready to plant.

## General Site Preparation

Ideally, the planting hole should be two to three times the width of the rootball, container, or rootmass (the poorer the soil, the wider the hole), with sides that slope towards the base of the rootball (Fig. 1). Wide planting holes provide a beneficial zone of well-aerated and well-drained soil that tree roots will readily exploit during the establishment period. In addition, sloped walls help direct growing root tips upward to the surface rather than in a circling pattern. Hole depth should allow the tree to be positioned so that the root collar or trunk flare is level with, or slightly higher than the surrounding grade. Never dig the hole deeper than the height of the rootball or rootmass because the tree may settle deeper into the hole than intended. Planting too deep, either intentionally or unintentionally, can cause trees to die within months of installation, or lead to other chronic problems (girdling roots, stem or trunk rots, etc.) that significantly shorten their lives.

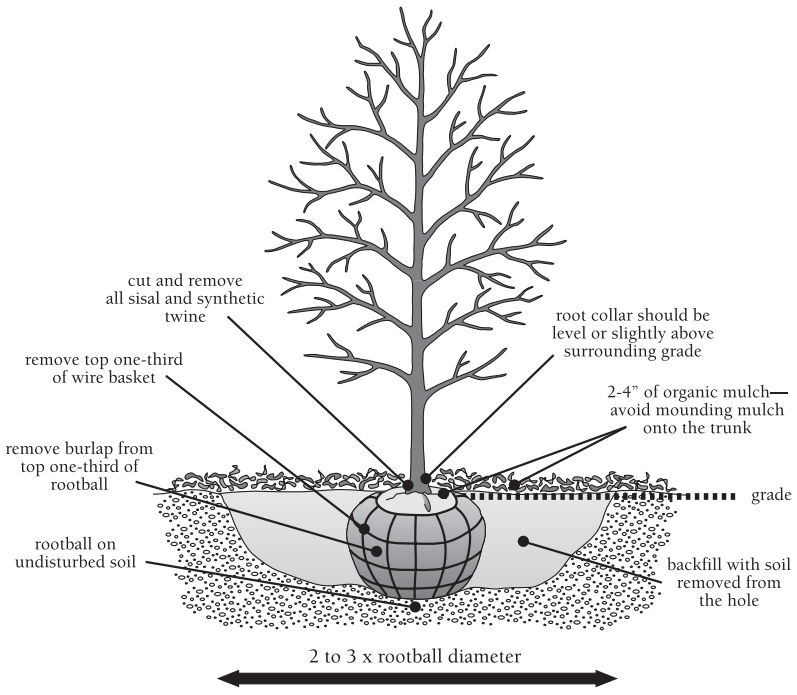


Figure 1. Tree planting method for well-drained soil. The planting hole should be 2 to 3 times the width and no deeper than the height of the rootball.

But what about planting trees in new housing developments where the "growing medium" is compacted clay subsoil? When confronted with situations where drainage is poor and soil oxygen is in short supply, only species tolerant of these challenging conditions should be used. Alternatively, you might install expensive and elaborate subsurface drainage systems, or plant trees in raised berms (natural-appearing land forms composed of good topsoil). If trees must be planted directly into poorly-drained or compacted soils, a wide, shallow hole should be prepared so as much as one-third of the rootball or rootmass protrudes above the surrounding grade (Fig. 2). This technique raises the zone of active root growth above potentially saturated, oxygen deficient conditions.

Contrary to popular belief, soil removed from the planting hole is the most appropriate backfill material. Soil amendments like peat moss, ground bark, and composted manures mixed with the native soil and used as backfill have not proven beneficial to tree establishment. In fact, studies have shown tree root systems in amended soils remain confined to the amended soil in the planting hole, while trees planted without the "benefit" of soil amendments developed roots far beyond the original planting hole. And on poorly-drained sites, soil amendments can collect too much water. Because amended soil has greater pore space than surrounding clay soil, water will move into it preferentially. During periods of heavy rainfall, the amended planting hole can fill up with water like a bathtub, causing root suffocation and tree death.

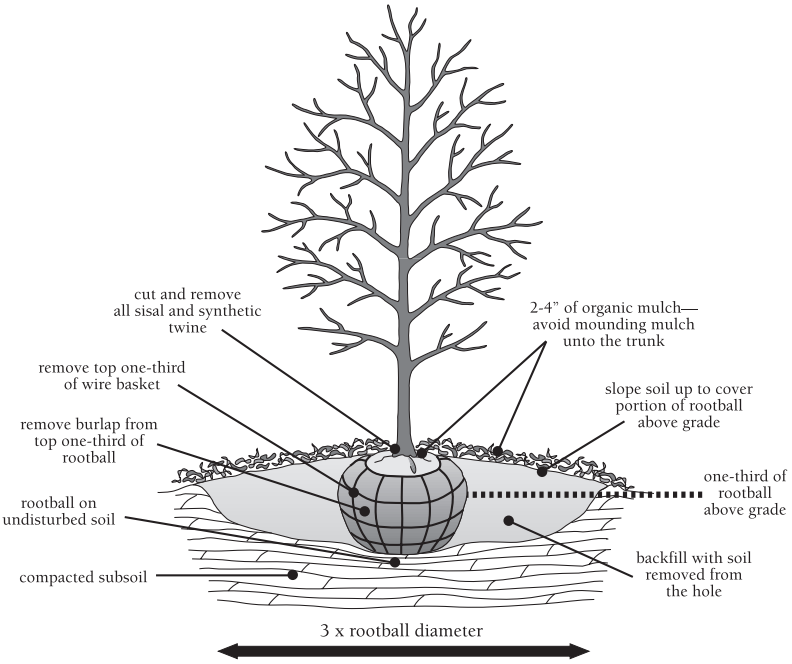


Figure 2. Tree planting method for poorly-drained soil. The planting hole should be 3 times the width of the rootball and shallow to allow one-third of the rootball to protrude above grade.

**Planting Bare-root Trees**

Damaged, broken, or excessively long roots should be pruned from bare-root trees prior to planting. When positioned in the hole, root systems should not be twisted, bent, or kinked. Planting bare-root trees is made easier by building a firm, cone-shaped mound of soil at the bottom of the hole. When roots are spread evenly over the mound or pedestal, the ground line on the trunk (indicating previous planting depth at the nursery) should be at, or just above the surrounding grade. After proper depth has been determined, backfill soil can be added, taking care to work the soil around the roots. Watering the backfill when three-fourths completed, and again when the backfill matches the surrounding grade, will eliminate undesirable air pockets. **Caution:** *Do not place excess soil, especially clay-type soil, over the planting site. When heaped over the plant roots, clay soil forms a layer that oxygen and water cannot readily penetrate. Adding clumps of turfgrass in the "overfill" also is to be avoided.*

**Planting Balled & Burlapped Trees**

Balled & burlapped (B&B) trees must be handled carefully to prevent damage to the trunk and to the roots inside the rootball. Trees should always be handled by the rootball and not by the stem or trunk.

To determine proper hole depth, examine the rootball to locate the original "ground level" at which the tree was growing in the nursery. Repeated cultivation in the nursery sometimes causes extra soil

to accumulate around the trunk, disguising the original grade. Trees can be planted too deep when the planter assumes the top of the rootball is the original ground level. Peel back the burlap from the top of the rootball and look for the flared trunk base that increases in diameter as it meets the ground. Also look for roots. If these features aren't immediately apparent, scrape the soil away until fibrous roots are discovered. Now the true depth of the root system can be determined and an appropriate hole can be prepared.

Balled & burlapped trees should be gently lowered, not dropped, into the prepared hole. If plastic or poly-burlap has been used to encase the rootball, it should be removed before backfilling begins. These materials interrupt water movement from the surrounding soil into the rootball, and also may restrict root growth.

Deciding which other support-lending materials to remove from the rootball before backfilling begins is handled on a case-by-case basis. If the rootball is exceptionally sturdy, all burlap, sisal and synthetic twine, and the wire basket can be removed before backfilling begins, however, removing these materials at this stage may result in the loss of rootball integrity and cause root damage. A safer method involves backfilling layers of soil around the rootball until one-half to two-thirds of the planting hole is full. Then, all twine from around the trunk, and the top one-third of the wire basket can be removed from the rootball to eliminate the possibility of root or stem girdling. Next, burlap covering the top one-third of the rootball can be cut away to allow free movement of water into the rootball. Removing the burlap is preferred over simply folding it back into the planting hole because a burlap "wad" two or more layers thick may form which could hamper root egress in the first few months after transplanting. Now backfilling can be completed, gently firming the backfill soil with your hands. Because dry rootballs will result in poor growth, a thorough watering is absolutely essential for the newly planted tree. A "deep-root" feeder or watering needle can be used to force water throughout the rootball to "recharge" it and promote root development. Also, make sure the backfill soil is thoroughly watered to eliminate air pockets.

**Planting Container-grown Trees**

Container-grown trees are planted using many of the same techniques described for balled & burlapped trees. But before backfilling begins, all containers must be removed from the rootball or rootmass. Even the so-called "plantable" or paper mache containers should be removed to keep them from interfering with root growth and drainage.

When planting a large tree, or if a tree is poorly established in the container (a common problem when container-grown trees are purchased in early spring), the planting operation is made easier by first, cutting away the bottom of the container, and then lowering the rootball into the hole before removing the rest of the container.

Occasionally, container-grown trees may become pot-bound or root-bound (roots dense and circling). If not corrected, this condition can restrict root growth development into the surrounding soil and make it difficult to wet the original root mass. Several vertical cuts made the length of the rootmass will disrupt circling roots and lessen the chance for girdling roots later in the life of the tree.

**Planting Trees in Fabric Containers**

Several in-ground fabric containers, using various designs and fabrics, have been produced by R. Reiger and C. Whitcomb. All of these fabric in-ground containers are removed from the field at harvest, with the containers not being removed until trees are transplanted. A new in-ground fabric container is made from Biobarrier™, a product composed of Typar geotextile and Treflan herbicide. While this new in-ground fabric container (the Geocell™) still allows for the lateral exchange of water between the native soil in and surrounding the container, it differs from the previous in-ground fabric containers in that the herbicide keeps the roots from growing through the fabric into the surrounding soil. No root loss should occur at harvest with the Geocell™, whereas up to 20% of roots may be lost using other types of in-ground fabric containers. In addition, the Geocell™ is not used, as are other in-ground fabric containers, for root ball protection and tree shipping/marketing, and often remains

behind in the production hole. But if trees are received with grow bags still attached to the root balls, they must be removed at planting to prevent possible root deformation and prolonged restriction of nutrient and carbohydrate movement.

**Planting with a Tree Spade**

Trees transplanted with a tree spade generally respond like B&B trees, however, if the planting hole is dug with a tree spade in clay soil and the sides of the hole become glazed, some roots could have trouble growing into the surrounding soil. To alleviate this problem, enlarge the hole before planting so roots can penetrate the loosened backfill soil. Lower the spade with the root ball into the hole and partially fill in around the spade with loosened backfill soil. Firm the soil and add water to settle.

Trees moved with a tree spade into loamy or sandy soils can usually be planted into the "spaded hole" with little, if any alterations to the hole. The tree often ends up a little higher than the surrounding grade, which is certainly much better than planting too deeply.

**The Establishment Period - Post-plant Care**

In USDA hardiness zones 4 and 5, the establishment period lasts about 12 months per inch of trunk diameter. For a two-inch caliper tree, this translates into a 24-month establishment period.

Proper **water** management is crucial for newly-planted trees. Recent evidence suggests frequent irrigation provides more benefit than applying large volumes of water infrequently. This is in direct contrast to the recommendation for established trees where occasional irrigation with large water volumes is considered better than light, frequent applications. Be sure to gradually increase the area irrigated around the tree to accommodate root growth.

Bare-root trees and those planted in windy, exposed sites may require **staking** for support. Staking materials should not girdle or injure the stem and should allow some trunk movement or sway. When possible, stakes should be removed after one year of service.

Severe **pruning** at planting time is unnecessary and may reduce the growth rate of developing roots. Remove only dead, broken, or rubbing branches.

**Mulching** the area around newly-planted trees with pine needles, wood chips, shredded bark, or slightly decomposed leaves (2 to 4 inches deep) is highly recommended. Mulching increases tree growth by reducing turfgrass competition, conserving soil moisture, and reducing the chance of mechanical injury from lawn mowers and string trimmers. The only precaution is to keep mulch several inches away from the trunk so it will not rot the trunk.

Finally, ensuring good aeration for developing roots through proper planting techniques and providing adequate moisture to the root-zone and surrounding backfill are far more important than applying **fertilizer** at planting time. Fertilizer is more appropriately applied at the beginning of the second growing season.