

At the GUFC Quarterly meeting (April 14, 2005), Jim Urban gave a presentation that focused on healthy soils.

Here are some bullet points from that meeting that may be of interest to you:

- Know the soils you are working with: development history, soil survey, aerial photography, mapping of houses done every 20 years by insurance companies.
- What will the soil look like when you are through with the site, before the landscape is installed?
- Texture is important to know for native soils and disturbed soils. For native soils, may only need to know the % sand, silt, clay, and gravel.
- If soil is disturbed, need to know more, especially need information about the sand. There is a substantial difference between very fine and very coarse sands, and the fineness relates to the compatibility of the soil.
- If buying soil, need to know the sand fractions (golf course soil testing labs can provide this).
- Clay particles bond to each other loosely, and function as a larger aggregate. If wet, it's easy to break the bonds, which changes (damages) soil structure.'
- Soil structure relates to how soil particles break apart and fracture.
- Water and air movement through soils is based on texture and structure.
- The more homogeneous the soil, the faster the movement of water & air.
- At soil interfaces, movement becomes horizontal. There is usually a distinct color change at this point.
- The ability of a soil probe to penetrate depends upon moisture.
- Odor and color of a soil are important.
- The greater the carbon, organic matter, and oxygen, the browner the soil.
- The greater the sulfur, the lower the oxygen, the lower the drainage, and the lower the organic matter, the grayer the soil.
- A bright color (yellow, red, orange) with no odor indicates low organics, but good drainage.
- "The Soul of Soil" is a good introductory look at urban soils.
- Soil chemistry can be regulated by organic matter.
- An increase in organic matter on top of the soil increases the soil biology and produces better availability of chemicals to the plant.
- Really don't have to worry about N, P, K when organic matter is present in good quantities.
- pH is the most important soil factor, and it is very difficult to change pH.
- Group plants around the pH you have.
- Building materials are lime based (basic/alkaline) in urban areas.
- Cornell University has a simple soil pH test kit that they sell and is recommended.
- Compaction, organic matter, and soil biology are the most important factors in keeping trees (plants) healthy.
- Tree space: in bad soil, spacing doesn't matter; in good soil, once canopies grow together 1/3 of trees will die every 10 years to increase room for non-suppressed canopy.
- Woody, permanent roots are at a depth where moisture is consistently available. Feeder roots grow up from woody roots and are seasonal.
- Striker roots can grow deeper down below the main structural roots, accessing a deeper moisture layer.

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A presentation by James R. Urban, FASLA, in Atlanta, Georgia

- Crowns of trees never intersect or overlap--they can meet.
- Spacing depends upon the use of the area. 50-60 feet apart will allow for full crown development (large maturing trees).
- The closer trees are planted, the more they create favorable microclimate conditions for themselves and other plants. Early survival may be better.
- Less than 25 feet is too close, 50 feet on center is good for long-term development.
- 30-35 feet is recommended for urban streets and parking lots.
- Exudates may move from the leaves to the roots and into the soil to a much greater degree than was originally thought.
- Previously, it was thought that 10-15% of carbohydrates are exuded into the soil, and feed the tree (Shigo). There is some thought now that, for some species, up to 20-50% of the total carbohydrates produced by the tree are exuded into the surrounding soil.

10 Strategies Related to Soil

SOIL

- Plant easy places first. Make bigger holes.
- Preserve existing soil, mulch, etc. Removing, stockpiling, & re-spreading soil is only a last resort, however.
- Fix soil and drainage. When altering native soils, always consider designing and installing a sub-surface drainage system from the beginning. You can always delete it from the plans.

TREE

- Respect the base of the tree. Draw the zone of rapid taper (6-8 feet around the trunk) on the plans.
- Provide root space under paving, using:
 - a) root paths (\$1,000-\$2,000 per tree),
 - b) root trenches (\$3,000-\$4,000 per tree),
 - c) structural soils (\$10,000-\$15,000 per tree),
 - d) columns w/bridged pavement (\$20,000-25,000/tree),
 - e) Amsterdam soil, sand based, very dry, requires irrigation.
- Plant the right tree in the right place. Need diversity as a tool to combat invasive pests. A lot of cultivars are being used nationwide. They have more regional requirements than we recognize.

MANAGEMENT

- Balance the budget for soil. Double the planting budget to include the costs of managing the soil resource.
- Soil based construction details. Have separate soils plan in the construction plans along with drainages, details.
- Science based oversight on construction sites. Need to be on the job looking at the soils, materials, etc.
- Design for maintenance. Need access to soil to add organic matter, resist compaction, better tree selection (eliminate co-dominant leaders), and avoid unmaintainable projects. Avoid deep planting and resulting stem encircling and girdling roots.

And finally...

Tree grates are expensive and a waste of money. Put more money into the soil!

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