Planting Field-Grown Shade and Ornamental Trees

Step #1 – Offload Safely Using Properly Rated Equipment and Trained Personnel

CAUTION / CUIDADO

USE EXTREME CAUTION WHEN HANDLING ROOTBALLS. STRAPPING AND WIRE BASKET CAN BREAK OR LOOSEN.

STAND CLEAR AT ALL TIMES!

USE PRECAUCION EXTREMA CON CUIDADO AL MOVER EL ARBOL. SE PUEDE ROMPER EL ALAMBRE O EL CINCHO.

CUIDADO AL LEVANTAR EL ARBOL PARARSE FUERA DEL ARBOL!

BE CERTAIN YOUR EQUIPMENT IS RATED TO HANDLE THE WEIGHT OF THE TREES YOU ARE LIFTING.

ESTE SEGURO QUE EL TRACTOR TIENE CAPACIDAD SUFICIENTE LEVANTAR EL PESO DEL ARBOL.

CAUTION / CUIDADO

IMMEDIATELY AFTER UNLOADING, STAND THE TREES UP. THIS WILL REDUCE THE RISK OF SUNSCALD.

INMEDIATAMENTE DESPUES DE DESCARGA, LEVANTA LOS ARBOLES ARRIBA. ESTE REDUCIRA EL PELIGRO DE SUNSCALD.

REMOVE THE CARDBOARD TRUNK PROTECTOR WITHIN 48 HOURS TO REDUCE THE RISK OF INSECT DAMAGE.

QUITE EL PROTECTOR DEL TRONCO DE CARTON EN MENOS DE 48 HORAS REDUCIR EL PELIGRO DE INSECTO DANA EL TRONCO.

BEFORE PLANTING REMOVE ANY PLASTIC WRAP FROM AROUND THE ROOT BALL.

ANTES DE PLANTAR QUITA CUALQUIER PLASTICO QUE ENVUELVE LA ROOT BALL.

SATURATE THE PLANTING HOLE WITH WATER AFTER BACKFILL IS 3/4 COMPLETE TO AID REMOVAL OF AIR FROM THE BACKFILL.

A PLANTAR APLICA AGUA SUFICIENTE ESTABLECER BIEN LA TIERRA EN EL HOYO.

AFTER PLANTING AND THE TREE IS STRAIGHT, REMOVE THE SYNTHETIC STRAP AND THE TOP PORTION OF THE WIRE BASKET DOWN TO THE FIRST HORIZONTAL RING. CUT THE BURLAP AWAY FROM THE TOP PORTION OF THE ROOT BALL.

A PLANTAR EL ARBOL ESTA SEGURO QUE EL ARBOL ES DERECHO ANTES DE CORTE EL CINCHO ENTONCES CORTE EL ALAMBRE DE LA PARTE DE ARRIBA HASTA EL PRIMER ANILLO DE LA CANASTA.

TREES SHOULD BE MONITORED FOR BORING INSECTS FOR THE FIRST YEAR AFTER INSTALLATION. PREVENTIVE PESTICIDE APPLICATIONS ARE RECOMMENDED DURING THE ESTABLISHMENT PERIOD.

TEINE CUIDADO POR EL PRIMER ANO POR PLAGAS. RECOMENDAMOS APLICA INSECTICIDAS PREVENTIVAS DURANT EL PRIMERO ANO.

CAUTION / CUIDADO

Well managed tree planting projects start with appropriate site analysis, customer expectations, site design, and tree selection. Site conditions and after care capabilities should dictate maximum tree size at planting, root ball characteristics, appropriate tree production method, and tree structure. Tree selection includes choosing the appropriate species or cultivar for the planting site based on site analysis. Then, suitable nursery stock must be chosen based on site conditions and intended after care.

The nursery stock must be inspected carefully to pick the best quality tree. Trees with poor quality may be inexpensive in some cases but might perform poorly in the landscape. Tree quality can be assured by planning the transportation to the landscape site and by handling the tree carefully. Once at the landscape site, appropriate planting practices will help the tree get off to a good start. Many trees are planted too deeply so they perform poorly following planting. Management of the landscape site in the early years following planting will dramatically affect the establishment rate and ultimate success of the planting project.

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Step #2 – Preparing the Planting Site

1- If native soil at the planting site has been adversely altered, remove undesirable backfill and replace with native soil. Remove as much undesirable backfill as possible. The minimum recommended amount would be two to three times the diameter of the root ball and one and one half the depth of the root ball. Planting islands should be totally renovated of undesirable backfill to a depth of one and one half the depth of the root ball. Restore renovated areas to landscape grade and remove all weeds and grass. Awareness of soil (ph) at the planting site is recommended. Based on the trees tolerance level to soil (ph) ranges, the soil (ph) may need to be amended, or another tree selection made to better accommodate the existing soil (ph) conditions.

2-Liberally excavate the planting hole with widely sloping sides making certain the depth of the hole is not greater than the depth of the root ball. It is better to have the hole slightly shallower than the root ball than slightly deeper than the root ball.

3- Recommended planting hole diameter is dependent on the soil type and condition. If soils are heavy, fine textured and compacted, special care should be taken to dig the planting hole two to three times the diameter of the root ball or, till the soil to a depth of 16” out from a smaller planting hole that is two to three times the diameter of the root ball. If soils are light, coarse textured and optimally aerated, the planting hole can be one and one half times the diameter of the root ball. Critical to optimum tree establishment and tree survival is a properly aerated soil around the root ball that will provide adequate oxygen for roots to develop.

4- If water is in the planting hole, soil must be added to the hole and packed until water is covered. This condition would place the root ball above grade therefore a raised mound of appropriate proportions should be constructed from similar type-site soil. Root balls should never be placed in water.

5- Planting on a slope requires the root flare be slightly higher than the grade on the uphill side. Similar type soil will need to be added to the down hill side of the slope. The amount of soil to add will depend on the slope and the diameter of the root ball

Step #3 – Locate the Root Flare

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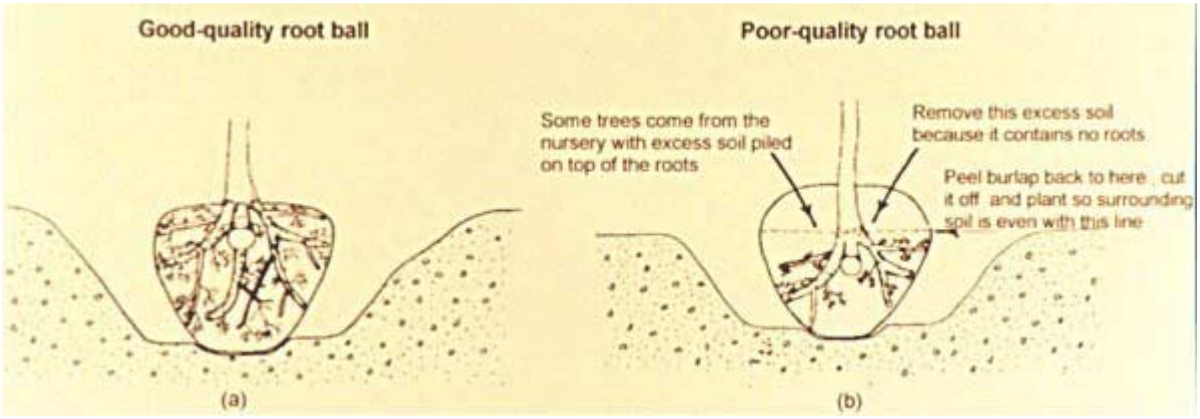

The highest-quality root balls have the point where the top-most root emerges from the trunk within 2 inches of the surface as shown at left. Poorer-quality root balls have the top-most root and root flare (if present) buried down inside the root ball as shown at right. A close look at the two root systems above will show that trees with the top-most root too deep in the ball have less of a root system than trees with the top-most root near the surface. As the distance between the top-most root and the soil surface increases, the percentage of the root system harvested from the field nursery decreases.

Shademaker Trees are properly harvested; therefore, the root flare will be clearly evident and the highest percentage of roots will be maintained.

Step #4 – Planting Pit Excavation – consider the existing Site Factors

1) Look up. If there is a wire, security light, or building nearby that could interfere with proper development of the tree canopy as it grows, plant elsewhere.

2) Dig a shallow planting hole as wide as possible. Shallow is better than deep! Many people plant trees too deep. A hole three times the width of the root ball is often recommended but about one-and-one-half the diameter is more common. Wider holes should be used for compacted soil and wet sites. This might help roots from becoming deformed by the edge of the hole in compacted or clayey soils. The depth of the hole should be LESS than the height of the root ball, especially in compacted or wet soil. If the hole was inadvertently dug too deep, add soil and compact it with your foot. Breaking up compacted soil in a large area (out to the dripline of the tree) around the tree provides the newly emerging roots room to expand into loose soil. This will hasten root growth translating into quicker establishment. Loosen the soil with a rototiller, shovel or other tools.

Step #5 – Planting Depth

Proper planting detail	
If you form a berm of mulch (preferred) or soil (less preferred) around the root ball to hold irrigation, keep it less than about 4 inches high. Water held in a taller berm wastes water because it simply runs through the root ball. It might	

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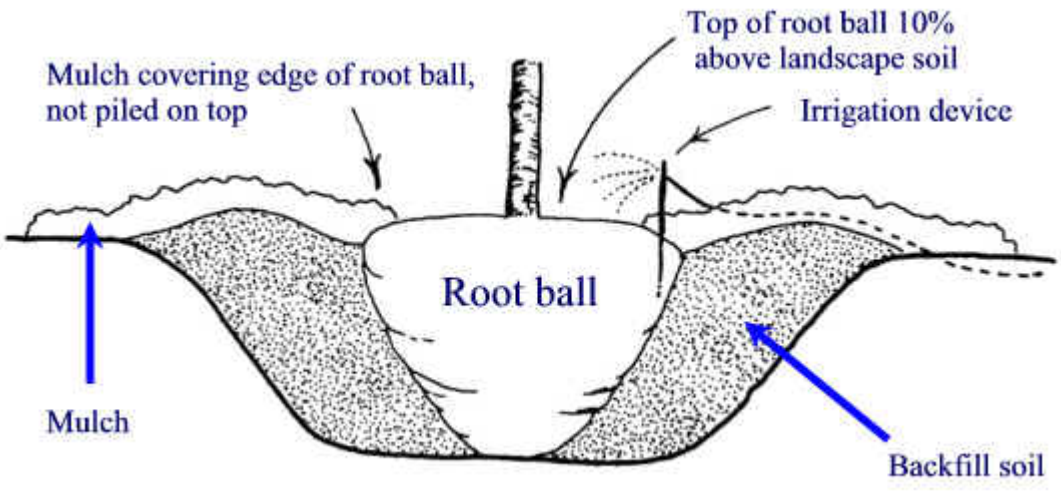
eventually. Placing soil over the root ball cuts off oxygen and water.



When planting on slopes set the tree so the top-most root in the ball on the uphill side is about even with the soil. The side of the root ball on the downhill side will be well above the surrounding soil. Bring in enough soil to cover the sides of the root ball with soil. Apply mulch to finish the planting job as shown in the diagram above.

3) Find the point where the top-most root emerges from the trunk (Root Flare) . If this is buried in the root ball then remove enough soil from the top so the point where the top-most root emerges from the trunk is within the top two inches A swelling (called trunk flare, root flare, root crown) may or may not be present where the top-most roots join the trunk. Check for and treat circling roots especially in the top half of the root ball. Soil above the top-most root may have to be removed to check for these. The point where the top-most roots emerge from the trunk can be exposed and visible.

4) Slide the tree carefully into the planting hole. To avoid damage when setting the tree in the hole, lift the tree with straps or rope around the root ball, not by the trunk. Special strapping mechanisms need to be constructed to carefully lift trees out of large containers.

5) Position the point where the top-most root emerges from the trunk slightly above the surface of the landscape soil. Most horticulturists agree that it is better to plant the tree a little high than to plant it too deep. If the tree is too deep in the hole, remove it from the hole and firmly pack soil in the bottom of the hole to raise the root ball. If it is only a little deep, tip the ball to one side and slide some soil under it; then tip it back the other way and slide some more soil under the ball. Continue this until it is set at the appropriate depth. Once it is at the appropriate depth, place a small amount of soil around the root ball to stabilize it. Soil amendments are usually of no benefit. The soil removed from the hole makes the best backfill unless the soil is terrible or contaminated. Cut roots that are kinked or any that circle the top of the root ball where appropriate. If these cut roots are large, the tree might shock and could die.

Step #6 Planting The Tree:

1- Place root ball in the center of the hole by-- manually lifting the root ball into the hole,--manually rolling the root ball into the hole,-- or mechanically placing forks underneath the root ball and gently sliding into hole. Do not cinch trunk to place tree in hole.

2- Key your sight on the crown root flare (crown root flares have been exposed in previous steps), **making certain the root flare is slightly higher than landscape grade**. The top most terminal roots at the outer diameter of the root ball should be even with landscape grade. If the planting hole is too deep or too shallow lean the tree and add or remove soil as necessary. Repeat this procedure for each side of the root ball; simultaneously plumb the tree for vertical alignment during this process. When alignment is complete place a small amount of backfill around the root ball to stabilize. Add water and backfill to planting site while making slicing cuts with deep nursery spade or jet water stake. Soil needs to be snugly connected to the root ball to establish the connection of the roots and the soil-water system. Extensively water the entire planting site to remove all large air pockets; small air pockets could be beneficial by allowing more air to reach the roots. The idea is to snugly connect the native soil with the root ball without compacting the soil to the degree that would inhibit root establishment.
3- If the tree must be irrigated by manual or other high water volume means, construct a 3" or higher water ring twice the diameter of the root ball. This will direct water into the root ball and the surrounding soil to maximize root establishment in the native soil. When tree is safely established water rings should be removed. Water rings should only be used when necessary. Water rings can inhibit proper root development outside the root ball. Properly designed and sized spray stakes will provide better root establishment.

Immediate Post Plant Care:

1-Staking: In many cases, staking is not necessary. Staking should be done if root ball and/or tree canopy are vulnerable to shifting and or breakage from wind conditions. Optional staking methods are:

a. Tripod Method: Padded ropes or flat ¾" strapping attached to the tree in a non-binding manner. Extend ropes or strapping to three anchor points and adjust tautness with adjustable handle. Monitor tautness of attachments during establishment to avoid trunk damage and blow downs.
b. Two Pole Method: Two poles planted outside of root ball with flexible attachments from poles to tree trunk.
c. Root Ball Staking: Two pair of vertical stakes driven in ground outside of root ball with horizontal stakes going over the top of the root ball attaching to vertical stakes.
d. Root Ball Staking: Two or three vertical wood dowels driven through outer edge of root ball.

2- Mulch: Apply a 3" layer of mulch to an area of two feet diameter per caliper inch of tree trunk. Minimum diameter should be six feet for trees with less than three-inch trunk caliper. A thin layer of mulch should be over the outer half of the root ball with no mulch touching the trunk.
3- Fertilizer Recommendation for 12 Months Establishment Period Basis for application rate at planting is calculated based on one application of 12-4-12, slow release fertilizers with minors that would provide the equivalent of 400 lbs of nitrogen per acre per year. Area to fertilize is based on applying fertilizer to the area that is the size of the tree canopy. (Fixed canopy size per count size) Application at planting is broadcast over the defined area at the prescribed rate listed within reference table. **NOTE: Rate is for trees that do not receive turf fertilizer**. For restricted root zone areas planters, side walks, street curbs, etc. apply recommended rate divided by multiples of application (2 or 3). After 1-year establishment period trees can be maintained at a rate of 270 lbs of nitrogen per acre per year. Apply fertilizer to an area that is 1.5 times the area of the tree canopy. Shademaker, L.P. recommends a slow-release balanced blend fertilizer such as a Polyon™ coated material (available from Harrell's www.harrells.com).

Fertilizer Reference Table

Tree Canopy	Lbs. 12-14-12 Fertilizer
3'	0.54
4'	0.96
5'	1.5
6'	2.16
7'	2.94
8'	3.84
9'	4.87
10'	6.01
11'	7.27
12'	8.65
13'	10.15

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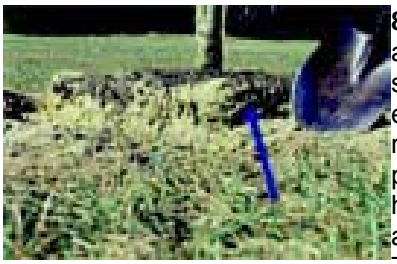
14’	11.77
15’	13.52

Step #7 Final Checks

6) Straighten the tree in the hole. Before you begin backfilling have someone view the tree from two directions perpendicular to each other to confirm the tree is straight. Fill in with some more backfill soil to secure the tree in the upright position. Once you add large amounts of backfill, it is difficult to reposition the tree.

7) Remove all synthetic materials from around the trunk and root ball. String, rope, synthetic burlap, strapping, plastic, and other materials that will not decompose in the soil must be removed at planting. Some people attempt to remove some or all of the wire from wire baskets before backfilling; this may void any guarantee that came with the tree.



8) Slice a shovel down into the backfill 20 to 30 times all around the tree as you add backfill soil. Attempt to break up clayey soil clumps as much as possible. Do NOT step firmly on the backfill soil because this could compact it and restrict root growth, especially in clayey soil. When the planting hole is filled with soil the root ball should remain 1 (small trees) to 3 (larger trees) inches above the backfill soil as shown in the photograph at left. Add 10 to 20 gallons of water to the root ball and backfill. Fill in any holes or depressions with additional backfill soil. Do not firmly pack backfill soil in an attempt to eliminate air pockets because this could cause too much soil compaction. The water infiltrating the backfill soil will eliminate the large air pockets. The presence of small air pockets could even be of benefit because they could allow more air to reach the roots.

9) Cover the sides of the root ball with mulch and apply mulch to at least an 8 foot diameter circle around the tree. Construct a berm out of mulch at the edge of the root ball only if the tree will be watered with a hose, bucket, or other high volume means. Constructing a berm in all other situations will not provide more water to the root system. Do not construct a berm from soil since this soil could end up over the root ball several months later. Water the mulch well after it is spread.

10) Stake the tree, if necessary to hold the root ball firm in the soil. If the root ball moves in the wind, emerging roots could break and trees will establish slowly. Staking to hold a weak trunk upright should not be necessary on trees with a trunk diameter more than about 1.5 inches. If large trees require staking to prevent the trunk from bending, it probably indicates a lesser quality tree. Smaller trees might require staking until enough trunk strength develops. Trees could establish more quickly and develop a slightly stronger trunk and root system if they are not staked at the time of planting.

Step #8 – Irrigation and Maintenance Period

Field-Grown Trees have more water storage capacity than container-grown trees. For this reason, Field-Grown trees are generally hardier than container-grown trees and often establish faster at new planting sites. Over watering, however, is still the primary cause of tree planting failure.

Irrigation Requirements For Establishment:

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1. Tree establishment can be enhanced as well as financially and personally rewarding with the proper irrigation design, irrigation scheduling and irrigation monitoring If the many irrigation variables of newly planted trees are addressed.
2. Published irrigation guidelines based on tree size, gallons per tree, irrigation intervals, hardiness zones and seasonal conditions are just a starting point for one to adapt to the many variable circumstances that exist within a new tree planting.
3. Variable circumstances that influence irrigation design and scheduling—
   a. Water requirements for each tree species.
   b. Climatic season and weather pattern within the season.
   c. Total tree mass in relation to size and condition of root ball. The larger the tree mass in relation to the root ball size, the greater the irrigation requirements. The poorer the root structure (large spiraling roots), the greater the irrigation requirements and the potential for tree failure since the tree cannot efficiently utilize the available moisture often resulting in root rot.
   d. Trees evapo-transporation potential—large tree canopy with new tender succulent foliage—small tree canopies with hardened off foliage—or deciduous trees in dormancy.
   e. Daily evapotransporation rates.
   f. Soil type from coarse well drained to very fine compacted and saturated.
   g. Size of plant material from 3- gallon to 72" Box.

4. Directing water where it's needed when its needed is important for optimum tree establishment. Proper irrigation after transplanting will influence rapid root growth therefore the diameter of the trees irrigation pattern should increase as the trees roots expand into native soils.
5. The most critical time for optimum soil moisture within the planting site is just before darkness. If trees have optimum soil moisture at this time tree establishment will be enhanced. The trees cells have the opportunity to replenish and process water and nutrients without loss from extreme evapo-transporation conditions during this time. Put your trees to bed happy if possible.
6. Critical to scheduling irrigation for newly transplanted trees is the systematic monitoring of soil moisture within the root ball profile, the soil moisture in the adjacent native soil and the visible hydration level of the trees foliage. There is no substitute for monitoring soil and tree condition. Soil moisture is monitored for too wet or too dry conditions too wet can contribute to poor tree establishment and or tree decline as well as too dry. Irrigation should not be applied to a saturated root ball. **Fixed irrigation schedules without appropriate monitoring and action can be costly**.

Irrigation Guidelines (Hardiness Zones 7-8)			
Rootball Size	**Gallons of Water**	**Schedule**	**Months to Establish**
36-45"	6	Daily for 2 weeks. Every other day for 3 months. Weekly until established.	12-24 months
45-55"	10	Daily for 2 weeks. Every other day for 3 months. Weekly until established.	24-36 months
55-80"	12	Daily for 2 weeks. Every other day for 3 months. Weekly until established.	24-36 months
80-120"	20	Daily for 2 weeks. Every other day for 3 months. Weekly until established.	24-36 months

- Water rates are based on 2 gallons of water per caliper inch (University of Florida Research). Adjust rates plus or minus based on soil moisture profile within root ball and or condition of canopy. Water should be delivered to the root ball in a slow manner to allow for penetration and absorption. Irrigation rates increase with warmer temperatures and decrease with cooler temperatures. Irrigation rates are reduced during tree dormancy.

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- Establishment rates are based on 6 months per inch of trunk caliper. Optimum root ball soil moisture profile can be better maintained if water is applied in multiple irrigation cycles during the day.

Irrigation Guidelines (Hardiness Zones 9-11)			
Rootball Size	**Gallons of Water**	**Schedule**	**Months to Establish**
36-45”	8	Daily for 1-2 months. Every other day for 4 months. Weekly until established	6-12 months
45-55”	10	Daily for 1-2 months. Every other day for 4 months. Weekly until established	6-12 months
55-80”	15	Daily for 2 months. Every other day for 5 months. Weekly until established	12-24 months
80-120”	25-30	Daily for 2 months. Every other day for 5 months. Weekly until established	12-24 months

Irrigation Guidelines (Hardiness Zones 9-11)

- Water rates are based on 3 gallon of water per caliper inch (University of Florida Research)
- Adjust rates plus or minus based on soil moisture profile within root ball and or condition of canopy
- Water should be delivered to the root ball in a slow manner to allow for penetration and absorption
- Irrigation rates increase with warmer temperatures and decrease with cooler temperatures
- Irrigation rates are reduced during tree dormancy
- Establishment rates are based on 3 months per inch of trunk caliper. Optimum root ball soil moisture profile can be better maintained if water is applied in multiple irrigation cycles during the day

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