

Tree Selection

Trees and shrubs must be selected for quality, which can be determined through thoughtful inspection. Quality factors to evaluate include root ball size and structure; trunk form and strength; branch structure; and evidence of injury, disease or poor cultivation methods.

Choosing the Right Tree Size

Water must be supplied on a regular basis to newly planted trees. Smaller trees will require regular irrigation for several months following planting, larger trees for much longer. If you cannot meet the watering requirements of a given tree, choose it in a smaller size.

Site drainage also affects the size of tree to choose. On poorly drained sites, smaller trees with shallower root balls often do better than large nursery trees. A nursery tree is considered large if its trunk is more than 2 inches in diameter. The larger root balls of big trees can become submerged in water on a poorly drained site. This will kill the roots at the base of the root ball and stress the tree, slowing the rate of establishment and thus making it more sensitive to pests, disease and drought injury. If large trees are absolutely necessary for a poorly drained site, select trees especially grown with a shallow root ball or plant in a shallow hole to keep roots above the water level.

Root Ball Characteristics

The shape, depth and size of a tree's root ball is determined by the way the tree was produced in the nursery. Trees grown directly in the ground are called field-grown. Trees may also be grown in containers that are made in sizes, shapes and materials that affect the structure of the root ball. When a tree will be planted in a well-drained site and receive regular irrigation, the way it was

produced doesn't really matter. However, when watering will be infrequent, the method by which a tree was grown or harvested will affect its chances of surviving transplanting.

Field-Grown Trees

Field-grown trees that have been properly harvested and hardened off are strong and sturdy. They are good choices for any kind of site and usually the best choice for sites where watering will be infrequent or irregular. Compared to trees grown by other methods, the root ball of a harvested field-grown tree is larger and capable of more water storage, thus making it slower to dry out. The root balls of field-grown trees are also much heavier than those of container-grown trees, making them significantly harder to handle.

When field-grown trees are harvested, burlap is wrapped around the root balls and secured with nails, string or wire. The root ball of a balled-and-burlapped tree is fairly durable, but care should be exercised to avoid breaking or crushing roots in transport and handling.

Container-Grown Trees

Container-grown trees have smaller root balls and many times more fine roots than similarly sized field-grown trees. For a variety of reasons, container-grown trees dry out more quickly, making them more sensitive to drought injury in the period following planting.

Fabric containers or fabric bags are made of a heavy flexible fabric especially designed for this growing method. Trees are planted in the fabric containers that are then planted in the ground. While their smaller size makes them easier to handle, they are also more fragile and dry out faster than the root balls of balled-and-burlapped trees.

Trees and shrubs are most commonly grown in plastic containers that are placed either above ground or, more recently, below ground and inside permanently installed containers with specially designed drainage holes. This latter method, known as pot-in-pot, insulates the root system and should produce roots that are more uniformly distributed than those found in above-ground containers.

Containers are usually filled with an artificial or soilless growing medium composed of one or more materials like bark, peat moss, compost and sand. These media are generally coarser than soil, which permits them to drain quickly and which, in turn, helps prevent root rot. To maintain optimum growth after planting, water container-grown plants at least as often as they were watered in the nursery. In the summer, it may be necessary to irrigate daily on well-drained, sandy soils for a number of weeks or months after planting, especially for trees whose trunks are over 2 inches in diameter. Taper off on watering as roots grow out into the landscape soil.

Bare-Root Trees

As the name suggests, bare-root trees are sold with roots that are not encased in soil. They are field-grown, hardened off trees and are not commonly found in the market. If their roots are kept shaded, moist and cool until planting, bare root trees should perform as well as container-grown or balled-and-burlapped trees.

Checking the Root Ball for Defects

The health of a plant's root ball is critical to its ultimate survival. Some root ball defects are obvious, while others require careful observation and inspection to discover. A thorough inspection before planting will help prevent future disappointment.

One defect can be easily diagnosed without removing soil or the growing medium from the root ball. Remove any stakes from the tree and simply push the trunk back and forth once or twice while holding the root ball still. The trunk on a tree of good quality will bend along its length but will not move in the soil or medium. The trunk on a tree with a defective root system will pivot at its base before it bends or will appear to be loose in the root ball. A tree with this defect may not develop enough stability to hold itself up.

Next, check for the location of the top layer of the tree's roots, which should be very near the surface of the soil. Slip your fingers along the trunk and down into the soil until you feel the first root growing from the trunk. This should be no more than an inch or two below the surface of the soil. Sometimes trees have been planted too deeply either in the ground or in containers. The raised soil level can hinder the tree's establishment in the landscape or can cause its decline several years later. If for some reason you are compelled to plant a tree with a raised soil level, remove all soil to expose the topmost root in the root ball. Plant the tree so that this root is just below the soil's surface.

Check the main roots close to the tree's trunk. Look for kinked or circling roots close to the trunk and near the soil surface. If circling roots are tight up against the trunk, do not purchase the tree. Circling or kinked roots less than about one-third the trunk diameter can be cut at the point where they begin to circle. This may temporarily slow growth but should have a positive impact on future tree survival and growth.

Inspect the bottom of the container for escaping roots. There should be no evidence of escaping roots larger than about one-fifth the diameter of the trunk of the tree. Smaller escaping roots may be cut off with little harm to the tree. If the larger roots exist and need to be cut to remove the tree from the container, the tree could suffer decline and leaf drop. If you try to pick up a container-grown shrub and find that it is fastened to the ground by escaping roots, select another plant. The root ball should be free of weeds, which slow the establishment rate of a plant and may spread into the surrounding landscape.

Once you have checked the container's bottom, lay the tree on its side. You should be able to simply slide the container off the root ball. If not, gently push the bottom of the container while holding the rim to loosen the root ball from the container. If this doesn't free the root ball, it may be pot-bound.

Once the tree is out of the container, the root ball should stay together but be somewhat flexible. You should be able to pick the root ball up and gently place it back in the container without losing much media. If the root ball falls apart when you remove it, particularly with shrubs, it may have just been

"stepped up" to a larger container. You could be buying a large container of potting media with very few roots.

If many roots circle around the outside of the root ball or the root ball is very hard, it is said to be pot-bound or root-bound. A mass of circling roots on the outside of a root ball can act as a physical barrier to root penetration into the landscape soil after planting. The circling roots can also choke and kill the tree as it grows older. Do not purchase pot-bound plants.

Examine the roots on the surface of the root ball. Do not buy a plant with black roots. These roots were probably killed by heat stress, freezing temperatures or over-watering.

With trees and shrubs that are balled-and-burlapped, note whether the root ball has been secured tightly with pins, twine or wire. A loose or droopy root ball indicates that the plant was not properly cared for and may perform poorly after planting. The trunk should be sturdy in the root ball. If the trunk is unstable or needs a stake to prevent it from falling over, the root system may be inferior. Purchase is not recommended.

Bare-root trees should have living, small-diameter roots growing from the larger roots. The insides of living roots are whitish and wet.

Trunk Form & Structure

Strong trunks are thickest near the ground and taper up. They do not require stakes to support them. Trees that were staked for a long time in the nursery may not develop proper trunk taper and may fall over when stakes are removed. The trunks of these trees are often the same diameter at the ground as they are several feet up the tree. This is a sign that the trunk may be weak.

To test for trunk strength, take the tree into an open area and remove all stakes. If the tree is in leaf and it remains erect, it is probably strong enough. If possible, simulate rainfall by wetting the foliage with a hose. This weighs the branches down and further tests the sturdiness of the trunk.

Single-Trunked Trees: Trees with one trunk are usually considered stronger than their multi-trunked

counterparts and are more durable in the landscape. Certain small trees such as crape myrtle (*Lagerstroemia indica*), Japanese privet (*Ligustrum japonicum*), southern waxmyrtle (*Myrica cerifera*) and other ornamentals usually grow with several trunks, but can be trained in the nursery to one trunk.

A tree that will grow to be more than 40 feet tall should have a single trunk well up into its canopy, but the trunk does not have to be arrow-straight. A tree that forks in its top half should have one of the trunks removed before planting. If the trunk forks in the lower half of the tree, is unusually bent or has a severe dog-leg, then it should not be planted.

Trees with a single trunk are usually more appropriate for planting along streets and near walks and are also easier to train so that the branches grow well overhead of vehicles and pedestrians. Lower branches and entire trunks on multi-trunked trees often have to be removed several years after planting because they obstruct pedestrians and traffic. This often disfigures the tree and compromises tree health.

Multi-Trunked Trees: Small multi-trunked trees less than 30 feet tall at maturity have a definite place in the landscape. If their several trunks originate close to the ground, they make nice specimens, especially those trees that have attractive, showy bark or trunk structure.

Trees with several trunks often develop embedded bark in the crotches. Embedded bark appears as a crease running several inches to many feet down from the crotch. Bark is pinched into the crease. This condition can cause one of the trunks to split from the rest of the tree during a storm or even on a windy day. When a major branch or trunk splits, the character and health of the tree may be altered.

Branch Size & Arrangement: Branches should be distributed along the trunk and not clumped toward the top. Branches in the lower half of the tree help distribute the stress placed on the trunk when the wind blows. At least half of the foliage should originate from branches on the lower two-thirds of the tree.

Branches that are less than half the diameter of the trunk and those with a U-shaped crotch are stronger

than those that grow larger than half the trunk diameter and those with a V-shaped crotch.

Branch arrangement and spacing is especially important on trees that will be large, over 40 feet at maturity. On saplings with trunk diameters of less than 2 inches, the main or largest diameter branches should be about 6 inches apart. Smaller-sized branches can be closer than this. Trees with trunk diameters between 2 and 4 inches might have one or two branches that will be permanent branches. Permanent branches should be spaced at least 18 inches apart and should not have bark embedded in the branch crotches. Trees with trunks larger than 4 inches in diameter are likely to have several permanent branches that should also be at least 18 inches apart.

Branch arrangement and spacing is less crucial on trees that will be small at maturity. Simply look for those with a pleasing branch arrangement that will fit the needs of the planting site.

Signs of Disease & Injury: Examine a tree's leaves, trunk and branches for evidence of disease, pest infestation or other injury. Not only do you want to select a tree that is healthy, you also want to avoid exposing the other plants in the landscape to an un-healthy plant.

Pest Problems: Many mites and insect pests are tiny and/or well-hidden. Look carefully at both sides of a tree's leaves, especially if the foliage is speckled or spotted. Speckling may be the result of a generally armless leaf spot disease. Spotted foliage may also be an indication of sunburn or chemical injury or possibly an infestation of scales, spider mites, lace bugs or some other pest that sucks sap from the foliage. Do not purchase trees with these pests. If you are not certain of the cause of leaf speckling or spotting, ask the nursery manager.

Because their color is often similar to that of twigs and branches, the presence of scale insects is one of the more difficult infestations to detect. Look for raised ridges or bumps on the tree's twigs. Do not plant trees with scale infestations.

Except in their dormant season, nursery trees should have foliage to the ends of all their branches. Dead tips indicate problems that need further study. If the tree is dormant and has no leaves, scrape several of its twigs with your fingernail. If the tissue revealed is greenish or white, the twig is alive. Dry brown tissue indicates that the twig or branch is dead from that part out to the tip. This condition is known as dieback. As a rule, trees with dieback should not be purchased.

Injuries & Cultivation Damage: Avoid trees with scars and other open wounds along the trunk. Open pruning wounds are fine if they are small, but the presence of large open pruning wounds could indicate a poor or unplanned pruning program at the nursery. Small broken branches should be pruned back to healthy tissue. Trees with large broken branches should usually be left at the nursery. Do not purchase trees with bark stripped down the trunk from an improper pruning cut.

Check for injuries to the trunk from stakes rubbing against it, and be sure the tree was not harmed in the nursery by stake ties that were left on for too long. By the time of purchase, a tree should usually be able to stand without stakes.

Leaves should be colored like those of other trees of the same type. If leaves are smaller, lighter colored or yellower than others, the tree may lack vigor and grow poorly.

Excerpted from the *South Carolina Master Gardener Training Manual*, EC 678.

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