

Show me your root flare!

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What we know

- Right tree right place
- Choose pest resistant species or cultivars
- Plant at the appropriate depth
- Water, mulch, and monitor moisture until tree is established



What we find...

- Plants arrive to garden centers and landscapes in containers (including B&B) and they are **PLANTED TOO DEEP!!!**



What we find

- Trees that are being planted too deep in the container are also being planted **TOO DEEP IN THE LANDSCAPE!!!**



Planting too deep is epidemic

- 93% of professionally-planted trees (Smiley and Booth 2000)
- 75% of nursery-grown trees (Maynard 1995)
- Arborists intuitively know deep planted trees fail



Potential deep-planting problems

- Reduced O₂ availability to roots
- Reduced water infiltration
- Reduced access to shallow nutrient pools
- Girdling root development (anecdotal)
- Increased fungal and insect infestations

Potential deep-planting problems

- Bark, typically located above ground is now buried in earth or mulch and kept moist.
- Wet bark is susceptible to penetration by disease (fungi) and insects.
- The carbon dioxide and oxygen exchange between living bark (phloem) and the atmosphere is restricted and may result in decay.
- Microbes in the damp mulch or soil may decompose bark along with the organic matter in the mulch or soil.

Bark



Zelkova serrata *Ulmus parvifolia* *Ulmus alata* *Quercus phellos* *Acer saccharum*

Potential deep-planting problems

- Roots need to “breathe” (respire) and exchange gases passively through bark, lenticels, and root hairs.
- Roots respiration (gas exchange) takes place within a few inches of the soil surface-where oxygen from the atmosphere can diffuse down to the roots.
- Roots are injured or killed when the exchange of oxygen and carbon dioxide is restricted.
- Roots are injured or killed when soil moisture levels are so high that oxygen levels are reduced (Maynard & Smiley, 2001)

Potential deep-planting problems

- Bark rot and root decline result in reduced translocation of food from the leaves to the roots.
- With a smaller root system less water is taken up, resulting in leaf drop and dieback.
- Resulting plant death is often blamed on secondary boring insects or canker fungi that attacks stressed plants.
- The cause of death-planting too deep- may go undetected.

Potential deep-planting problems

- “And as the roots go, so goes the whole plant.”
 - -Maynard & Smiley, 2001

Root flares



Carya illinoensis



Metasequoia glyptostoboides



Quercus nigra

Root flare clarification

- Not all trees show a distinct curve where they enter the soil. This is okay and quite natural.
- The root flare is the place where the topmost root emerges from the trunk.



Clemson University Research

- Effects of deep planting on landscape tree performance
 - Christina Wells¹, Karen Townsend¹, Judy Caldwell¹, Don Ham², and Mike Sherwood³
 - ¹Department of Horticulture, Clemson University
 - ²Department of Forestry & Natural Resources, Clemson University
 - ³Bartlett Tree Research Lab, Charlotte, NC



Two species

- 'October Glory' red maples
- Yoshino cherries

Treatments

- Control (0 inches deep)
- 6 inches deep
- 12 inches deep

Randomized Complete Block





Measurements

- Winter 1996: Trees planted
- Late spring 1997: Aboveground measurements
- Winter 1997: Root cores
- Winter 2000: Airspade excavations



Results for cherries

- Two years after transplant, 50% of the 6” and 12” deep planted had died.
- All control cherries lived.
- No girdling root development noticed on cherries.

Results for maples

- Planting depth did not affect the short term survival of maples, but did influence the development of girdling roots.
- 4 years after transplant, control maples exhibited 14% of their root collar/trunk circumference encircled by girdling or potentially girdling roots; 6” deep had 48%; and 12” deep 71% formation of girdling or potentially girdling roots.

Results

- So, while cherries die from deep planting in the short term, maples are likely to suffer injury in the long-term from girdling root development.



Conclusion

- Results are consistent with arborists' observations that deep planting is a significant source of stress in landscape trees.



Grown to die?

Potential results

- Girdling roots
- Gradual decline
 - Secondary invasions or stresses
- Poor industry standards
- Decline of customer loyalty
- Decline of customer reinvestment issues



More tree crimes

- Planting with straps and lines intact
- Over mulching
- Topping
- Wrong plant wrong space
- Soil compaction



Tree crimes



Tree crimes



Tree crimes



Tree crimes



Tree crimes





Tree crime

Volcano mulching

- Water
- Oxygen
- Nutrients

Slide from Laurie Reid, SC Forestry
Commission; art from ISA web page

Solutions

- Urge consumers to hire certified professionals
- Become an ISA certified arborist
 - www.isa-arbor.com



Solutions

- Urge consumers to hire certified professionals
- Become an SC ELC (Environmental Landscape Certification)
 - www.sclta.com



Solutions

- Urge consumers to hire certified professionals
- Become a **CNP** (Certified Nursery Professional or **CLT** (Certified Landscape Technician)
 - www.scnla.com



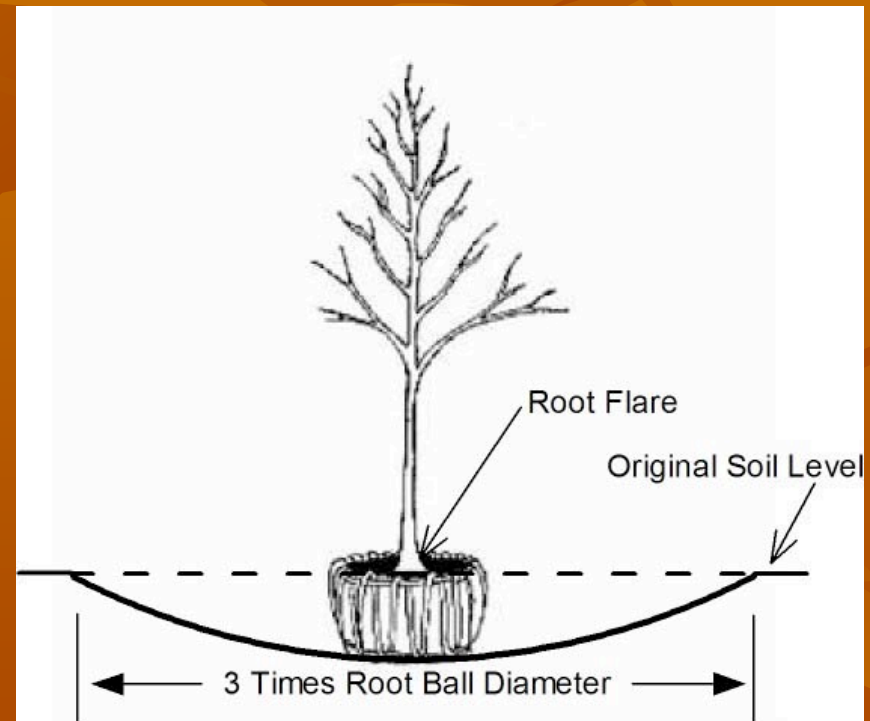
Best Management Practice-Planting

- Locate the root flare. The root flare, also called the trunk flare, is where the first main roots attach to the trunk.
- Remove excess soil to expose the root flare, as well as across the top of the entire root ball.



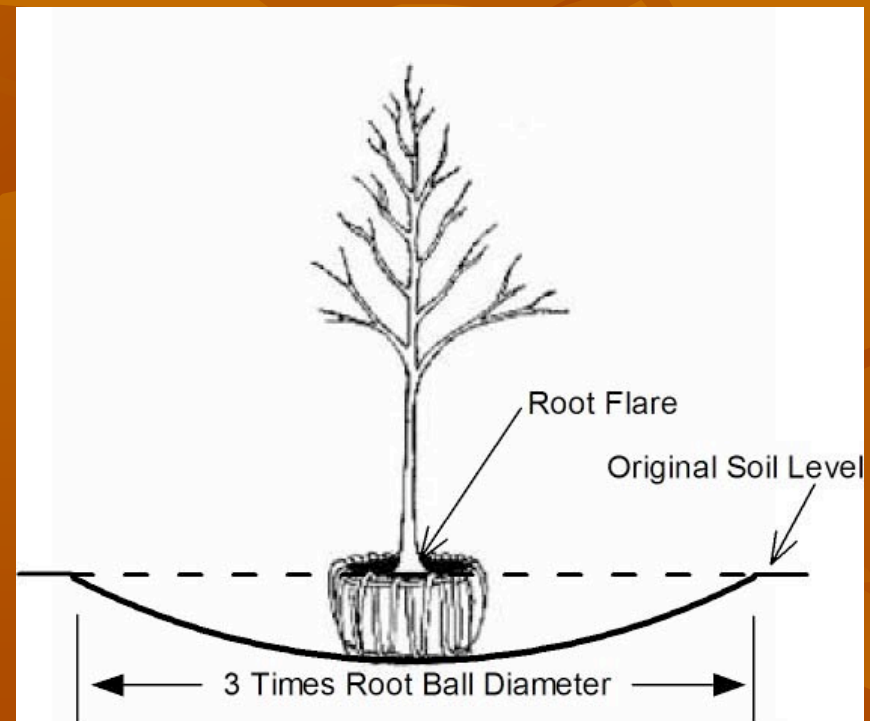
Best Management Practice-Planting

- Place the tree in the hole so that the top of the ball (root flare) is even with the surrounding soil level or an inch or so higher.
- Do not loosen the soil in the bottom of the hole, as that may cause the root ball to settle and the tree to be planted too deep.



Best Management Practice-Planting

- Remove containers, as well as ropes and straps from the base of the trunk. If planting a balled and burlapped tree, cut and remove the upper 1/3 of the wire basket and burlap wrapping.
- If synthetic or treated burlap is used, remove it completely from the root ball at time of planting.



Best Management Practice- Mulching

- Apply vegetative mulch to a minimum of 3' from the trunk to the edge of the mulch (6' across min.)
 - Modify-out to the dripline of mature trees
 - Modify-at least 12" beyond the root ball for newly planted trees
- The goal is to maximize the area of soil under mulch that the roots can penetrate
- Keep mulch 3-6" away from the trunks of mature trees.
- In wet or poorly drained sites avoid fine textured mulches-use coarse textured mulches or none at all.

Your story here



Urge everyone to

Show me your root flare!



For more information

- Environmental Landscape Specialist
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 - ellenav@clemson.edu

- SC Urban and Community Forestry Council
 - www.scurbanforestry.org