TRANSPLANTING GUIDE

Planting guide covers:

Selecting high-quality nursery trees
Handling, transporting and storing nursery trees
Transplanting ball and burlap, container and bare root trees
Post-planting maintenance

1. Selecting high-quality nursery trees

The goal in selecting nursery plants is to purchase those plants most likely to become successfully established and to mature in the landscape in order to meet design expectations with a minimum of maintenance. To do that, choose plants with good root systems and healthy, well-formed and undamaged crowns and trunks. In addition, any plant that you purchase should have a professional pedigree: grown in a nursery, dug and prepared for shipping by trained workers, and maintained properly while awaiting purchase. That is, buy plants from nurseries with good reputations and whose people you trust. Chances are that plants from reputable nurseries will have been treated properly and will establish reliably.

There are specific characteristics to look for (and look out for) when selecting nursery plants.

a. *Trunk and Branch Characteristics*

1. Buy plants that have a form typical of the species.
2. Shoots should show good vigor and growth.
3. Branches should be well-spaced and have good branch attachment. Avoid narrow branch attachments that may have included bark.
4. Crowns should be reasonably free of wounds and/or evidence of insect damage and/or disease.
5. Avoid top-heavy trees and plants that have been severely headed back.
6. Trunks should be straight, free from wounds or diseases and show trunk flare and proper trunk taper.

b. *Foliage Characteristics*

1. Foliage should have good color, with no sign of insect pests and/or diseases.
2. There should be an adequate number and size of leaves.
3. Avoid plants with leaf margins that are scorched. It is a sign of water stress.

***c.* Root and Rootball Characteristics**

1. All plants should have an adequate-sized rootball as specified by the *American Standard for Nursery Stock*.
2. Roots should have a good connection with the shoots—if you gently rock the plant, the entire rootball should move.
3. Ball and burlap rootballs should be covered with natural burlap.
4. Container plants should not be pot-bound and, if you gently remove a plant from its pot, you should see healthy whitish root tips.
5. Avoid plants with kinked root systems. It is hard to determine if a plant has a kinked root, but if you see one, do not buy that plant.
6. Avoid plants with weedy rootballs.

2. Handling, transporting and storing nursery trees

The objective in handling, transporting and storing nursery plants is to minimize water stress and ensure a good connection between the roots and the shoots. To minimize water stress, use techniques in handling, transporting and storing plants that reduce transpirational stress while providing enough water to meet plant requirements. The following are recommended techniques for nursery plants (the most important recommendations appear in boldface type).

a. ***Handling***

1. **Always carry the plant by the rootball**, never solely by the trunk or branches.
2. Keep any wrap or other protection on the plant when handling, transporting or storing.
3. Avoid dropping or crushing the rootball.
4. Pad the edges of machinery that handles plants to avoid wounding.
5. Tie up branches with a gentle hand. They can easily crack or break.

b. ***Transporting***

1. **Tarp all plants in transit**, preferably with a breathable mesh covering.
2. Rootballs should be moist before transporting.
3. Plants should be placed in truck so there is a minimum of shifting and movement while in transit.
4. If possible, support trunks.

c. ***Storing Trees at the Jobsite or Holding Yard***

1. **Make sure plants are well watered.** Daily or even more frequent irrigation may be needed during summer months.
2. Store plants in a shady location.
3. Group plants together.
4. Heel plants into mulch or soil if they are to be stored for a long time.

3. Transplanting ball and burlap, container and bare root trees

The goal in transplanting is to make every effort to allow the plant to become established quickly by encouraging the swift regeneration and regrowth of the root system. To do this, the planting hole should be wide and shallow (mimicking the shape of the plant's root system), backfilled appropriately, and the tree or shrub planted at the proper depth. The decision on whether or not to amend the backfill with organic material depends on the soil texture and drainage characteristics of the site.

a. ***The Planting Hole***

1. **Dig the planting hole 2 - 3 times the diameter (width) of the rootball and no deeper than the depth of the rootball.**
2. Loosening or tilling the entire landscape bed is preferred over digging individual planting holes. If compacted, add at least 30% organic matter to the entire site - not just within the individual hole.
3. Avoid planting when the soil is very moist because wet soil has a tendency to glaze and become compacted.

b. ***Removing Rootball Coverings***

In general, rootball coverings that will impede root growth should be removed. Not all materials that look like natural burlap (which degrades slowly, but surely) are natural burlap, and may not degrade much, if at all. Depending on what type of burlap was used, you will have to be more or less vigorous in your efforts to remove it before planting.

Natural burlap Remove excess burlap from around rootball and any burlap that has been wrapped around the trunk. Be sure that there will be good soil contact between the rootball and the backfill.

Synthetic burlap , carpet backing, synthetic/natural blend It is best to remove this material—but be careful to keep the rootball intact. If you do not think you can pull all the burlap away from the plant without the rootball remaining intact, cut away as much as possible.

Natural and synthetic twine Remove all twine that is wrapped around the trunk of the tree or shrub.

Wire baskets Use this two-step approach to remove wire baskets without jeopardizing the rootball:

1. before the plant is placed in the hole, cut away the bottom few "rungs" of the basket
2. place the plant in the hole, using the remaining part of the basket to move and face the plant, backfill up to the wire, then remove the remaining wire. In this way, the wire basket is removed only when the plant is stable in the planting hole.
3. If all of the wire basket cannot be removed, remove the top half of the basket after the rootball has been secured in the planting hole.

Container plants If the plant is not pot bound, tease out the roots with your fingers. If the plant is pot bound, make four 1" slices with a knife, spade or trowel down the sides of the pot and also slice the bottom of the rootball. Tease out roots with your fingers.

c. ***Placing the Tree in the Hole and Backfilling***

1. Place the plant in the hole by handling the rootball only. Face and plumb the plant appropriately.
2. **Plant tree at the proper depth.** The rootball should be set so that the trunk flare is exactly at the existing grade in loamy or sandy soils, and above the existing grade in clayey or poorly drained soils (up to 1/3 rd of the ball can be above the existing grade). Make sure that you have uncovered the trunk flare. Soil can be added inadvertently covering the flare during digging at the nursery.
3. Backfill firmly, but without overly compacting the soil. Try to eliminate air pockets. Some landscapers partially backfill the hole, irrigate, then allow the water to fully drain before completing the backfilling. This helps eliminate air pockets.
4. Do not cover the trunk with soil; the backfill should come right up to the rootball, but little, if any soil should cover the rootball.
5. If you wish, form a 2 - 3" soil rim at the edge of the planting hole. The rim helps hold in water and direct it to the roots, but be sure to remove the rim within two years (roots should be beyond the planting hole by then).
6. There is no need to fertilize the tree or shrub at planting.
7. Avoid planting when the soil is very moist. It is difficult to work the soil, and the risk of glazing and compacting the soil is great.

d. ***Planting Bare Root Trees***

Bare root trees are handled and planted in much the same manner as balled and burlapped and container plants. The planting hole is dug 2 - 3 times the width of the root mass, and dug only as deep as the roots. The decision to amend or not to amend hinges on soil texture as previously described. There are, however, a few techniques that you can use to increase the success of bare root plantings.

1. Research at Cornell University has shown that dipping the roots of a recently dug bare root tree in a slurry of hydrogel and water aids in preventing the desiccation of the roots in transit between the nursery and the planting site. The slurry creates a reservoir of water that helps the roots avoid desiccation.
2. If you must store bare root trees for a few days before planting, keep the them in a cool, shaded location.
3. If root ends appear jagged or split, cut them cleanly with a sterilized pair of pruning shears.
4. When backfilling, be sure that you fill all air spaces with soil—avoid large pockets of air which inhibit root growth.
5. Stake if necessary and water in well.

***For a complete description of bare root transplanting contact the Urban Horticulture Institute to receive the *Creating the Urban Forest: The Bare Root Method* booklet and/or video. The booklet is available on line at the UHI website: <http://www.hort.cornell.edu/uhi>**

e. ***Completing the Planting***

1. Create a mulch ring using a layer of 2 - 3" of mulch. Do not over-apply mulch, and keep it away from the trunk. There should not be any mulch touching the trunk.
2. Water the tree in well. Irrigating supplies needed water, helps to remove air pockets and improves soil contact with the rootball.
3. Prune to remove dead, diseased, damaged, crossing branches and competing leaders.
4. Stake the tree only if necessary. Know that any material you use on a tree must be removed within a year to prevent girdling. If you must stake, stake so the tree can move in the wind and use materials that minimize rubbing.

4. Post-planting Maintenance

a. ***Maintenance in the First Growing Season***

1. Irrigate the plants as frequently as is necessary to keep rootball moist, but not too wet. As a rule of thumb, start with two waterings per week for the first few months, then drop to once a week through the rest of the growing season. When you water, water well.
2. Maintain the 2 - 3" mulch layer. Keep weeds to a minimum.
3. Use fertilizer only if you have determined, by visual inspection of growth and/or by a nutrient analysis test, that the plant requires additional nutrients. Usually, nitrogen is the only deficient nutrient. If you choose to fertilize, broadcast 1-2 pounds of nitrogen per 1000 square feet per year of a slow release fertilizer before budbreak.
4. After the first growing season, evaluate the structure of the plant and do any necessary structural pruning.

b. ***Planting in Poorly Drained Soils***

Most plants cannot live in waterlogged or poorly drained soils. If you must plant in poorly drained soils, be sure that the species you have selected tolerate wet soil. In addition to planting high, you may need to take additional steps to improve drainage within the planting hole.

1. Plant high as described for clayey soils. The mound that is created by planting high reduces the amount of water that enters the planting hole—water simply runs off the mound and away from the rootball.
2. Place the rootball on a pedestal of undisturbed soil so that excess water can pool below the rootball before the water slowly moves further down the soil profile.
3. Install a sump at the bottom of the planting hole that acts as a reservoir for excess water. A sump is made by using a post-hole digger to dig a 2 - 3' deep hole at the bottom of the planting hole, but as near to the rootball as possible. Place a slotted plastic pipe in the hole and fill the pipe with gravel. Cover the top of the pipe with geotextile fabric.