

Soil Rehabilitation Experiment Site at Kentland Farm, Virginia Tech

Center for Sustainable Urban Landscapes (CSUL)

Current Objectives:

Can we restore valuable soil functions to damaged urban soils?

How will each soil treatment influence tree growth and function?

Soil treatments (6 reps total):

Minimum Effort (ME)
Enhanced Topsoil (ET)
Profile Rebuilding (PR)
Control- Undisturbed (UN)

Project participants:

Rachel Layman, Horticulture
J. Roger Harris, Horticulture
Susan D. Day, Forestry
P. Eric Wiseman, Forestry
W. Lee Daniels, Crop and Soil
Environmental Sciences



The original site before soil treatments were installed (facing southwest).



The research site after all soil treatments were installed (October 2007).

Introduction: Soils in heavily developed areas are usually compacted and lack organic material because of construction activities such as heavy equipment use and grading. These unfavorable soil conditions result in decreased tree health and life expectancy. Since there is an increased need for developing urban tree canopy, more information pertaining to soil rehabilitation recommendations for urban tree growth is necessary.

The Soil Rehabilitation Experiment Site (SRES) is currently being used to evaluate the effects of several soil improvement practices on soil physical properties and tree establishment. We hope to determine the most effective and practical treatment necessary for optimal tree growth.

Future: This research site will also be used to determine the effects of mechanical loosening and incorporation of organic matter on the soils' ability to provide ecosystem services such as carbon sequestration, vegetation support, rainfall interception, and groundwater recharge.

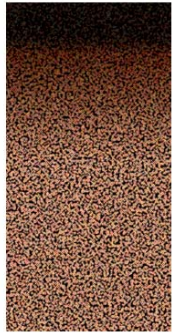


To learn more about soil rehabilitation, contact Rachel Layman (ralayman@vt.edu).



This project is funded in part by the Tree Research and Education Endowment Fund

SRES Soil Treatment Profiles:



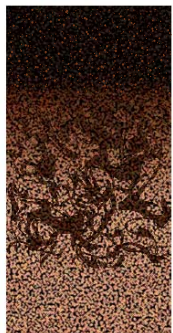
Topsoil



Rototilled Topsoil

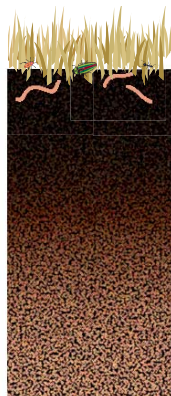
The Minimum Effort (ME) treatment represents a low effort level of rehabilitation of compacted and low organic soils. It is a common practice among many contractors and landscapers.

Enhanced Topsoil (ET) treatment represents a moderate level of soil rehabilitation. Topsoil is rototilled to scarify the interface between the topsoil and existing compacted soil.



Rototilled Topsoil

"Scoop and Dump" Compost



Undisturbed A Horizon

Profile Rebuilding (PR) treatment is the most intensive treatment. This treatment involves the highest degree of rehabilitation and is intended to both address the low organic matter of the compacted soil as well as the high root limiting density.

The Undisturbed (UN) treatment was not graded or compacted. Existing vegetation was sprayed with herbicide.

Trees used in this study:

Accolade Elm (*Ulmus 'Accolade'*)

Red Maple (*Acer rubrum*)

Swamp White Oak (*Quercus bicolor*)

First Lady Cherry (*Prunus 'First Lady'*)

Bur Oak (*Quercus macrocarpa*)

Tree measurements:

Leaf photosynthesis

Water potential

Survival

Tree height

Trunk diameter

Root length and distribution

Soil measurements:

Bulk density

Organic matter

C:N ratio

pH

Particle size analysis

Soil respiration

CSUL is a cooperative research effort affiliated with the Department of Horticulture (Sustainable Landscapes) and the Department of Forestry (Urban Forestry) at Virginia Tech in Blacksburg, VA.

For more information on other CSUL projects, contact Susan Day, sdd@vt.edu

