deeproot

BARTLETT LABORATORIES FIELD TRIALS

Summary – Winter 2015

Study Summary

The purpose of the study, which is being conducted by Dr. Tom Smiley and The Bartlett Tree Laboratory, is to test the effectiveness of different load-bearing soil options for tree growth. In July 2014, six different treatments were installed:

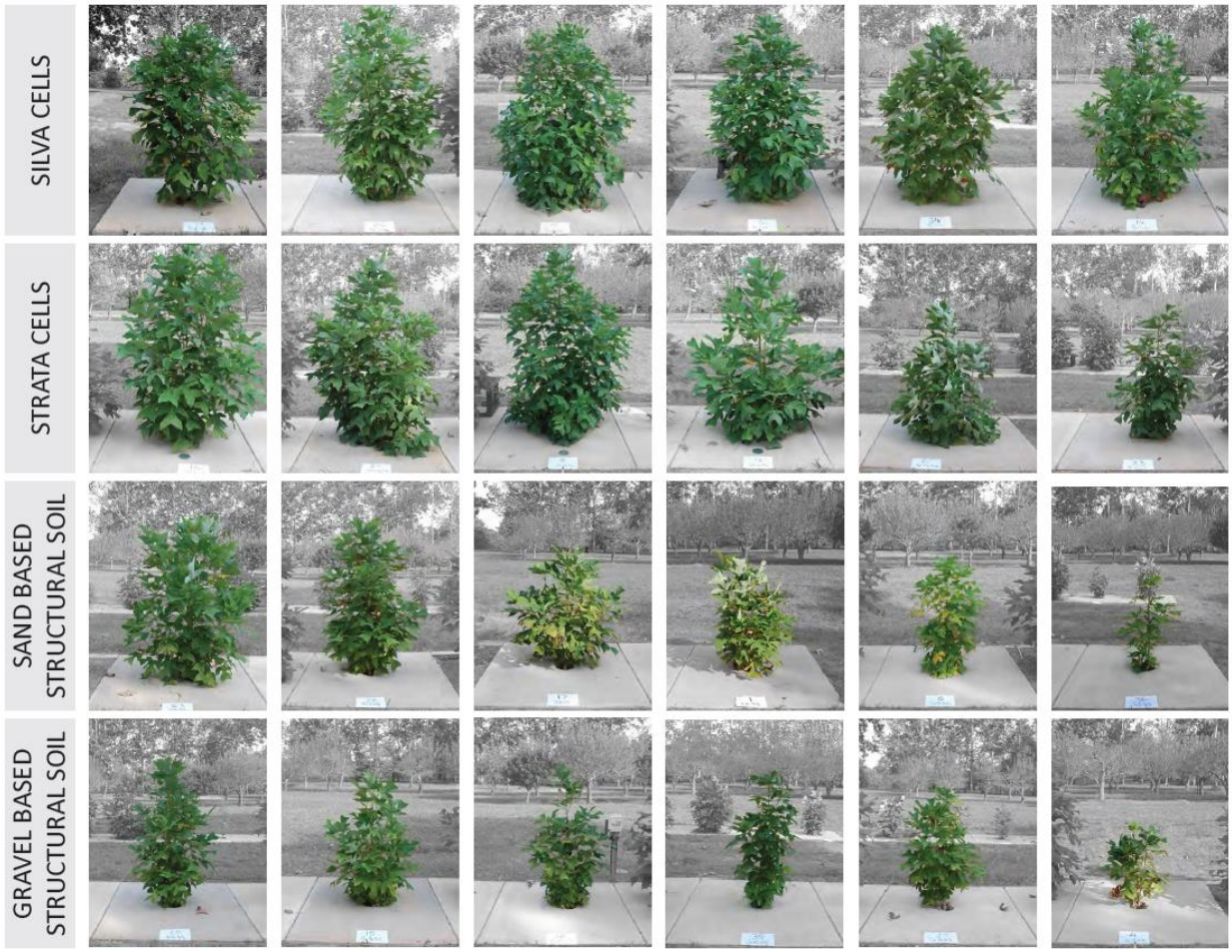
1. Control – the soil mix was compacted to 80% Proctor.
2. Compacted control – the soil mix was compacted to 95% Proctor to meet current standards for compaction under streets and structures typically found in most cities.
3. Silva Cells – the soil mix was compacted to 80% Proctor within the Silva Cell structure.
4. Strata Cells – the soil mix was installed but the soil density was not tested.
5. Sand Based Structural Soil (SBSS) – the soil mix was very similar to Amsterdam soil. The basic formula was 4 parts medium to coarse (concrete) sand, 1 part topsoil loam and 1.5 parts mature compost. It was compacted to 94 – 96% Proctor.
6. CU Structural Soil – a gravel based mix was defined and compacted according to specifications of Amereq, Inc. or Cornell University publications. The basic mix was 80% #5 stone, 20% soil mix and 0.003% hydrogel. The mix was compacted to 95% Proctor.

Tulip poplar trees *(Liriodendron tulipifera)* were planted in a 90 foot long plot that simulated a city sidewalk. The trench was lined with Typar fabric to contain roots within the specified growing condition, and wood barriers were constructed at five foot intervals to hold the fabric and separate each of the plots.





Preliminary Study Results



In September 2015, tree data was collected and tree height, diameter, condition, dieback, and leaf color were all measured. Leaf moisture and chlorophyll fluorescence were also determined. As depicted in the photographs above, the initial results show significantly stronger performance by soil cells, with Silva Cells showing the most consistent plant response across all six plots. This research further confirms that trees grow best in (1) loamy soils with intact structure, and (2) in rooting areas that are open both vertically and horizontally.

According to James Urban, FASLA, “Dr. Smiley's work is a significant step in understanding the relationships of trees, soils, and pavements. Other areas of design that are equally important to successful trees that arborists and designers need to understand include, providing the right spacing between trees for a reasonable canopy growth; harvesting rain water into the root zone under the pavement; and assuring that trees are purchased with proper root systems. Good arborists can work with the trees natural functions and still make beautiful places that respect trees.”

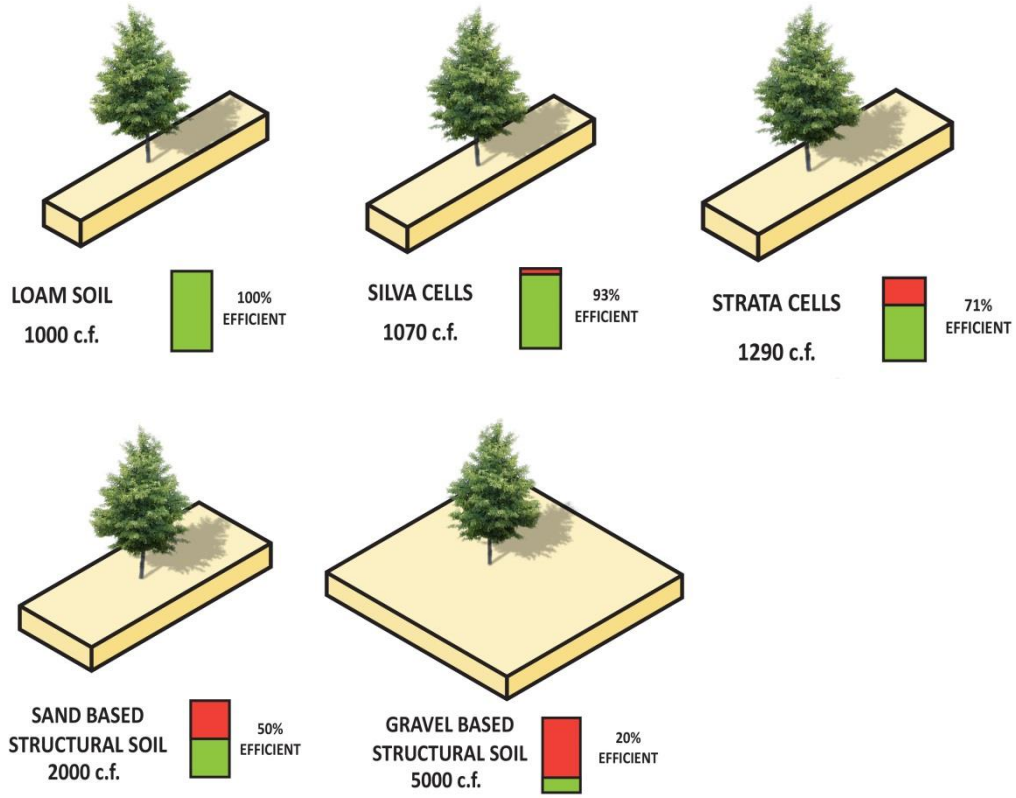
We know that tree-friendly urban design is possible, yet we still struggle to get designers, owners, and builders to change their approach. We hope Dr. Smiley’s research will continue to

push Urban Forestry in the direction of providing city trees with what they need to grow, mature, and provide meaningful environmental services.

An interim report by Dr. Smiley is expected this winter, and a full review of the study will be published when it's completed.

Net Available Soil

These preliminary results remind us that soil volume calculations should be based on efficiency – or net available soil. The following is a reasonable expectation of efficiency based on manufacturer claims and field observations.



References

Dr. Tom Smiley, Bartlett Tree Laboratory – personal communication
James Urban, FASLA, Urban Trees + Soils – personal communication
"A Better Way to Grow City Trees," by Len Phillips.