

Sustainable Landscape Tree

Ellen Vincent, Ph.D.
Environmental Landscape Specialist



11.10.2009

Sustainable defined

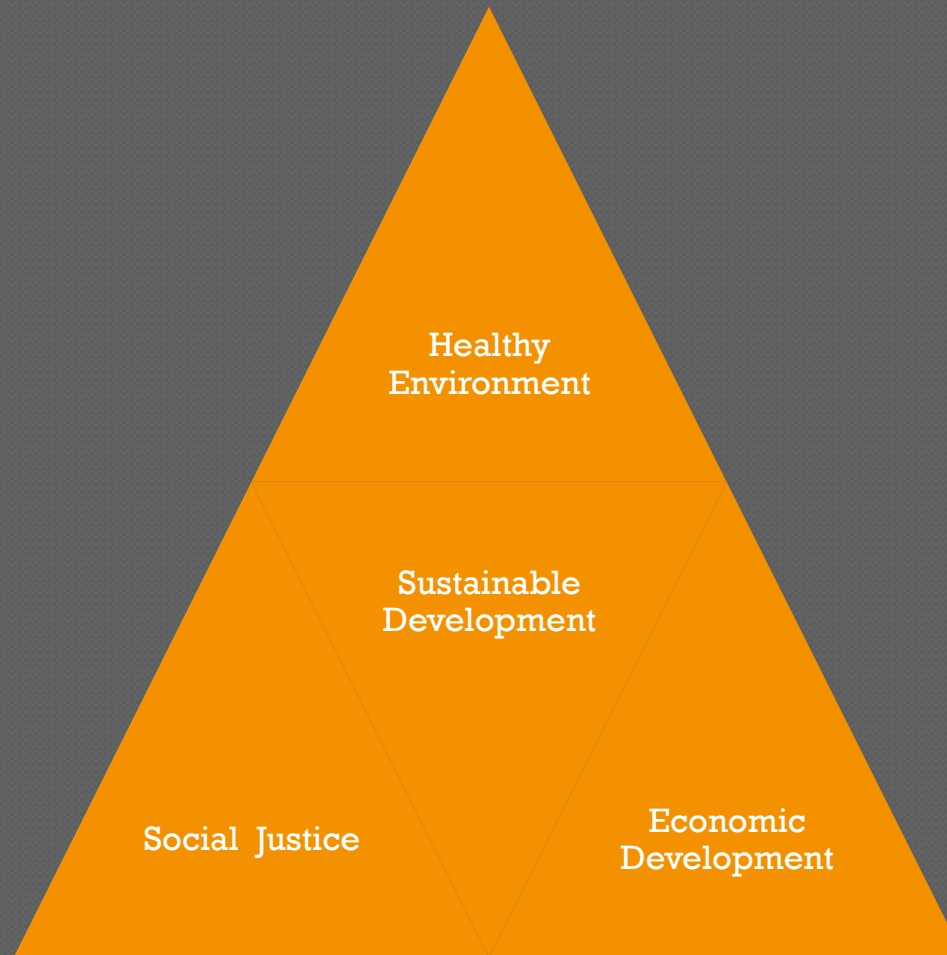
- *Sustainable development, according to the Brundtland Report, meets the needs of the present without compromising the ability of future generations to meet their own needs (1987, p. 8).*



Photo: images.google.com
kidsdreamgym.com

The World Commission on
Environment and Development.
1987. *Our Common Future*.
Oxford University Press: Oxford

Issue triad



Sustainability Steps

Soil:
Build and maintain

Site analyses:
Right tree right
place

Plant selection:
Pest resistance
Drought tolerance

Proper planting:
*Show me your root
flare!*

Maintenance:
Water
Mulch

1. Build healthy soil

- Compost reduces need for fertilizers because it produces beneficial microorganisms.
- Compost holds water in the soil.
- Runoff is minimized.



Photo:
images.google.com
www.thegreentheory.com

Maintain healthy soil

- Soil compaction can seriously damage the physical structure of fertile soil.
- Pressure (weight) is a primary cause of compaction.

Photo:

<http://www.soils.umn.edu/academics/classes/soil2125/img/7bdtrl.jpg>



Prevent compaction

Compression



Compaction



Consolidation



Photo:
images.google.com
www.thegreentheory.com

Soil compression

- Compression reduces pore spaces (macropores). Large air-filled pore spaces are crushed leading to more small water filled pores.
- Most commonly occurs in soils under wet conditions.



Photo:
images.google.com
www.thegreentheory.com

Basic soil properties

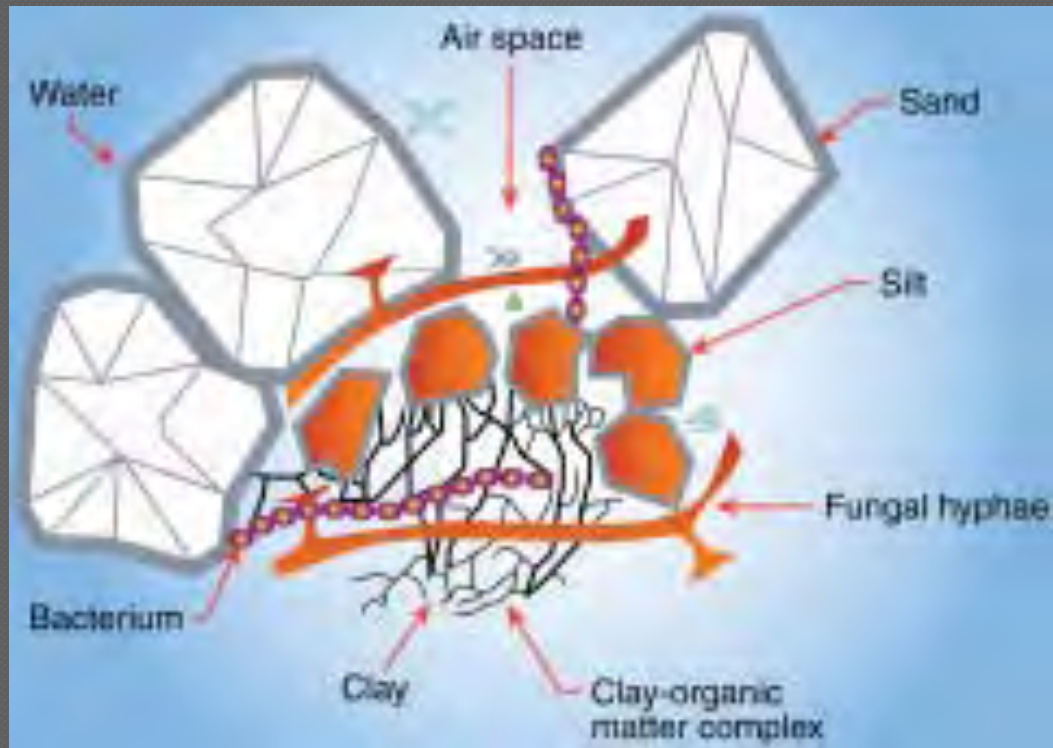


Photo: [http://soils.usda.gov/use/urban/downloads/primer\(screen\).pdf](http://soils.usda.gov/use/urban/downloads/primer(screen).pdf)

Soil compaction

- Compaction is the destruction of soil aggregates, and collapse of aeration pores.
- High moisture content facilitates compaction.

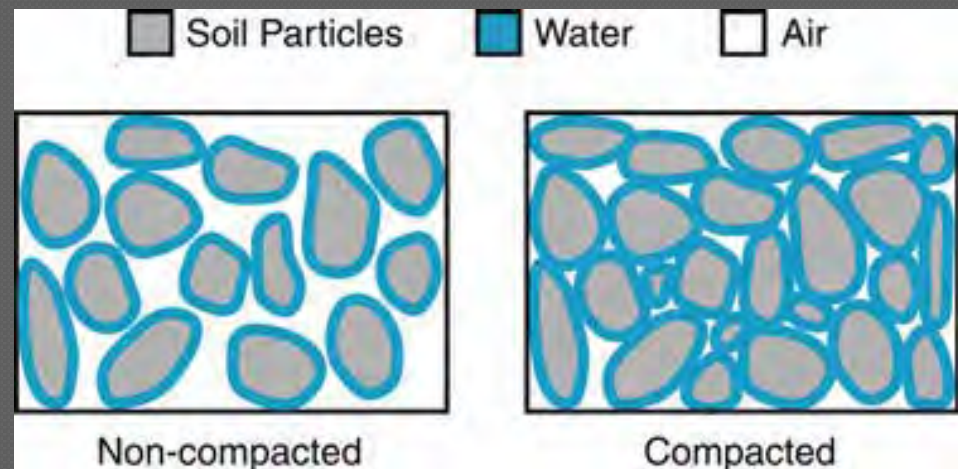
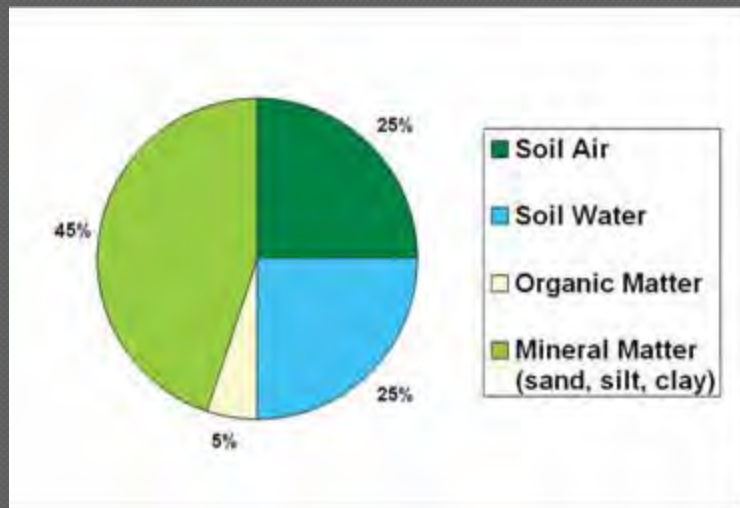


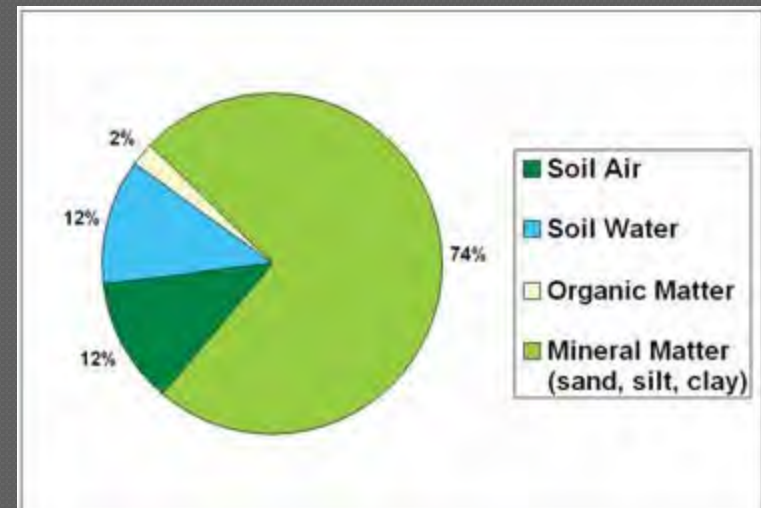
Image:

[http://soils.usda.gov/use/urban/downloads/primer\(screen\).pdf](http://soils.usda.gov/use/urban/downloads/primer(screen).pdf)

Soil compaction



Composition of a natural soil, by weight.



Composition of a compacted soil, by weight.

Images:

[http://soils.usda.gov/use/urban/downloads/primer\(screen\).pdf](http://soils.usda.gov/use/urban/downloads/primer(screen).pdf)

Maintain soil during construction

- Establish tree protection zone.
- Develop soil protection policies.
- Implement enforcement (warnings, fines).



Photo:
images.google.com
www.thegreentheory.com

Maintain soil during construction

Figure 1. CRITICAL ROOT ZONE

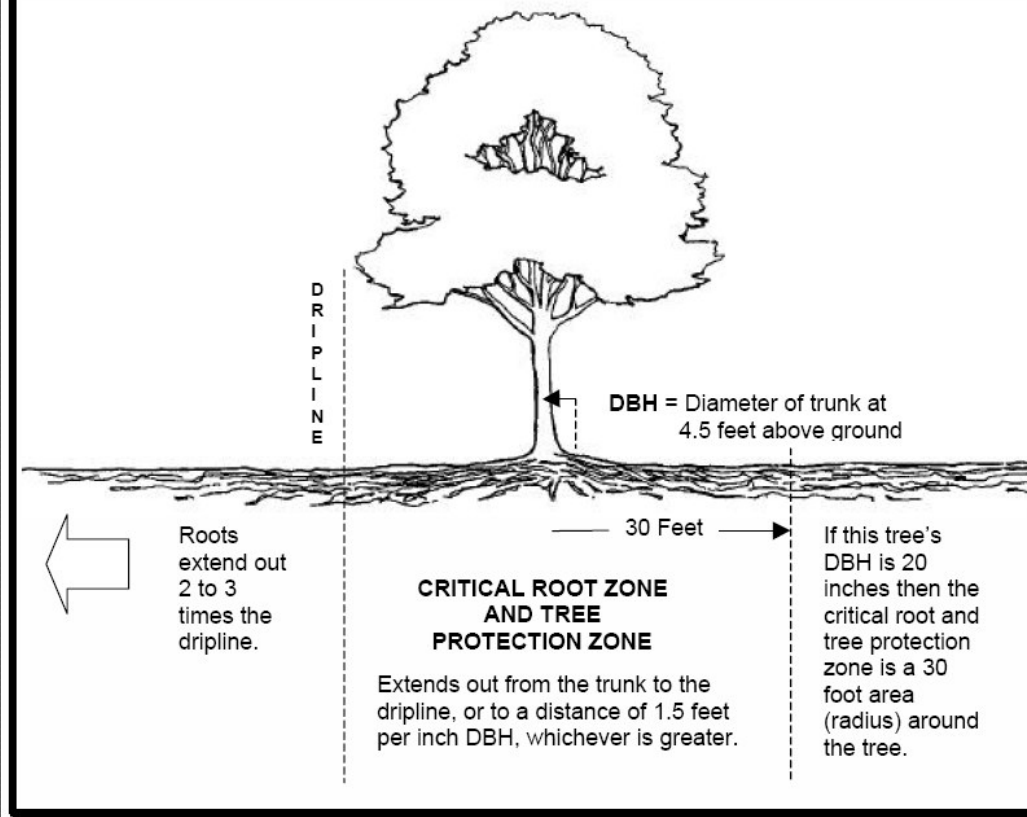


Photo:
images.google.com
www.thegreentheory.com

Maintain soil during construction



Photo: [http://soils.usda.gov/use/urban/downloads/primer\(screen\).pdf](http://soils.usda.gov/use/urban/downloads/primer(screen).pdf)



Silt fences can keep sediment from reaching streams and other water bodies.

Maintain soil during construction

When properly installed compost (filter berms and filter socks) may be more effective at controlling erosion than other technologies



Filtrexx International: Erosion Control

<http://www.epa.gov/epawaste/conserves/rrr/greenscapes/projects/filtrexx.htm>

For more information, see [Filtrexx International's Web site.](#)

2. Site analysis

Right tree right place

Perform a site analysis and determine

- Sun exposure zones
- Soil texture zones
- Water flow zones
- Trees of merit (natives, drought tolerant, pest resistant, animal habitat, size, soil stabilizers, shade, etc.)



Photo: Al Watson

Site analysis (cont.)

Right tree right place

- Locate zoning ordinances and code restrictions
- Utility conflicts
- Available space (so mature trees will not require pruning for size reduction)



Photo: Steve Jeffers

Site analysis (cont.)



Photo: Steve Jeffers

3. Plant selection

Diligent plant selection can contribute to a holistic approach to pest management

- Use IPM techniques and start with prevention.
- Prevention involves maintaining healthy soil with compost and mulch, selecting pest resistant plants, and planting them in the sun/shade and soil conditions they are best suited to.

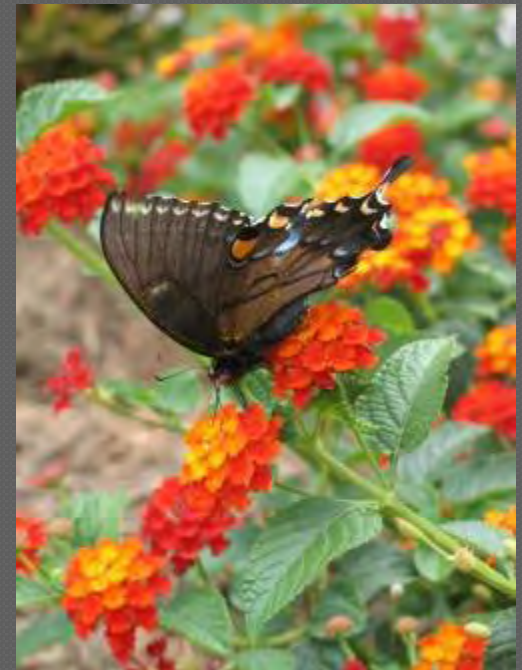


Photo: Ellen Vincent

Plant selection: Pest resistant plants

Plants that do not normally succumb to annual disease and insect infestations

Resistance does not imply immunity

Resources:

- Books
- University publications
- Botanical gardens (regional) recommendations
- Industry professional experience (regional)



Photo: Ellen Vincent

Pest resistance resources

- Tree information resources for SC
 - ISA Certified Arborists
 - SCNLA Certified Landscape Technicians
 - SCLTA Environmental Landscape Certified Professional
 - Clemson Home & Garden Information Center
- *Urban Tree Species Guide* free from SC Forestry Commission
- *Manual of Woody Landscape Plants* by Michael Dirr
- *Trees for Urban and Suburban Landscapes* by Ed Gilman



Plant selection: Drought tolerant plants

- Drought tolerance possible *once established*
- Establishment occurs when the roots grow at the same rate as they did prior to transplant.
- Trees typically take 1-5 years to establish normal growth after planting.



Photo: Ellen Vincent

Drought tolerance resources

- Xeriscape > Clemson University EC 672
[http://soils.usda.gov/use/urban/downloads/primer\(for_printing\).pdf](http://soils.usda.gov/use/urban/downloads/primer(for_printing).pdf)
[http://soils.usda.gov/use/urban/downloads/primer\(screen\).pdf](http://soils.usda.gov/use/urban/downloads/primer(screen).pdf)
- Plants that Tolerate Drought > Clemson University HGIC 1717
- <http://www.clemson.edu/extension/hgic/plants/other/landscaping/hgic1717.html>
- *Manual of Woody Landscape Plants* by Michael Dirr
- *Trees for Urban and Suburban Landscapes* by Ed Gilman



Photo: Ellen Vincent

Taxodium distichum

- Bald cypress
- Sun to part shade
- 60-80' h x 25-30' w
- Feathery foliage
- Deciduous conifer
- Fast grower
- Drought & wet tolerant; forms 'knees'
- Tolerates compaction
- Zones 4-11
- Native



Ginkgo biloba

- Ginkgo
- Sun to part shade
- 50-75' h x 50-60' w
- Fan-like foliage
- Slow grower
- Deciduous
- Soil texture, pH, & drought tolerant once established
- Bright yellow fall color
- Zones 4-8
- Asia



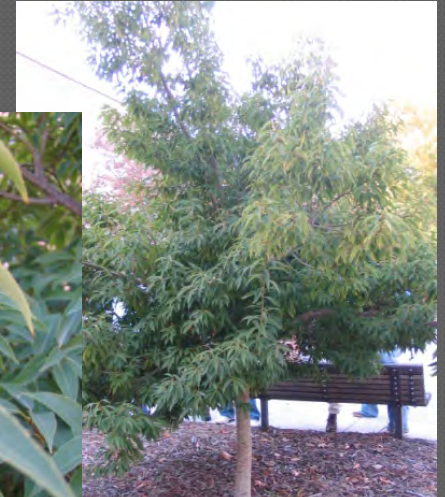
Ulmus parvifolia 'Drake'

- Lacebark elm
- Sun to part shade
- 40-50' h x 35-50' w
- Fast grower
- Deciduous
- Soil adaptable, drought tolerant once established
- Exfoliating thin bark
- Zones 5-9
- Urban tolerant
- Asia



Quercus myrsinifolia

- Chinese evergreen oak
- Sun to part shade
- 20-40' h x 20-30' w
- Slow grower
- Evergreen
- Soil adaptable, drought tolerant once established
- Smooth bark, beech-like
- Zones 7-9
- New foliage purple-bronze
- China



4. Proper planting: Tree planting BMPs

Show me your root flare!

- 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.



Root flares

Carya illinoensis



Metasequoia glyptostoboides



Quercus nigra



Root flares

- 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.



Deep planting: Epidemic problem!

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



Deep planting problem!

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



Deep planting problem!

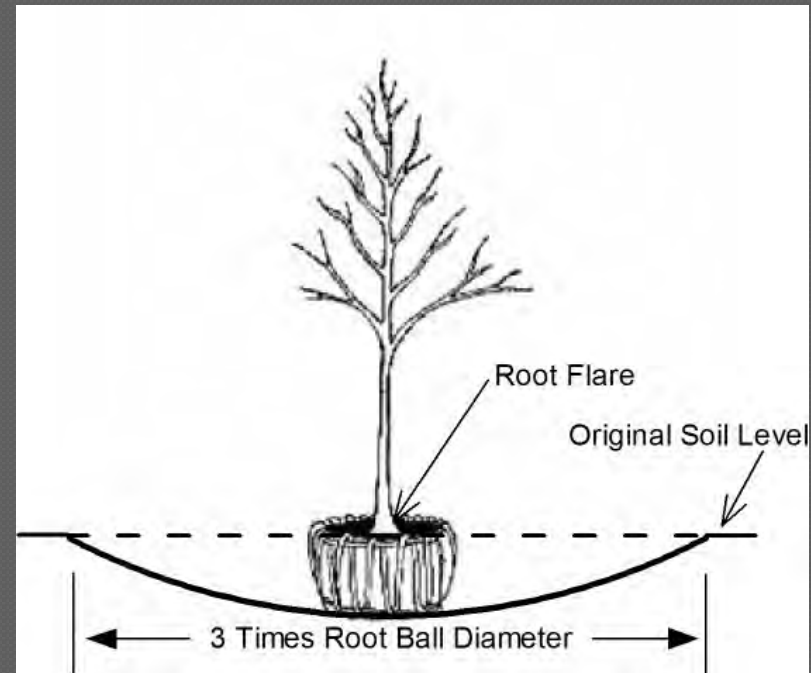
- Bark rot and root decline result in reduced translocation of food from the leaves to the roots.
- With a smaller root system less water is taken up, resulting in leaf drop and dieback.
- Resulting plant death is often blamed on secondary boring insects or canker fungi that attacks stressed plants.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



8/12/10

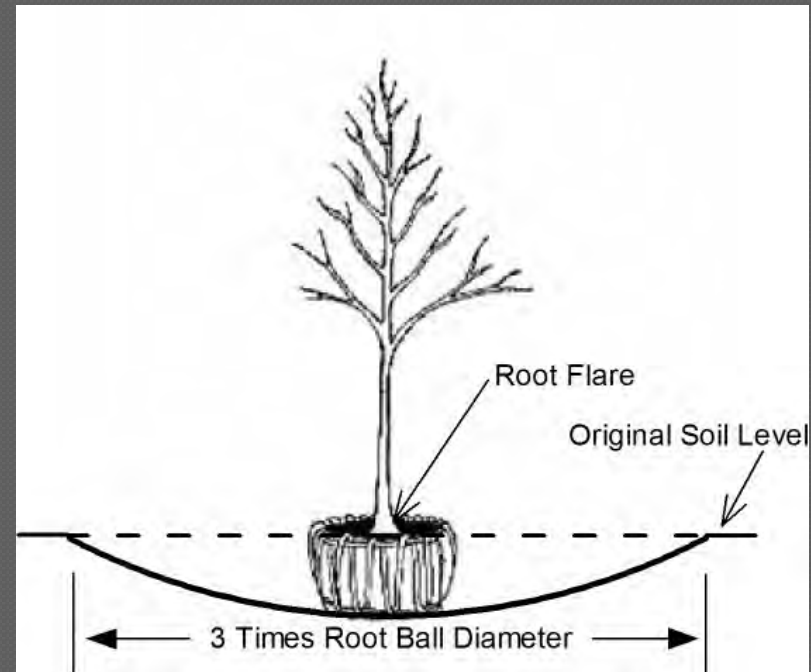
Proper planting: Tree planting BMPs

- 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.



Proper planting: Tree planting BMPs

- 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.



Show me your root flare!



Proper planting: Mulch BMPs

- Apply vegetative mulch
 - Out to the dripline of mature trees
 - 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 trees.
- In wet or poorly drained sites avoid fine textured mulches-use coarse textured mulches or none at all.



5. Initial maintenance

Scout for moisture levels, mulch levels, plant health levels

- Prevention involves identifying problems before you “spray, squash, or stomp.”
- Many insects are beneficial and some damage to landscape plants may be needed to encourage natural predators.
- Use traps and barriers and plant replacement before using pesticides.



Photo:
images.google.com
www.ent.iastate.edu

Initial maintenance (cont.)

Practice smart watering

- Water deeply but infrequently.
- Water only until plants are established (2-5 years for trees)
- Add compost to the soil
- Select drought tolerant plants
- Use drip system or soaker hoses instead of sprinklers to save water and \$.
- Water in early a.m. to reduce evaporation and plant diseases.
- Install permeable pavement to allow water to soak into the ground.



1



2

1: www.rittenhouse.ca/asp/Product.asp?PG=1655

2: www.ne-design.net/

Initial maintenance (cont.)

Practice smart watering (cont.)

- Connect rain barrels to downspouts



Photo: Ellen Vincent

Initial maintenance (cont.)

Maintain mulch levels

- Replace when needed



Photo: Ellen Vincent

Sustainability is not new

- *“The Commission has completed its work. We call for a common endeavor and for new norms of behavior at all levels and in the interests of all. The changes in attitudes, in social values, and in aspirations that the report urges will depend on vast campaigns of education, debate, and public participation” (WCED 1987, p. xiv).*

Resources

- Urban Soil Primer >USDA
[http://soils.usda.gov/use/urban/downloads/primer\(for_printing\).pdf](http://soils.usda.gov/use/urban/downloads/primer(for_printing).pdf)
[http://soils.usda.gov/use/urban/downloads/primer\(screen\).pdf](http://soils.usda.gov/use/urban/downloads/primer(screen).pdf)
- Sustainable Sites Initiative Guidelines and Benchmarks Draft 2008 >American Society of Landscape Architects, Lady Bird Johnson Wildflower Center, University of Texas at Austin, United States Botanic Garden
http://www.sustainablesites.org/report/SSI_Guidelines_Draft_2008.pdf
- GreenScapes >EPA
<http://www.epa.gov/epawaste/conserv/rrr/greenscapes/index.htm>
- *Urban Tree Species Guide* >SC Forestry Commission
- *Manual of Woody Landscape Plants* by Michael Dirr
- *Trees for Urban and Suburban Landscapes* by Ed Gillman

Resources (cont.)

- *Xeriscape* >Clemson University EC 672
http://www.clemson.edu/extension/hgic/plants/other/landscaping/ec672_xeriscape.pdf
- *Plants that Tolerate Drought* >Clemson University HGIC 1717
<http://www.clemson.edu/extension/hgic/plants/other/landscaping/hgic1717.html>
- Tree Selection for Drought Resistance >Univ. of GA
<http://warnell.forestry.uga.edu/service/library/for99-008/for99-008.pdf>

Thank you

Ellen Vincent, Ph.D.
Environmental Landscape Specialist
Department of Environmental Horticulture
E-143 Poole Agriculture Center Box 340319
Clemson, SC 29634-0319

864.656.1342 office
803.243.8888 cell
864.656.4960 FAX

ellenav@clemson.edu

