



## PLANTING TECHNIQUES FOR TREES AND SHRUBS

M. A. (Kim) Powell, Extension Horticultural Specialist

A properly planted tree or shrub will be more tolerant of adverse conditions and require much less management than one planted incorrectly. Planting technique impacts water quality as it minimizes water, fertilizer and pesticide use. When making decisions on planting techniques, one should consider how the plant was grown in the nursery, the plant's drainage requirements, the soil type and drainage characteristics, and the availability of irrigation water. The plant should be specifically appropriate to the site, or the site should be amended to specifically fit the plant.

**The Challenge:** Horticulture researchers have estimated that 75% of the roots may be lost when digging field-grown nursery stock. Cultural practices by the nurseryman, such as root pruning, irrigation, fertilization, root-ball configuration, and digging techniques, influence the percentage of harvested roots. Water stress, due to removal of most of the water-absorbing roots, is the primary cause of transplant failure. Most water absorption capability within a transplanted root-ball results from very small diameter roots. These fragile roots are the first to suffer from excess water loss in newly transplanted landscape plants.

**Sources of Plant Material:** Landscape contractors and home gardeners can choose from a wide variety of plant material in

North Carolina. Plants are grown by various production methods, e.g. bare-root, balled and burlapped, fabric container and plastic container. Some large landscape trees are mechanically dug with a tree-spade and placed in wire baskets. Each of these harvesting and growing techniques is acceptable, but requires a specific planting and management technique.

**Bare-root Plants:** Advantages of planting bare-root plants are mostly economical. Plants are less expensive to produce because of the ease of harvesting, storing and shipping. Many species respond well to bare-root harvesting. A greater portion and longer roots are retained after harvesting and roots are easily inspected at planting time. Damaged roots can be trimmed and girdling roots can be removed before planting. Bare-root plants should be planted while they are completely dormant. Landscape-sized bare-root trees usually require staking.

**Balled and Burlapped Plants:** Larger landscape plants are traditionally harvested as "balled and burlapped" (B&B). A major advantage of B&B plants is that soil types can be matched, thereby reducing any interface problems that might inhibit water movement between the rootball and surrounding soil of the landscape site. There is an acceptable, standardized formula for sizing rootballs, which is the

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American Standard for Nursery Stock. The main disadvantage of B&B material is that a large portion of the roots may be severed at harvest time. The amount of roots harvested depends upon soil type, irrigation practices and root pruning during the production period. Plants moved B&B are subject to seasonal constraints. The most favorable seasons are when transpiration demand is low and root generation potential is high, such as in fall, winter and early spring. With the much-reduced root system, water is a critical element in the successful transplanting of B&B material.

**Container-Grown Plants:** The advantage of using plants grown in containers is that 100% of the roots are in the container. Thus, the plant goes through limited transplant shock if given adequate follow-up care. Container-grown plants can be planted into the landscape year-round. Plants produced in containers, in a soilless medium (usually bark and sand), are much lighter than B&B material. This is very helpful to home gardeners who may not have large equipment to handle the heavy plants.

The main disadvantage of container-grown plants is the possibility of deformed roots. "Rootbound" plants have roots circling inside the container. The entangled roots are a physical barrier to future root growth and development. If this condition is not corrected at planting time, the plant may experience slow growth and establishment because of the girdled roots. Some form of root mass disturbance is recommended before planting.

A relatively new production system is the use of fabric containers or bags. Plants are grown in the bags, placed in the ground, with a soil backfill. The advantage to this production technique is purported to be a means of harvesting a greater number of roots while using field production practices. The fabric must be removed at transplanting time. This can be somewhat of a problem when the roots have become attached to the walls of the bag, or if roots have escaped through the fabric.

### **What Size Plant Should You Choose?**

Smaller plants live better and establish faster than large plants and are more economical. Many consumers, on the other hand, want the "instant" landscape look. Demand for large, landscape-size

trees has certainly increased over the last decade. With large mechanical digging equipment, 6- to 8-inch diameter trees can be moved. Large diameter trees are often transplanted for instantaneous effect, but post-transplant stress and costs increase with the size of the tree.

**Planting Procedures:** Correct planting technique begins with the loading of the plant at the nursery or garden center. Home gardeners and landscapers should be very careful with plant material. Always protect the roots, stems and foliage during transport. The plant tops should be shielded from winds. Never pick up a plant by the trunk. Trees are particularly vulnerable to damage if growth has started. In the spring the bark is easily injured. B&B trees are very susceptible to this type injury because of the weight of the root-ball. Lift plants from underneath the rootball with the appropriate equipment. Container-grown plants should be handled by the container and never by the tops of the plant. If plants must be held or stored on the landscape site, it is best to place them in a location protected from the wind and sun. Do not let the roots freeze or dry out during this time. If the delay in planting is more than a few days, one should "heel in" B&B material by covering the roots with bark or some other mulch. Supplemental irrigation is critical for the nursery stock during the growing season.

**The Planting Hole:** A current trend in landscape design is to plant trees and shrubs in large beds. When this design concept is followed, preparation of the entire plant bed area and not just individual holes is recommended. In many urban areas, gardeners will find that the soils are compacted and sometimes poorly drained. In these situations one should create a good rootzone by amending the beds with a sandy-loam topsoil and aerifying the soil as deep as possible. The addition of organic matter provides little or no advantage to the planting hole in good soils. Backfill should, in most cases, be the soil removed from the planting hole: "what comes out...goes back in". This is especially important for B&B material and bare-root planting stock. An exception to this would be where entire beds can be amended to create an homogeneous root-zone. The organic matter, e.g. compost or composted pine bark, is uniformly mixed with the soil. This makes room for future growth and increases aeration to the backfill.

In very poorly drained soils, drain tile under the beds is necessary. If a french drain or tile drain is installed, be sure that it drains downhill at a 2% minimum slope and there is an outlet on the downhill side. When setting plants, be certain to plant them high. If the poor drainage condition cannot be corrected, don't plant a tree or shrub in the area, unless it can tolerate these conditions.

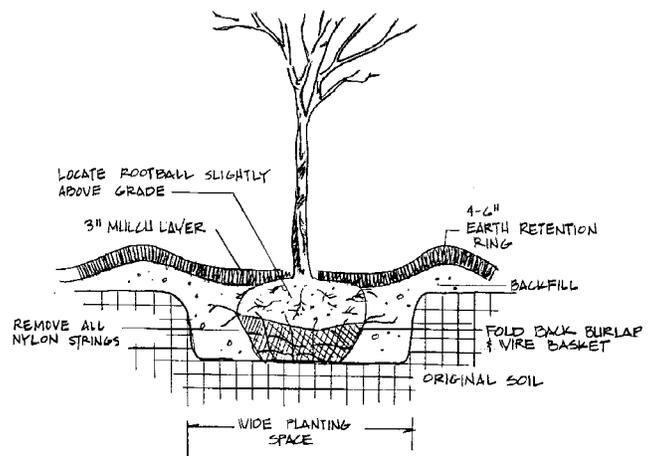
If the soil is sandy and moisture is difficult to hold, a heavier topsoil can be added. Organic matter in this situation will be valuable as it improves the water-holding capacity of the sandy soil. After planting, add a 3- to 4-inch layer of organic mulch on the soil surface around the plant. This will conserve moisture, discourage weeds and moderate soil temperatures. Also be sure to consider the aesthetics of the mulch (see Figure 1).



**Figure 1.** The raised bed method of planting plants that will not tolerate heavy, poorly-drained soils.

The most important consideration in planting trees and shrubs is the planting depth. Don't plant too deep. It is better to plant in a raised manner so the roots will not drown or suffocate. Dig planting holes 2 to 3 times wider than the rootball and the same depth. Locate the rootball on solid soil and not loose backfill. Wire baskets do not need to be completely removed from large field grown trees. Cut and fold down the top half of the basket, fold back the burlap, and remove nylon strings. Be sure to remove plastic liners or synthetic burlap type materials.

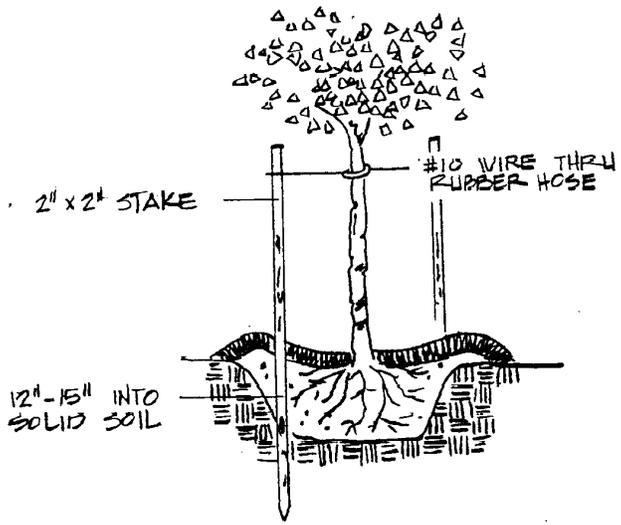
For the most efficient use of water, construct an earthen dam 4 to 6 inches high around the dripzone area of the plant after planting. Water will have the ability to collect in this saucer and move slowly down into the planting hole. Runoff will be minimized (Figure 2).



**Figure 2.** Planting technique for B&B trees.

**Wrapping, Staking, and Pruning:** Trunk wraps, in theory, help prevent sunscald and frost cracks on thin bark trees such as maple and birch. They also offer some protection from rodents and maintenance equipment. Recently, however, this practice has been questioned. These injuries are usually winter injuries due to extreme environmental conditions. Trees in exposed sites where trunks are open to south and southwest direct winter sun may require protection. The decision on whether to apply a tree wrap should be made on a tree by tree basis.

Sometimes a newly planted tree will require additional support, anchorage or protection. Stakes should be added for one of these reasons, although an unstaked tree grows faster than a staked one. Prolonged staking not only reduces the taper of the trunk, but also creates a liability, particularly if it is not clearly flagged. Trees that were staked in the nursery may require additional support once they are transplanted. Trees planted in open, windy sites may require staking. Large transplanted "tree-spaded" trees may require heavy gauge guy wires (guying), especially evergreens such as magnolia or cedar (Figure 3). Follow-up management of the wires attached to the tree trunk is mandatory. Girdling can become an irreversible problem, if wires are left more than one growing season. Recently planted small trees can benefit from stakes placed around them as a protection method. When they reach sufficient size, the stakes can be removed. There are no wires attaching the stakes to the trees when used for protection. A 3- to 4-inch layer of organic mulch around the base of the tree also offers protection from mechanical equipment.



Traditionally, B&B trees have been pruned at transplanting time but this practice has been amended. The traditional rationale was that reducing the top by 25% to 40% compensated for root loss and would result in better tree survival. Pruning should be done to remove damaged branches and to improve the structure of the plant. Overlapping, parallel, and crowded branches should be pruned after installation. Cosmetic pruning to improve the form and shape of the plant is also recommended.

**Figure 3.** Staking method for landscape tree. Be certain to drive stake into solid soil.