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 $O_2$ 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 “breath” (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 illinoinensis

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 Wells\(^1\), Karen Townsend\(^1\), Judy Caldwell\(^1\), Don Ham\(^2\), and Mike Sherwood\(^3\)

- \(^1\)Department of Horticulture, Clemson University
- \(^2\)Department of Forestry & Natural Resources, Clemson University
- \(^3\)Bartlett 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](http://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
  - Clemson University Extension Service
  - ellenav@clemson.edu

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