A satellite image of a hurricane over the Gulf of Mexico. The hurricane's eye and spiral cloud bands are clearly visible. A blue rectangular text box is overlaid on the top half of the image.

Urban Forest Hurricane Recovery Program

<http://treesandhurricanes.ifas.ufl.edu>

Planting and establishing trees



Dr. Edward F. Gilman and Traci Partin

Remember!

If you remove a tree after a hurricane,
plant another one in its place.

<http://orb.at.ufl.edu/FloridaTrees/index.html>



Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. Find the top-most root and treat root defects
4. Place tree in hole
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. Remove synthetic materials
8. Add backfill soil and firm the root ball
9. Add mulch
10. Stake and prune if needed



Look up!



This is your last chance to be sure you have selected the right tree for the right place.

If there is a wire, security light, or building nearby:

- Plant elsewhere, or
- Plant a small-maturing tree

Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. Find the top-most root and treat root defects
4. Place tree in hole
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. Remove synthetic materials
8. Add backfill soil and firm the root ball
9. Add mulch
10. Stake and prune if needed



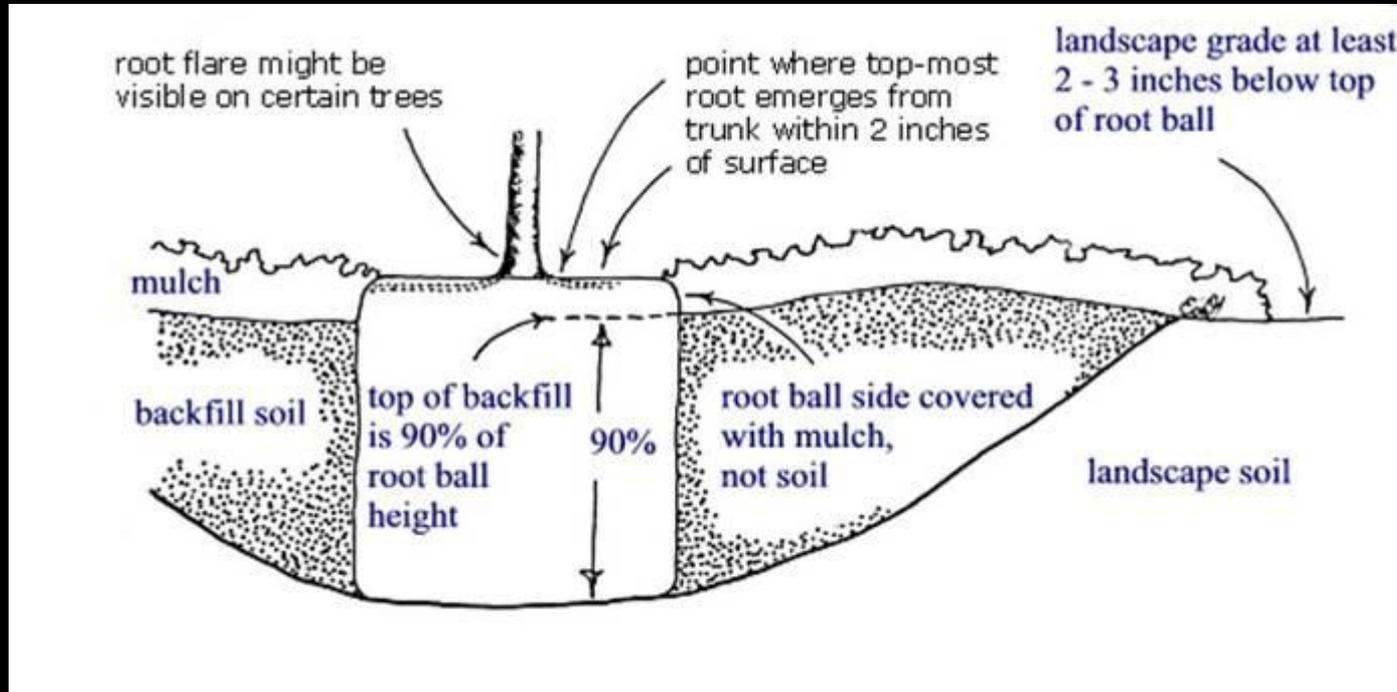


Measure the distance between the top most root and the bottom of the root ball.



Dig the hole to about 90 to 95% of this depth.

Dig the planting hole as wide as possible



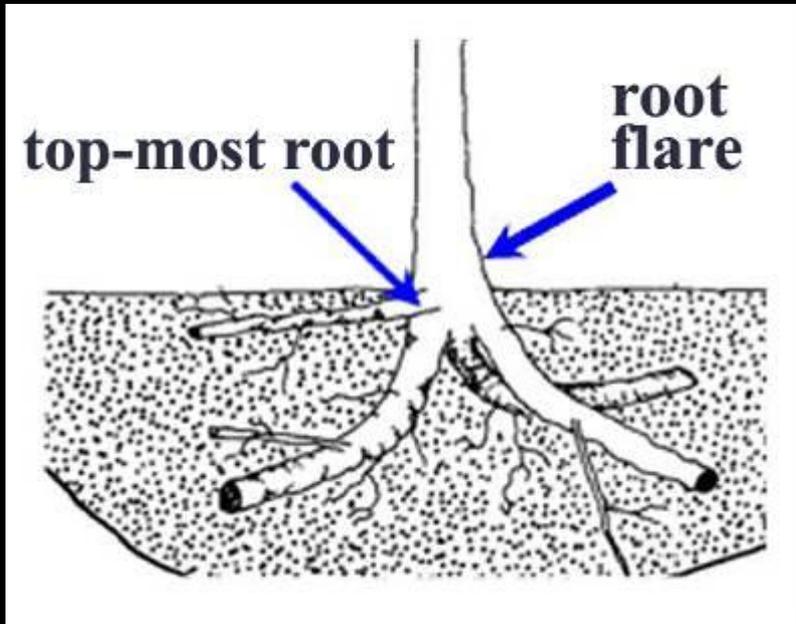
- The planting hole is at least 1.5 times the diameter of the root ball.
- This provides loose soil for the expansion of new roots.

Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. **Find the top-most root and treat root defects**
4. Place tree in hole
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. Remove synthetic materials
8. Add backfill soil and firm the root ball
9. Add mulch
10. Stake and prune if needed



Find the top-most root



- The point where the top-most root meets the trunk of the tree should be no more than 2 inches deep in the root ball.

Desirable root ball



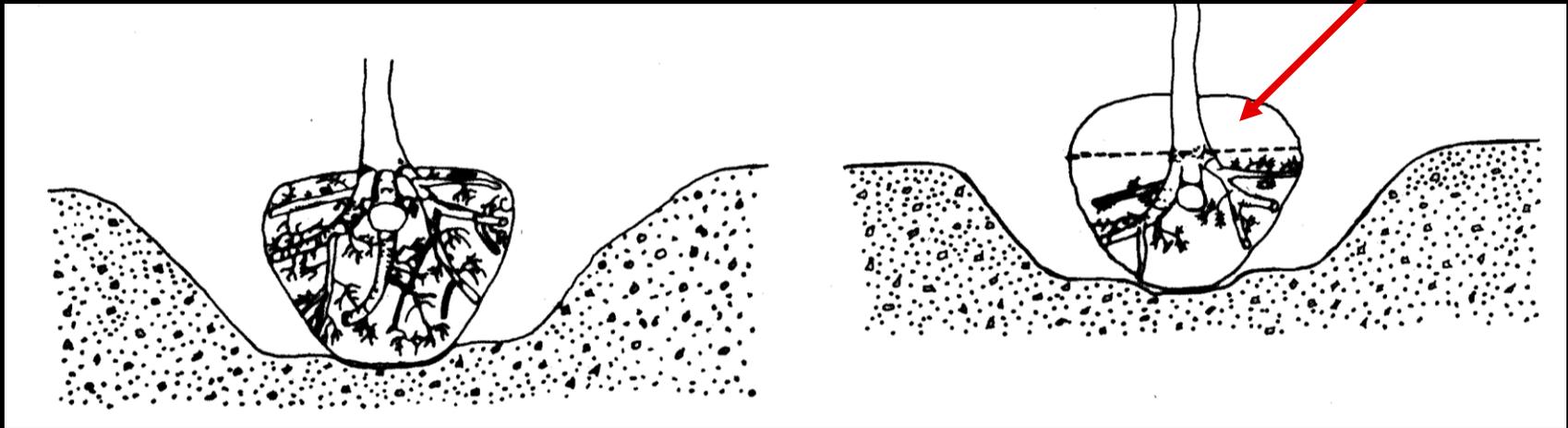
- The point where the top-most root emerges from the trunk is at the surface. Encourage growers to grow trees like this to make it easy to check for root defects.

Root ball quality

Good-quality root ball

Poor quality root ball

Remove
excess soil



- (RIGHT) Too much soil on top of the root ball can indicate a poor-quality root ball.
- (LEFT) Trees with the top-most root near the surface of the root ball have more of a root system.

Remove excess soil

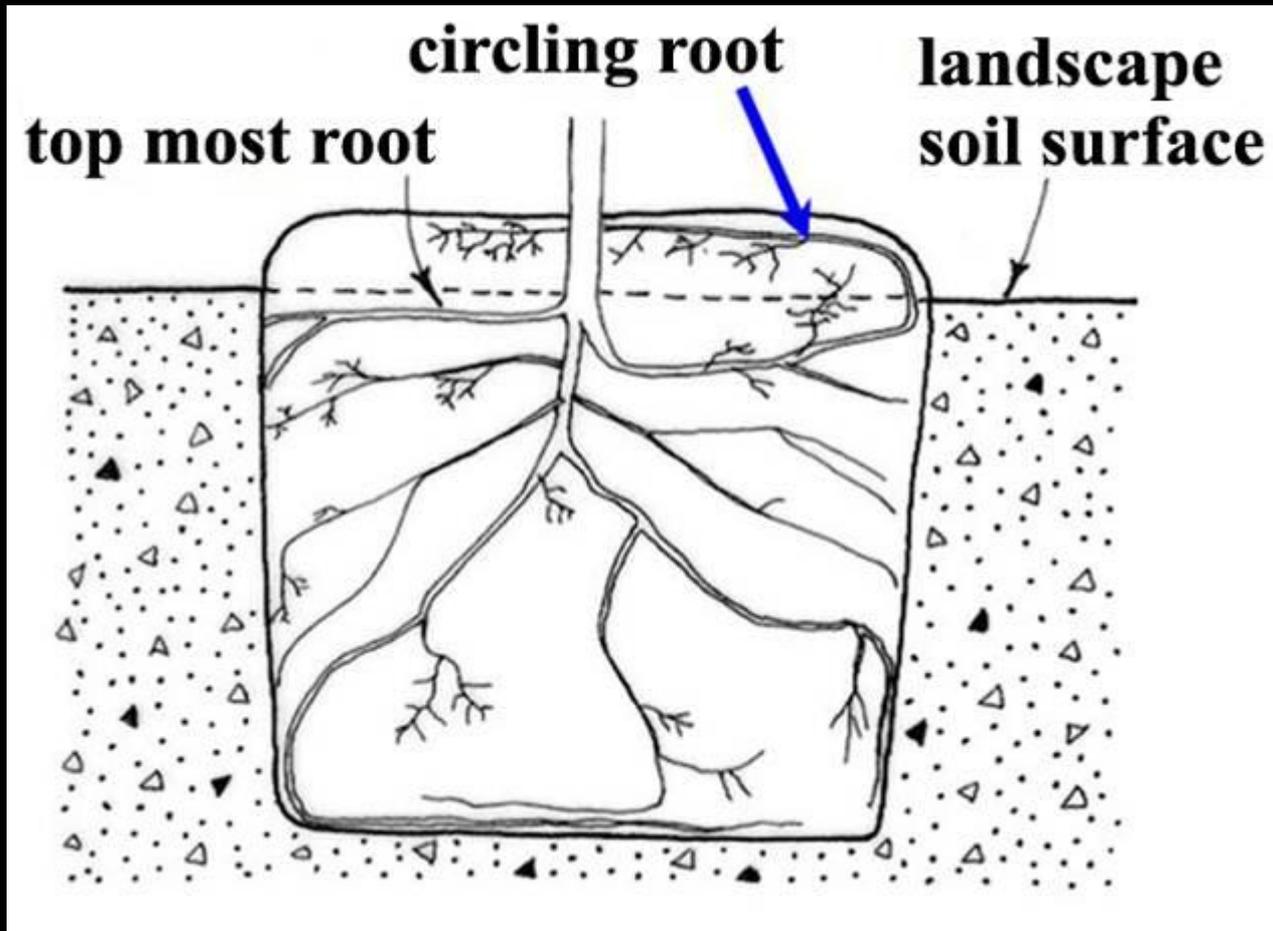
- Remove excess soil from the top of the root ball.



Three inches of soil and media were removed from the top of this ball.

Treating root defects

- Cut or spread out any circling or kinked roots growing up above the top-most root.



Defects at top of ball



- Remove media from top of root ball and cut circling and crossed roots

Circling roots – cut them, or tear up the edge of the root ball to spread roots out



Cutting circling roots



- New roots will grow quickly into backfill soil following cutting and stem girdling roots are less likely to form.

Defects can be inside root ball



- Be sure to look for roots that circle when trees were in a smaller container
- These are difficult to cut because they are hidden in the interior of the ball.

Trees with circling root defects are often found leaning or fallen after a storm.



Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. Find the top-most root and treat root defects
4. **Place tree in hole**
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. Remove synthetic materials
8. Add backfill soil and firm the root ball
9. Add mulch
10. Stake and prune if needed



Lifting tree 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.

Set tree in the hole



Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. Find the top-most root and treat root defects
4. Place tree in hole
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. Remove synthetic materials
8. Add backfill soil and firm the root ball
9. Add mulch
10. Stake and prune if needed



Position the tree in the soil

- Many professionals agree that it is better to plant the tree a little high than too deeply.



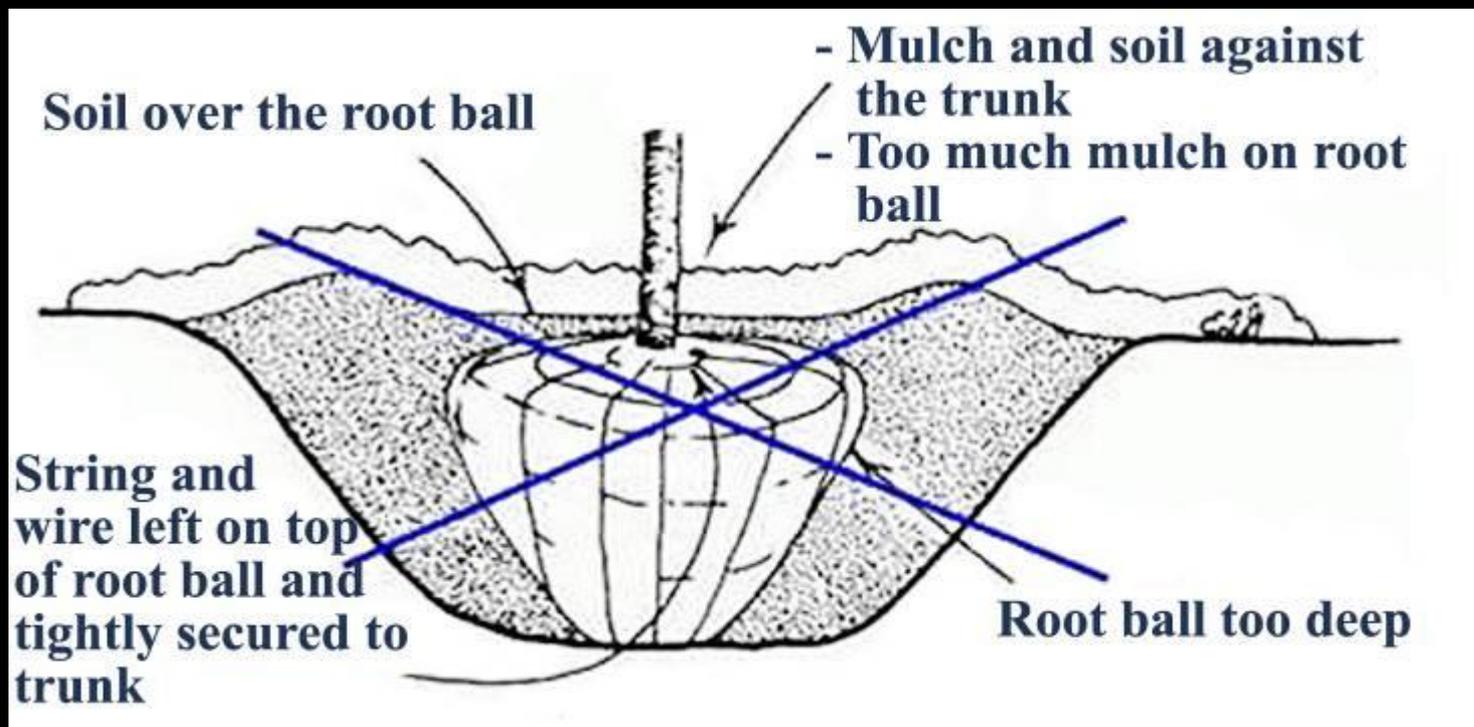
- When the top-most root is too deep in the root ball, set the top of the ball several inches higher than the landscape soil to adjust as shown above.

TOO DEEP! - add soil to
bottom of hole



Effect of planting depth on stress after planting

- Soil intercepts water meant for the root ball causing roots to dry out.



Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. Find the top-most root and treat root defects
4. Place tree in hole
5. Position top root 1-2 inches above landscape soil
6. **Straighten tree**
7. Remove synthetic materials
8. Add backfill soil and firm the root ball
9. Add mulch
10. Stake and prune if needed



Straighten the tree



- Before adding backfill, be sure to check that the tree is straight by looking at it from two perpendicular directions.

Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. Find the top-most root and treat root defects
4. Place tree in hole
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. **Remove synthetic materials**
8. Add backfill soil and firm the root ball
9. Add mulch
10. Stake and prune if needed



Balled-in-burlap trees

- Burlap should be removed from the bottom of the trunk and the top of root ball.



Remove all synthetic burlap



- Synthetic burlap melts into a plastic goo while real burlap flames and turns to ash when lit.
- If burlap is synthetic, be sure to remove all of it with a pruner, knife or other sharp blade.

Synthetic burlap can girdle roots



- Roots grow through artificial burlap with little difficulty, but as the roots attempt to expand in diameter, they become girdled or strangled.



- Each of these roots is very easy to break off at the burlap because there is very little wood that developed through the burlap.

Wire baskets

- Baskets made from heavy gauge wire are often used to help keep a root ball intact during shipping and handling.
- There is no research documenting the detrimental effects of wire baskets on trees.



Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. Find the top-most root and treat root defects
4. Place tree in hole
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. Remove synthetic materials
8. **Add backfill soil and firm the root ball**
9. Add mulch
10. Stake and prune if needed



Cut into the backfill

- Slice a shovel into the soil at the edge of the hole to enlarge the hole.
- Push this soil against the root ball.



Enlarged hole and loosened soil



Moderately pack the backfill soil



Water the backfill to settle



Ready for mulch

- About two inches of the root ball should remain above ground after all the backfill soil is added.
- This ensures the top-most root remains above ground, even if the root ball settles.



Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. Find the top-most root and treat root defects
4. Place tree in hole
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. Remove synthetic materials
8. Add backfill soil and firm the root ball
9. **Add mulch**
10. Stake and prune if needed



Mulching



- Apply a 3-inch thick layer of mulch to at least an eight-foot diameter circle
- Apply a thinner 1" layer of mulch over the root ball if necessary, but keep it at least 10" from the trunk

Mulching



- Mulch as large an area as possible to allow the tree roots to expand without competition from turf roots.

Improper mulching

- If turfgrass grows up to the trunk, trees often perform poorly.
- Turf and weeds rob trees of moisture and nutrients and some produce chemicals that inhibit tree growth.
- Lawn mowing equipment damages trunk



Improper mulching



- Never pile mulch in a volcano-like manner against the trunk. This can rot the trunk, cut off oxygen to roots, keep vital irrigation and rain water out, and can keep roots too wet in poorly drained soils. Stem girdling roots form from this on some trees.

Adding a berm



- A 3 to 4-inch berm could be constructed at the edge of the root ball to prevent water from running off as seen here.



- Prevent soil from washing over the root ball by covering berm with a 3 to 4-inch layer of mulch, or by constructing the berm entirely from mulch.

Steps for proper planting

1. Look up for wires/lights
2. Dig shallow/wide hole
3. Find the top-most root and treat root defects
4. Place tree in hole
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. Remove synthetic materials
8. Add backfill soil and firm the root ball
9. Add mulch
10. **Stake and prune if needed**



Traditional staking methods

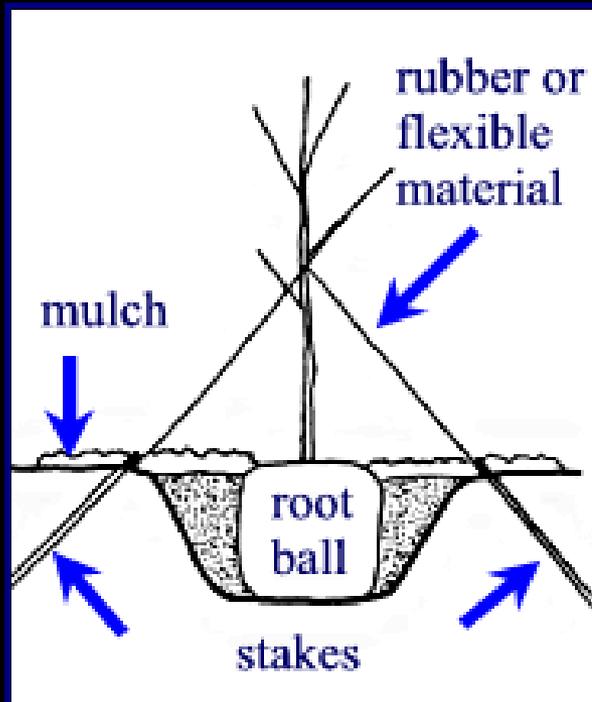


Figure 1

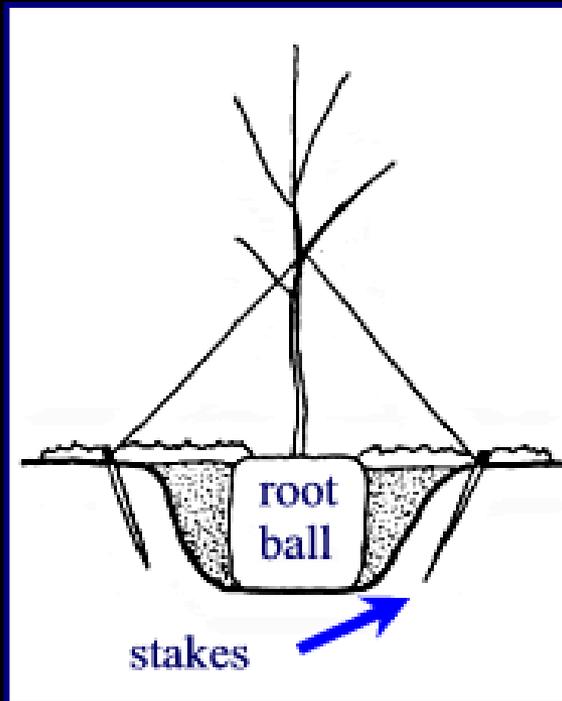


Figure 2

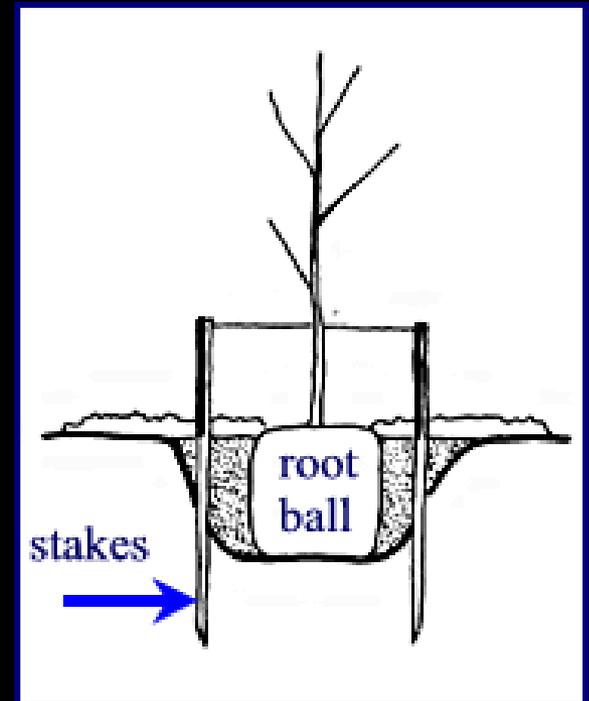


Figure 3

- All these systems require removal within one year of planting.

Alternative staking methods



Figure 4

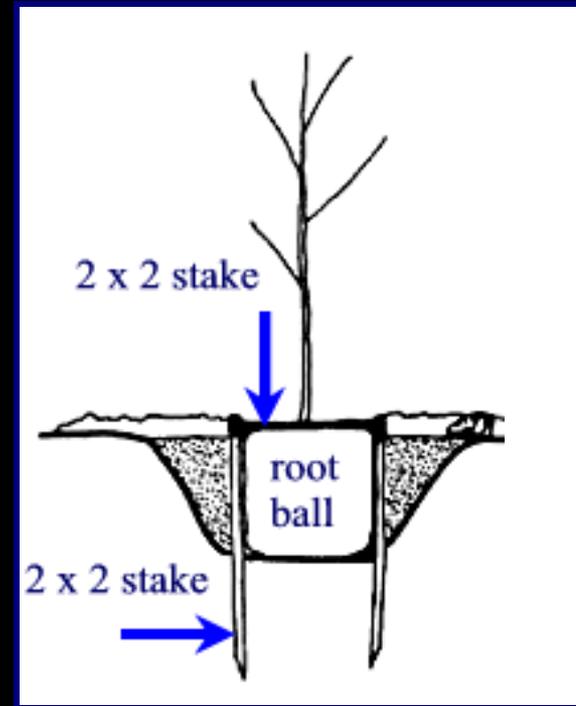


Figure 5

- This inexpensive alternative staking system does not need to be removed because they simply decay in a few years.

Prune to finish the job

- Remove broken branches.
- Perform structural pruning if needed.
- Do not prune to compensate for root loss.



Fertilizer at planting?

- **Not necessary** – fertilizing at planting time is not likely to improve survival or growth. A small benefit might occur in very poor soil.
- **Soluble fertilizers** could burn roots if too much is applied, which could injure or kill the tree.

Establishment

Establishment period: the time it takes for a tree to regenerate enough roots to stay alive without irrigation. In dry climates (western US), many trees will need supplemental irrigation well past the establishment period.

- Roots grow to pre-transplanting length
- Trunk and shoot growth match pre-transplant rate
- Time: about 3 - 4 months/ inch trunk caliper in Florida

Establishment rate is influenced by a variety of factors

Encourages growth	Limits growth	Little or no effect
Loose soil	Compacted soil	Peat or organic matter added
Proper irrigation	Little or no irrigation	Water absorbing gels
Mulch 8' around planting hole	Grass and weeds close to trunk	Root stimulant products
Root flare above soil surface	Planting too deeply	Adding spores of mycorrhizae *
Leaving shoots intact	Pruning at planting	Fertilizing at planting

During establishment

- **Irrigate**
 - 2 – 3 times weekly until established
 - 2 gallons per inch trunk caliper on root ball
- **Mulch**
 - Control weeds
 - Increase mulch diameter over time to keep pace with root growth
- **Minimize soil compaction**
- **Remove stakes, protect lower trunk**

Irrigation: is it volume or frequency?

- **It's frequency!**
- Experiment done on 4-inch hardened-off B&B trees where 1.5, 3, or 5 gallons of water were applied per inch trunk caliper.

→ Results show that volume did not matter but frequency did.



Frequency of irrigation based on tree size

Size of nursery stock	Irrigation schedule for vigor	Irrigation schedule for survival
< 2 inch caliper	Daily: 2 weeks Every other day: 2 months Weekly: until established	Twice weekly for 2-3 months
2 – 4 inch caliper	Daily: 1 month Every other day: 3 months Weekly: until established	Twice weekly for 3 – 4 months
> 4 inch caliper	Daily: 6 weeks Every other day: 5 months Weekly: until established	Twice weekly for 4 – 5 months

Months of irrigation to provide based on climate and tree size at planting

	USDA Hardiness Zone					
Max. trunk diameter at planting	5	6	7	8	9	10
1 inch	12 months	10 months	7 months	5 months	3 months	3 months
2''	24	20	15	10	6	6
3''	36	30	23	16	9	9
4''	48	39	30	21	12	12

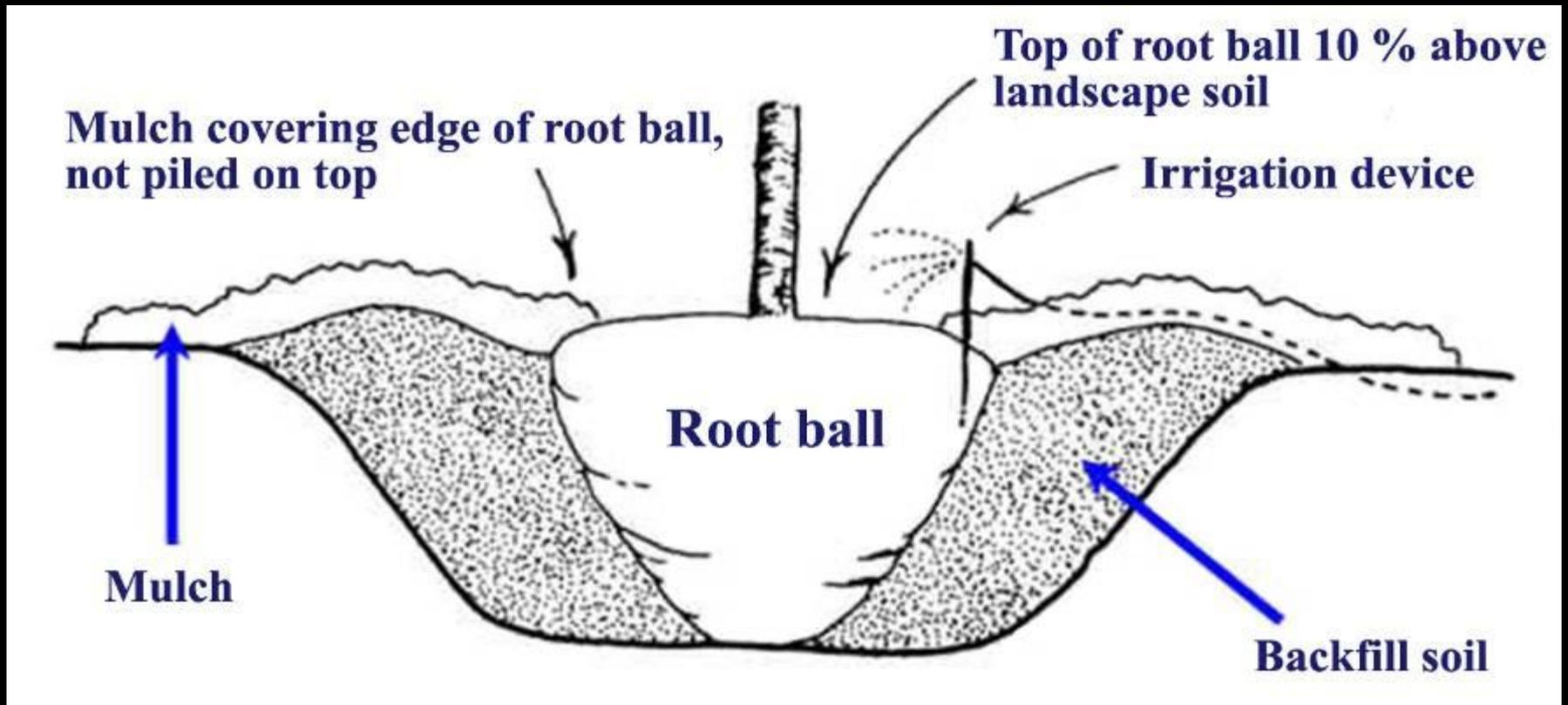
By the way this tree is planted correctly



This tree is planted too deeply



Summary of proper planting



**For more information
on related topics...**

Visit the website **Trees and Hurricanes:**

<http://treesandhurricanes.ifas.ufl.edu>